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## Der Tochttereffekt: Beeinflusst das Aufziehen von Töchtern geschlechterbezogene Einstellungen von Vätern am Arbeitsplatz?

## The Daughter Effect: Does Raising Daughters Influence Fathers' Gender-Related Attitudes in the Workplace?

Aline Isabelle Lanzrath

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### Abstract

Studies published under the term 'daughter effect' suggest that men's gender attitudes develop in a more egalitarian direction as a result of fathering a daughter. In a study with 184 working fathers, the expected daughter effect can only be demonstrated for fathers with a close father-child relationship and only at the level of explicit attitudes. The results question a general daughter effect and argue for the need to consider moderating variables. In a second study, 232 participants were randomly assigned to one of three experimental conditions (perspective-taking: daughter vs. son vs. control group) to test whether an experimental production of the daughter effect is possible through a mental perspective-taking manipulation. Consistent with the hypotheses, participants who took the perspective of an imagined daughter showed more egalitarian gender attitudes. Theoretical implications regarding the underlying theoretical mechanism and practical implications for developing diversity training in the corporate context are discussed.

### Zusammenfassung

Unter dem Begriff "Tochttereffekt" veröffentlichte Forschungsarbeiten legen nahe, dass sich geschlechterbezogene Einstellungen von Männern durch die Vaterschaft einer Tochter in eine egalitäre Richtung entwickeln. In einer Studie mit 184 berufstätigen Vätern kann der erwartete Tochttereffekt nur für Väter mit einer engen Vater-Kind Beziehung und ausschließlich auf einer expliziten Einstellungsebene nachgewiesen werden. Die Ergebnisse stellen einen allgemeinen Tochttereffekt in Frage und sprechen für die Notwendigkeit der Berücksichtigung moderierender Variablen. Um zu prüfen, ob eine experimentelle Herstellung des Tochttereffekts durch eine mentale Perspektivenübernahmemanipulation möglich ist, werden in einer zweiten Studie 232 Teilnehmende randomisiert einer von drei experimentellen Bedingungen (Perspektivenübernahme: Tochter vs. Sohn vs. Kontrollgruppe) zugeteilt. Konsistent zu den Annahmen zeigen Teilnehmende, die sich in die Perspektive einer vorgestellten Tochter versetzt hatten, egalitäre geschlechterbezogene Einstellungen. Theoretische Implikationen bezüglich des zu Grunde liegenden Wirkmechanismus sowie praktische Implikationen für die Entwicklung von Diversity-Trainings im Unternehmenskontext werden diskutiert.

**Keywords:** daughter effect; diversity; gender stereotypes; perspective-taking

### 1. Einleitung

*„Ich möchte sicherstellen, dass meine Töchter die gleichen Chancen haben wie Männer. Ich möchte nicht, dass sie für den gleichen Job, den ein Mann ausübt, schlechter bezahlt werden“*

Mit diesem Zitat rief Barack Obama im Jahre 2014 zu einer stärkeren Chancengleichheit und geschlechterfairen Bezahlung von Frauen und Männern am Arbeitsplatz auf (Jones, 2014). Als erster US-amerikanischer Präsident engagier-

te sich Obama damit aktiv für die Gleichberechtigung und geschlechtergerechte Bezahlung von Frauen am Arbeitsplatz (Kuhn, 2014). Selbst ist Obama Vater zweier Töchter. Eine Reihe unter dem Begriff *Daughter Effect* (zu Deutsch: *Tochtereffekt*) veröffentlichte Studien legten nahe, dass ein Zusammenhang zwischen den egalitären geschlechterbezogenen Einstellungen des ehemaligen US-Präsidenten und der Vaterschaft zweier Töchter bestehen könnte. So konnte gezeigt werden, dass Väter von Töchtern (im Vergleich zu Vätern ohne Töchter) über feministischere Einstellungen verfügen (Warner, 1991), fortschrittlichere Geschlechterideologien entwickeln (Shafer & Malhotra, 2011) und stärker politische Kampagnen befürworten, die Geschlechterfairness fordern (Warner & Steel, 1999). Andere Studien scheiterten hingegen daran, einen Tochtereffekt nachzuweisen (z.B. Lee und Conley, 2016) oder fanden diesen ausschließlich unter Berücksichtigung der Geburtenreihenfolge der Kinder, sprich ausschließlich bei Vergleich von Vätern erstgeborener Töchter und Vätern erstgeborener Söhne (z.B. Sharrow et al., 2018).

Während der Einfluss der Vaterschaft einer Tochter auf Einstellungen und Verhaltensweisen in der Politik (z.B. Washington, 2008) und vor Gericht (z.B. Glynn und Sen, 2015) wiederholt geprüft wurde, ist der Tochtereffekt in einem beruflichen Kontext noch recht unerforscht. Eine der wenigen Ausnahmen stellt eine Studie von Gompers und Wang (2017) dar, im Rahmen derer ein signifikanter Zusammenhang zwischen der Rekrutierung von Frauen und der Vaterschaft einer Tochter nachgewiesen werden konnte. So ist die Wahrscheinlichkeit der Neuanstellung von Frauen in Firmen, in denen die *Senior Partner* Väter von Töchtern sind, signifikant erhöht. Doch wie ist dieser Zusammenhang zu erklären? Zwar führten die Forscher post hoc eine Reduktion bestehender Geschlechterstereotype im beruflichen Kontext als möglichen vermittelnden Mechanismus an, eine Prüfung dieser Hypothese fand jedoch nicht statt und steht daher im Zentrum der vorliegenden Arbeit. Diese gliedert sich in zwei verschiedene Studien auf und liefert vier zentrale Kontributionen zur bisherigen Forschung:

- (1) Aufbauend auf der Studie von Gompers und Wang (2017) prüft die erste Studie erstmalig den angenommenen Zusammenhang zwischen der Vaterschaft einer (erstgeborenen) Tochter und egalitäreren geschlechterbezogenen Einstellungen am Arbeitsplatz und widmet sich somit einer hochaktuellen Thematik. Meines besten Wissens handelt es sich dabei um die erste Studie, die einen solchen Zusammenhang mit einer repräsentativen deutschen Stichprobe berufstätiger Väter untersucht. Methodische Schwächen bisheriger Arbeiten, wie etwa die mangelnde Berücksichtigung der Geburtenreihenfolge der Kinder, werden dabei durch Verbesserungen im Studiendesign adressiert. Eine weitere zentrale Erweiterung stellt die Kombination expliziter und impliziter Verfahren zur Einstellungsmessung in der Erforschung des Tochtereffekts dar.
- (2) Vor dem Hintergrund der gemischten empirischen Befunde besteht eine weitere zentrale Kontribution in der systematischen Untersuchung bisher unzureichend berücksichtigter Charakteristika der Familienstruktur, wie beispielsweise der Qualität der sozialen Vater-Kind Beziehung. Dies ist aus zwei Gründen bedeutsam: Erstens bietet die Analyse Möglichkeiten, Inkonsistenzen in bisherigen Forschungsarbeiten zu erklären und liefert somit Rückschlüsse bezüglich der Allgemeingültigkeit und Bandbreite des untersuchten Phänomens. Zweitens trägt die Analyse zur Identifikation des zu Grunde liegenden Wirkmechanismus bei, dessen Untersuchung im Fokus der zweiten Studie steht.
- (3) Eine zentrale Kontribution der zweiten Studie besteht somit in der Entwicklung eines besseren Verständnisses für die, dem Effekt zu Grunde liegenden, mentalen Prozesse und somit einer stärkeren theoretischen Fundierung des Tochtereffekts. Aus etablierten psychologischen Theorien erfolgt die Ableitung möglicher Wirkmechanismen, welche im theoretischen Teil der Arbeit detailliert vorgestellt werden. Der Fokus liegt dabei auf dem Mechanismus der *Perspektivenübernahme*, welcher in der vorliegenden Arbeit als zentraler Wirkmechanismus angenommen wird. Grundannahme des Ansatzes ist, dass es Vätern von Töchtern leichter fallen sollte, sich in die Perspektive der Tochter (und somit einer Frau) in der noch immer männerdominierten Arbeitswelt zu versetzen. Die geförderte Perspektivenübernahme sollte dabei mit positiveren Einstellungen gegenüber Frauen in Führungspositionen sowie einer stärkeren Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz einhergehen. Nimmt man die geförderte Perspektivenübernahme als zentralen Wirkmechanismus an, sollte eine mentale Simulation, welche Teilnehmende instruiert, sich in die Perspektive ihrer (vorgestellten) Tochter zu versetzen, ebenfalls zu egalitäreren geschlechterbezogenen Einstellungen führen. Ziel der zweiten Studie besteht somit in der Prüfung, ob eine experimentelle Herstellung des Tochtereffekts durch eine entsprechende mentale Perspektivenübernahmanipulation möglich ist.
- (4) Die Entwicklung eines besseren Verständnisses für den zu Grunde liegenden Wirkmechanismus ist nicht nur von hoher theoretischer, sondern auch von hoher praktischer Relevanz. So ergeben sich zentrale Implikationen für die Entwicklung von *Diversity*-Trainings am Arbeitsplatz, die eine Stereotypreduktion zum Ziel haben. Die Stärken eines auf dem Mechanismus der Perspektivenübernahme aufbauenden Trainings liegen dabei in der theoretischen Fundierung des Trainingskonzeptes sowie in der ökonomischen Durchführbarkeit.

### 1.1. Frauen in Führungspositionen

Trotz zahlreicher Versuche in den vergangenen Jahren die Chancengleichheit und Geschlechterparität von Frauen und Männern in Führungspositionen zu fördern, reflektieren aktuelle Statistiken noch immer eine Unterrepräsentation

von Frauen in hohen Management-Positionen (Hoobler et al., 2011; Weitz, 2016). Dabei sinkt der Frauenanteil substantiell mit steigender Hierarchieebene. So liegt der Frauenanteil in Führungspositionen insgesamt noch bei 29%, der Anteil der Frauen in Vorständen der Top 200 Unternehmen jedoch nur bei 8% (Holst & Wrohlich, 2018). Zudem lassen sich noch immer bedeutsame Unterschiede in den Gehältern weiblicher und männlicher Mitarbeitender feststellen (engl.: *Gender Pay Gap*), welche auch noch nach Kontrolle für arbeitsplatzbezogene Unterschiede (z.B. Branche, Arbeitszeit) nachweisbar sind (Geisberger & Glaser, 2014). Noch immer sind Frauen folglich in hohen Führungspositionen unterrepräsentiert und werden für vergleichbare Tätigkeiten schlechter bezahlt (Holst & Friedrich, 2017). Doch woran liegt das? Mögliche Gründe werden sowohl in der Wirtschaft als auch in den Medien derzeit intensiv diskutiert. Konsens wissenschaftlicher Forschungsergebnisse ist, dass der Minderheiten-Status von Frauen in Führungspositionen multikausal bedingt ist (Kaup, 2015). Im Folgenden sollen dabei Gründe auf Ebene der *Person*, der *Organisation* und der *Gesellschaft* diskutiert werden (vgl. Peus und Welpe, 2011).

Forschungsarbeiten zeigten, dass die primäre Suche von Faktoren auf Ebene der Person - sprich der Frauen selbst - wie etwa eine geringere Qualifikation oder Karrieremotivation weiblicher Mitarbeitender unzureichend ist (vgl. Wunderer und Dick, 1997). So sind derzeit mehr als die Hälfte aller Universitäts-Absolvierender weiblich und weisen vergleichbare oder bessere Studienabschlüsse als ihre männlichen Kommilitonen auf (Statistisches Bundesamt, 2019a). Ebenso ließen sich keine wesentlichen Unterschiede zwischen Männern und Frauen in Bezug auf Kreativität, Problemlösen, Intelligenz und Erinnerungsvermögen nachweisen (Matlin, 2004). Auch häufig zur Erklärung herangezogene Motivationsunterschiede konnten empirischen Prüfungen nicht standhalten: So zeigten Studien, dass Frauen eine mit Männern vergleichbare Berufsorientierung aufweisen (z.B. Abele, 2003). Die empirische Evidenz legt somit nahe, dass, neben Faktoren auf Ebene der Person, andere Faktoren bedeutsam sein müssen und zur geringen Frauenquote in hohen Führungspositionen beitragen. Oft wird in diesem Zusammenhang von dem *Glass Ceiling-Phänomen* gesprochen, einer Art unsichtbaren Decke und unüberwindbaren Barriere, die Frauen beim Aufstieg in hohe Führungspositionen zu hindern scheint (Cotter et al., 2001). Neben Faktoren auf Ebene der Organisation (z.B. schlechte Vereinbarkeit von Beruf und Familie, Mangel an weiblichen Vorbildern), tragen bestehende Geschlechterstereotype auf Ebene der Gesellschaft zur Aufrechterhaltung dieser Barriere bei (Heilman, 2001).

In der vorliegenden Arbeit soll eine geschlechterstereotype Wahrnehmung von Führung als zentrale Erklärung für die geringe Repräsentanz von Frauen in Führungspositionen herangezogen werden. Die Inhalte von Geschlechterstereotypen im beruflichen Kontext sowie Einflussvariablen auf deren Nutzung werden in den folgenden Kapiteln erläutert.

## 1.2. Geschlechterstereotype

Unter Geschlechterstereotypen versteht man sozial geteiltes Wissen über charakteristische Merkmale von Männern und Frauen (Ashmore & Del Boca, 1979). Sie beinhalten dabei Annahmen darüber, wie Frauen und Männer sind (deskriptive Anteile) und wie Männer und Frauen sich verhalten sollten (präskriptive Anteile; Burgess und Borgida, 1999). So werden Frauen eher sogenannte Emotionseigenschaften (engl.: *Communion*), wie etwa Wärme, Emotionalität und Fürsorge zugeschrieben, während Männern eher Kompetenzeigenschaften (engl.: *Agency*), wie Dominanz, Zielstrebigkeit und Durchsetzungsfähigkeit zugeschrieben werden (Bakan, 1966). Eng damit verwandt ist der Begriff der Geschlechterrolle, welcher Verhaltensweisen und gesellschaftliche Aufgaben beschreibt, die für ein Geschlecht als typisch (deskriptiv) oder akzeptabel (präskriptiv) gelten (Abele, 2003). In diesem Zusammenhang wird Frauen vermehrt die Familienarbeitsrolle (Kinder, Haushalt) zugeschrieben, während Männern primär die Erwerbsarbeitsrolle (bezahlte Erwerbstätigkeit) zugeschrieben wird. Während Vertreter traditioneller Geschlechterrollenideologien eine solche klare Rollendifferenzierung befürworten, befürworten Individuen mit einem egalitären Rollenverständnis die zunehmende Rollenangleichung von Mann und Frau (Athenstaedt & Alfermann, 2011).

*Geschlechterstereotype am Arbeitsplatz.* Der Fokus der vorliegenden Arbeit liegt auf Inhalten und Auswirkungen von Geschlechterstereotypen im beruflichen Kontext. Ein prominentes Modell, welches sich mit Geschlechterstereotypen am Arbeitsplatz beschäftigt, ist das *Lack-of-Fit-Modell* (Heilman, 1983). Nach dem Lack-of-Fit-Modell besteht eine fehlende wahrgenommene Passung zwischen den wahrgenommenen Anforderungen im Beruf und Eigenschaften, die traditionell mit Frauen assoziiert werden. Eine hohe Diskrepanz wird dabei vor allem zwischen den Anforderungen an Führungskräfte (z.B. Durchsetzungsfähigkeit) und traditionell mit Frauen assoziierter Emotionseigenschaften (z.B. Sensibilität) wahrgenommen. Dieses Phänomen ist auch unter dem Begriff *Think-Manager-Think-Male-Stereotyp* (TMTM-Stereotyp; Schein, 1973) bekannt. Demnach sind Eigenschaften, die erfolgreichen Managern zugeschrieben werden, wie etwa Durchsetzungsfähigkeit und Wettbewerbsorientierung, Eigenschaften, die traditionell eher mit Männern assoziiert werden. In anderen Worten: Das Stereotyp einer Führungskraft ist männlich - Frauen scheinen weniger gut in diese Position zu passen.

*Erfassung von Geschlechterstereotypen.* Zentral in der Stereotypenforschung ist es, das Vorhandensein von Stereotypen von einer tatsächlichen Stereotypisierung zu unterscheiden. Unter Stereotypisierung versteht man dabei die Anwendung von stereotypkonsistentem Wissen auf Personen oder Personengruppen (Kunda & Spencer, 2003). In anderen Worten: Nur weil Menschen über Geschlechterstereotype verfügen, bedeutet dies nicht, dass sie diese zur Bewertung von Personen heranziehen und offen zeigen. Verfügen Individuen über ausreichende kognitive Verarbeitungsressourcen (vgl. Wegener und Petty, 1997), ist eine willentliche Unterdrückung be-



stehender Stereotype möglich (Sczesny & Kühnen, 2004), etwa auf Grund des Strebens nach einem eigenen egalitären Selbstbilds (internale Motivation) oder aber eines Strebens nach sozialer Erwünschtheit und politischer Korrektheit (externale Motivation). Speziell in der Arbeitswelt ist derzeit eine steigende Sensibilisierung für die (oft unbewussten) Geschlechterstereotype am Arbeitsplatz zu beobachten. So entwickeln sich gerade in Großkonzernen zunehmend ganze Abteilungen, die sich mit Frauenförderung beschäftigen und Geschlechterdiskriminierung am Arbeitsplatz ist immer häufiger Gegenstand öffentlicher Debatten (PageGroup, 2018). Dies geht mit einer steigenden sozialen Erwünschtheit egalitärer geschlechterbezogener Einstellungen einher, wodurch eine reliable Erfassung von Geschlechterstereotypen in der empirischen Forschung erschwert wird. So antworten Personen vermehrt entsprechend in unserer Gesellschaft gültiger sozialer Normen, welche die Diskriminierung von Personen auf Grund ihres Geschlechtes ablehnen (Maass et al., 2000). Folglich kommt der Entwicklung von Verfahren, welche nicht intentional durch Teilnehmende verfälscht werden können, eine immer größere Bedeutung zu. Eine Möglichkeit besteht darin, neben expliziten Einstellungen, ebenfalls implizite Einstellungen zu erfassen. Während explizite Einstellungen willentlich kontrollierbar sind, zeichnen sich implizite Einstellungen dadurch aus, dass sie auch unbewusst und unwillentlich durch die reine Anwesenheit des Einstellungsobjekts aktiviert werden können (Kunda & Spencer, 2003). Eine Möglichkeit, um implizite Einstellungen zu erfassen, besteht in der Ableitung dieser aus scheinbar unzusammenhängenden Antworten oder Handlungen der Teilnehmenden (indirekte Verfahren, vgl. Banaji, 2001). So sind sich Teilnehmende nicht bewusst, dass ihre Einstellungen erfasst werden und/oder sie haben keine Kontrolle über das Ergebnis der Messung (Fazio & Olson, 2003). Eine intentionale Verfälschung der erfassten Einstellungen (z.B. aus Gründen sozialer Erwünschtheit) ist somit nicht möglich.

### 1.3. Einflussvariablen Stereotypnutzung

Doch welche Faktoren beeinflussen, ob wir über Geschlechterstereotype am Arbeitsplatz verfügen und diese zur Bewertung anderer Personen heranziehen? Bisherige Studien konzentrierten sich meist auf die Identifikation von stabilen, dispositionalen Faktoren, die interindividuelle Unterschiede im Vorhandensein von Geschlechterstereotypen erklären können. So konnte wiederholt gezeigt werden, dass Frauen über weniger Geschlechterstereotype verfügen als Männer (Cordano et al., 2002; Koenig et al., 2011). Ferner konnte ein Zusammenhang zwischen geschlechterstereotypen Einstellungen und dem Bildungsstand (Terborg et al., 1977) sowie der politischen Orientierung von Individuen gezeigt werden (Lottes & Kuriloff, 1992): So zeigten gut gebildete Individuen, die liberale politische Parteien befürworten, weniger stereotype Annahmen bezüglich der Merkmale und Verhaltensweisen von Männern und Frauen.

Neben solchen zeitlich stabilen interindividuellen Unterschieden beeinflussen jedoch auch Charakteristika der Situation, ob Stereotype in einer Bewertungssituation aktiviert

und genutzt werden (vgl. Fiske und Taylor, 1991). So konnte gezeigt werden, dass Leistungsbewertungen stärker von Stereotypen beeinflusst werden, wenn objektive Kriterien zur Evaluation fehlen (Nieva & Gutek, 1980). Existieren so beispielsweise in der Personalauswahl und Leistungsbeurteilung keine präzisen Anforderungsprofile, findet die Nutzung von stereotypkonsistentem Wissen stärker statt. Ein Fehlen konkreter Anforderungsprofile ist dabei besonders häufig in hohen Führungspositionen vorzufinden (Stumpf & London, 1981). Eine stereotypgeleitete Auswahl und Leistungsbeurteilung von Führungskräften ist somit wahrscheinlicher.

Während der Fokus bisheriger Studien auf der Untersuchung von Persönlichkeitseigenschaften und Situationscharakteristika lag, existiert wenig Forschung zu Frage, wie soziale Beziehungen geschlechterbezogene Einstellungen von Individuen beeinflussen. Dies ist vor dem Hintergrund der Vielzahl an Studien, die eine starke soziale Beeinflussung menschlicher Einstellungen und Verhaltensweisen zeigten (z.B. Cialdini und Goldstein, 2004), überraschend. Zu den wichtigsten menschlichen sozialen Beziehungen gehören soziale Beziehungen innerhalb der Familie (Habib, 2012). Konsistent zu dieser Annahme legten Forschungsarbeiten aus der Familienforschung nahe, dass Persönlichkeitseigenschaften und Werte der Eltern die Sozialisation ihrer Kinder substantiell beeinflussen (Maccoby, 1992). Dabei scheinen Kinder vor allem durch bestehende Vorurteile und Stereotype der Eltern sozialisiert zu werden: So ließen sich signifikante Zusammenhänge zwischen bestehender stereotyper Einstellungen der Eltern und jenen der Kinder nachweisen (Degner & Dalege, 2013; S. M. Myers & Booth, 2002).

Nur wenige Forscher beschäftigten sich hingegen mit einem umgekehrten Wirkzusammenhang und somit mit der Frage, ob und wie das Aufziehen von Kindern Einstellungen und Stereotype der Eltern beeinflusst. In anderen Worten: Ist auch eine Sozialisation der Eltern durch die eigenen Kinder möglich? Anekdotische Berichte von Vätern (z.B. Dupre, 2018; Jensen, 2015; Kenney, 2018) lieferten initiale Evidenz für diese Annahme und legten nahe, dass das Geschlecht des Kindes für die Sozialisationserfahrung der Eltern eine entscheidende Rolle spielt. So berichtete beispielsweise Basketball-Profi Stephen Curry, dass speziell die Geburt seiner Tochter seine Einstellung zu einer Vielzahl von Themen, vor allem aber der Chancengleichheit von Männern und Frauen in der Gesellschaft, fundamental verändert hat (Dupre, 2018). Auch andere prominente Persönlichkeiten wie Mark Zuckerberg oder Bill Gates berichteten von einer veränderten Weltansicht und zeigten nach der Geburt ihrer Tochter eine stärkere Unterstützung von Organisationen, die Geschlechtergleichheit fordern und fördern (Carrey, 2017). Den autobiographischen Berichten der Väter folgend, veranlasst die Vaterschaft einer Tochter Männer, unsere Gesellschaft erstmals aus der Perspektive der Tochter und somit einer Frau zu betrachten (vgl. Kenney, 2018). Die Vaterschaft einer Tochter scheint Männern somit die Augen bezüglich bestehender Geschlechterungleichheiten in unserer Gesellschaft zu öffnen und sie zu einem Hinterfragen bestehender Geschlechterstereotype zu bewegen. Doch lässt sich

dies auch empirisch untermauern? Ist die Vaterschaft einer Tochter folglich eine weitere Einflussvariable, die das Vorhandensein und die Verwendung von Geschlechterstereotypen in Bewertungssituationen, wie etwa Vorstellungsgesprächen, beeinflusst?

Im folgenden Kapitel soll der aktuelle Stand der Forschung zum Einfluss der Vaterschaft einer Tochter auf Einstellungen und Verhaltensweisen von Männern vorgestellt werden. Die differentiellen Einstellungsunterschiede zwischen Vätern, in Abhängigkeit des Geschlechts des Kindes, sollen im Folgenden als *Tochtereffekt* bezeichnet werden. Zunächst soll dabei auf die Stärken des Forschungsparadigmas im Vergleich zur Betrachtung anderer sozialer Beziehungen eingegangen werden.

## 2. Der Tochtereffekt

### 2.1. Stärken des Forschungsparadigmas

Die Stärke des dem Tochtereffekt zu Grunde liegenden Forschungsparadigmas besteht darin, dass das Geschlecht des Kindes als exogene (d.h. von außen vorgegebene) Zufallsvariable betrachtet werden kann. Was ist damit konkret gemeint? Gegeben eine Frau ist schwanger, liegt die Wahrscheinlichkeit für die Geburt eines Jungen im Vergleich zu einem Mädchen nahezu bei 50 Prozent (Statistisches Bundesamt, 2019b) und liegt zudem in westlichen Ländern in der Regel außerhalb der Kontrolle der Eltern (vgl. Washington, 2008). Folgt man diesen Überlegungen und versteht das Geschlecht des Kindes als exogene Zufallsvariable, kann dieses als unabhängig von bestehenden Einstellungen und Persönlichkeitseigenschaften der Eltern verstanden werden (vgl. Shafer und Malhotra, 2011). Dies stellt einen zentralen Vorteil zur Betrachtung anderer sozialer Beziehungen dar, in deren Zusammenhang die Selbst-Selektion sozialer Beziehungen eine bedeutsame Rolle spielt. So suchen wir uns selbst aus, mit welchen Menschen wir gerne Zeit verbringen und dies sind häufig Menschen, die uns in Bezug auf physische Charakteristika, Persönlichkeitseigenschaften und zentrale Einstellungen ähnlich sind. Dieses häufig als *soziale Homophilie* bezeichnete Phänomen hat zur Folge, dass die vom Individuum selektierten sozialen Beziehungen nicht als unabhängig von bestehenden Einstellungen des Individuums verstanden werden können (Young et al., 2006). Findet sich somit beispielsweise ein Zusammenhang zwischen einem egalitären Rollenverständnis von Männern und häufigem sozialen Kontakt zu Frauen, kann nicht differenziert werden, ob das egalitäre Rollenverständnis aus dem sozialen Kontakt zu Frauen resultiert oder ob Männer mit einem initial egalitären Rollenverständnis eher den sozialen Kontakt zu Frauen suchen. Vor dem Hintergrund der rein korrelativen Natur der Daten und der Plausibilität eines umgekehrten Wirkmechanismus sind zentrale Bedingungen für eine kausale Interpretation des Zusammenhangs somit nicht gegeben. Wird das Geschlecht des Kindes jedoch als exogene Zufallsvariable betrachtet, welche von den bisherigen Einstellungen der Eltern unabhängig ist, können Einstellungsunterschiede zwischen

Eltern und Nicht-Eltern von (erstgeborenen) Töchtern im Rahmen eines natürlichen Quasi-Experiments evaluiert und kausal interpretiert werden (vgl. Gompers und Wang, 2017; Washington, 2008).

Wichtig ist zu beachten, dass der Konzeptualisierung des Geschlechts als exogene Zufallsvariable die Annahme zu Grund liegt, dass die Eltern nicht aktiv pränatal auf das Geschlecht des Kindes Einfluss nehmen. Diese Annahme ist vor allem in westlichen Ländern plausibel, in denen geschlechterspezifische Abtreibungen im heutigen Zeitalter zur Seltenheit gehören und aktive Maßnahmen zur pränatalen Manipulation des Geschlechts des Kindes kaum stattfinden (Bharadwaj et al., 2014). Weniger klar ist jedoch, welche Rolle eine geschlechterspezifische Familienplanung (engl.: *gender specific stopping rules*) in unserer Gesellschaft spielt. Diese beschreibt die Präferenz von Paaren für die Geburt eines Jungen und die damit verbundene Tendenz, die Familienplanung erst nach der Geburt eines Sohnes zu beenden (Clark, 2000). So zeigen speziell Männer auch in westlichen Ländern noch immer eine Präferenz für männliche Nachkommen (G. B. Dahl & Moretti, 2008). Diese zeigt sich einerseits im Selbstbericht der Väter und andererseits in einer erhöhten Wahrscheinlichkeit der Geburt weiterer Kinder, wenn das erstgeborene Kind eine Tochter ist (G. B. Dahl & Moretti, 2008). Eine Möglichkeit, um für potenzielle geschlechterspezifische Familienplanungsregeln kontrollieren zu können, besteht in der ausschließlichen Berücksichtigung erstgeborener Kinder, die von einer solchen selektiven Familienplanung unabhängig sind (vgl. Basu und De Jong, 2010; Sharrow et al., 2018).

### 2.2. Bisherige Forschung zum Tochtereffekt

Quantitative empirische Studien stützen die anekdotische Evidenz von Vätern, die eine positive Beeinflussung geschlechterbezogener Einstellungen durch die Geburt einer Tochter nahelegen. So konnte gezeigt werden, dass Väter von Töchtern (im Vergleich zu Vätern ohne Töchter) über egalitäre, feministischere Sichtweisen verfügen (Warner, 1991) und stärker Maßnahmen befürworten, die Geschlechterfairness fördern (Warner & Steel, 1999). Dieser Befund konnte auch unter Nutzung eines Längsschnittdesigns repliziert werden (Shafer & Malhotra, 2011). So zeigten die Forscher, dass sich Geschlechterideologien von Männern nach der Geburt einer Tochter in eine signifikant fortschrittlichere Richtung entwickeln. Doch nicht nur Einstellungen, sondern auch konkrete Verhaltensweisen scheinen durch die Vaterschaft einer Tochter beeinflusst zu werden: So entscheiden Richter (Glynn & Sen, 2015) sowie Kongress-Abgeordnete (Washington, 2008) mit Töchtern (im Vergleich zu jenen ohne Töchter) liberaler in Bezug auf Themen, die Frauen betreffen (z.B. Arbeitszeitflexibilität für berufstätige Mütter).

Während all diese Studien Evidenz für egalitäre geschlechterbezogene Einstellungen von Vätern mit Töchtern lieferten, fanden andere Studien gegenteilige Evidenz, indem sie konservativere, traditionellere Geschlechterideologien von Vätern mit Töchtern nachwiesen (Kamo & Warner, 1997;

Perales et al., 2018). Wieder andere Studien konnten keinerlei Evidenz für Einstellungsunterschiede zwischen Vätern in Abhängigkeit der Geschlechterkonstellation der Kinder finden und scheiterten somit im empirischen Nachweis des angenommenen Tochttereffekts (z.B. Lee und Conley, 2016). Insgesamt ergibt sich somit ein inkonsistentes Bild in der bisherigen Forschung. Doch wie sind diese Inkonsistenzen zu erklären?

Ein Grund für die inkonsistenten Ergebnisse könnte in der uneinheitlichen beziehungsweise mangelnden Berücksichtigung der Geburtenreihenfolge der Kinder in bisherigen Studien liegen. So fanden einige kürzlich veröffentlichte Studien die postulierten Einstellungsunterschiede nur unter Berücksichtigung der Geburtenreihenfolge der Kinder, sprich ausschließlich zwischen Vätern mit erstgeborenen Töchtern und Vätern mit erstgeborenen Söhnen (Greenlee et al., 2018; Sharrow et al., 2018). Geschlechterbezogene Einstellungen von Männern scheinen demnach nicht durch die Vaterschaft einer Tochter *per se*, sondern primär durch die Vaterschaft einer erstgeborenen Tochter beeinflusst zu werden, wofür die Autoren den Begriff *First Daughterhood Effect* (zu Deutsch: *Erstgeborene Tochttereffekt*; Sharrow et al., 2018) prägten. Konsistent zu dieser Annahme messen auch Befunde aus der Familienforschung (z.B. Genesoni und Tallandini, 2009) dem erstgeborenen Kind eine zentrale Bedeutung in der Beeinflussung von Werten, Einstellungen und Verhaltensweisen von Vätern bei. So bringt vor allem die erste Vaterschaft eines Mannes die Herausforderung der Rollenveränderung vom Lebenspartner hin zum Familienvater mit sich, welche mit bedeutsamen Veränderungen in Lebensgewohnheiten sowie Verantwortlichkeiten einhergeht (Barclay & Lupton, 1999; Morse et al., 2000). Die Notwendigkeit der Neu-Definition der eigenen Rolle geht dabei mit einer stärkeren Formbarkeit bestehender Einstellungen und Werte einher (vgl. Genesoni und Tallandini, 2009; Greenlee et al., 2018). Geschlechterbezogene Einstellungen von Vätern sollten in dieser Phase somit besonders durch eine Tochter beeinflusst werden können. Primär sprechen jedoch methodische Argumente (siehe Kapitel 2.1) für einen primären Vergleich geschlechterbezogener Einstellungen von Vätern erstgeborener Töchter und Vätern erstgeborener Söhne in zukünftigen Studien. So sind Studien, die die Geburtenreihenfolge der Kinder nicht aktiv berücksichtigen, durch methodische Schwächen charakterisiert, da zentrale Voraussetzungen für die Konzeptualisierung des Geschlechts des Kindes als exogene Zufallsvariable verletzt werden (Greenlee et al., 2018; Shafer & Malhotra, 2011; Sharrow et al., 2018).

Neben der Geburtenreihenfolge wurden jedoch auch andere zentrale Charakteristika der Familienstruktur, wie etwa die Qualität der Vater-Kind Beziehung, in bisherigen Studien unzureichend berücksichtigt. Dabei ist es plausibel anzunehmen, dass das Aufziehen einer Tochter geschlechterbezogene Einstellungen von Vätern vor allem dann beeinflusst, wenn eine enge soziale Beziehung zur Tochter besteht. Folglich könnte die Qualität der Vater-Kind Beziehung eine wichtige, bisher unzureichend berücksichtigte, Moderatorvariable darstellen, die das Auftreten und die Stärke eines Tochtref-

fekts beeinflusst. Neben dem Potenzial Inkonsistenzen in der bisherigen Forschung auflösen zu können, bietet die Identifikation von Randbedingungen, unter welchen ein Tochttereffekt auftritt oder verstärkt wird, die Möglichkeit, ein besseres Verständnis für die involvierten kognitiven Prozesse zu entwickeln. So machen die in Kapitel 2.4 vorgestellten theoretischen Erklärungsmechanismen unterschiedliche Vorhersagen bezüglich eines möglichen moderierenden Einflusses der Geburtenreihenfolge der Kinder, der Anzahl der Töchter sowie der Qualität der sozialen Vater-Kind Beziehung. Eine systematische Analyse der Bedeutung dieser Familienstrukturvariablen ermöglicht somit Rückschlüsse, welcher der Erklärungsansätze einen Tochttereffekt am besten erklären kann (siehe Kapitel 2.4).

Gründe für die Inkonsistenzen könnten andererseits in der mangelnden inhaltlichen Definition und Abgrenzung der erfassten Einstellungsobjekte liegen. So wird zwar übergeordnet von einem Tochttereffekt gesprochen, die erfassten Einstellungsobjekte weisen jedoch teils eine geringe Vergleichbarkeit auf (z.B. Arbeitszeitflexibilität vs. reproduktive Rechte von Frauen). Um bestehende Inkonsistenzen adressieren zu können, ist daher eine klare Definition und Abgrenzung des untersuchten Einstellungsobjektes zentral. Aus diesem Grund fokussierte ich mich in der vorliegenden Arbeit auf geschlechterbezogenen Einstellungen in einem beruflichen Kontext, speziell auf die Einstellung zu Frauen in Führungspositionen sowie zu Frauenfördermaßnahmen am Arbeitsplatz. Die Eingrenzung erfolgte einerseits auf Grund der hohen praktischen Relevanz der Thematik für wirtschaftliche Fragestellungen. Andererseits ist der Tochttereffekt im beruflichen Kontext durch Forschungslücken gekennzeichnet, wodurch sich ebenfalls ein hoher wissenschaftlicher Mehrwert ergibt. Der aktuelle Stand der Forschung zum Tochttereffekt im Arbeitskontext wird im folgenden Kapitel vorgestellt.

### 2.3. Der Tochttereffekt im Arbeitskontext

Organisationen werden häufig als Abbilder des Top-Managements verstanden (Hambrick & Mason, 1984). So konnte wiederholt ein bedeutsamer Zusammenhang zwischen soziodemographischen Charakteristika der Manager und zentralen Unternehmensoutcomes, wie etwa gewählter Unternehmensstrategien oder erzielter Profite gezeigt werden (Wiersema & Bantel, 1992). Doch welche soziodemographischen Variablen sind in diesem Zusammenhang entscheidend? Sollte vor dem Hintergrund der Forschungsergebnisse zum Tochttereffekt zukünftig auch die Familienkonstellation der Manager in Analysen Betrachtung finden? Initiale Evidenz für eine solche Annahme lieferten Gompers und Wang (2017): Unter Nutzung umfangreicher Panel-Daten prüften die Forscher Rekrutierungsentscheidungen in den USA über einen Zeitraum von 26 Jahren (1990-2016) in der männerdominierten Risikokapitalbranche. Die Analysen indizierten, dass Rekrutierungsentscheidungen der männlichen (*Senior*) *Partner* substanziell durch die Vaterschaft einer Tochter beeinflusst wurden: So stieg mit jeder Tochter (anstelle eines Sohnes) die Wahrscheinlichkeit der Neueinstellung einer

Frau um 2%. Bei einem durchschnittlichen Anteil weiblicher Neuanstellungen von nur 8% entspricht dies einem relativen Anstieg von 24% (Gompers & Wang, 2017). Die Studie legt somit nahe, dass Väter von Töchtern geschlechterfairere Rekrutierungsentscheidungen treffen und so langfristig zu einer höheren Frauenquote in männerdominierten Arbeitsbereichen beitragen. Dieser Befund konnte kürzlich in einer weiteren Studie repliziert werden (Dasgupta et al., 2018). So zeigten die Forscher, unter Nutzung von Daten einhundert börsennotierter Unternehmen, dass Geschäftsführer mit Töchtern (im Vergleich zu jenen ohne Töchter) mit einer höheren Wahrscheinlichkeit Frauen einstellen. Zudem konnte ein Zusammenhang zwischen der Vaterschaft einer Tochter und dem Managementstil von Führungskräften gezeigt werden (Cronqvist & Yu, 2017). So fördern Manager mit Töchtern (im Vergleich zu jenen ohne Töchter) eine sozial verantwortlichere Unternehmenspolitik. Dies zeigte sich vor allem in Bezug auf *Diversity*-Themen, speziell in Bezug auf Frauenförderung am Arbeitsplatz.

Doch wieso zeigen Väter von Töchtern eine stärkere Tendenz Frauen einzustellen und setzen sich für eine stärkere Förderung von Frauen am Arbeitsplatz ein? Wie ist der Effekt zu erklären und was sind die zu Grunde liegenden psychologischen Prozesse und Wirkmechanismen? Während der Tochtereffekt zwar in verschiedenen Bereichen mit unterschiedlichen abhängigen Variablen geprüft wurde, blieben umfassende Versuche, den Tochtereffekt theoretisch zu fundieren und in seiner Wirkweise besser zu verstehen, bislang aus. Um ein besseres Verständnis des Tochtereffekts zu erzielen, ist es jedoch zentral, die zu Grunde liegenden mentalen Prozesse besser zu verstehen. Im Folgenden soll daher zunächst eine theoriebasierte und systematische Ableitung möglicher Wirkmechanismen aus etablierten psychologischen Theorien erfolgen. Ein Fokus liegt dabei auf den in Kapitel 2.2 diskutierten Charakteristika der Familienstruktur, in Bezug auf deren Bedeutung die Erklärungsansätze unterschiedliche Vorhersagen treffen.

#### 2.4. Theoretische Erklärungsansätze

Nachfolgend werden vier mögliche Erklärungsansätze jeweils zunächst in ihren Grundannahmen vorgestellt und anschließend in ihren Vorhersagen bezüglich eines möglichen moderierenden Einflusses zentraler Familienstrukturvariablen (Geburtenreihenfolge der Kinder, Anzahl der Töchter, Qualität der sozialen Vater-Kind Beziehung) differenziert. Die Vorhersagen der einzelnen Erklärungsansätze sind in Tabelle 1 zusammengefasst.

##### 2.4.1. Perspektivenübernahme

Unter einer Perspektivenübernahme versteht man die Wahrnehmung einer Situation oder das Verständnis eines Konzeptes aus der Sichtweise einer anderen Person (Galinsky et al., 2008). Dies geht mit einer erhöhten Fähigkeit einher, psychologische Erfahrungen wie Gedanken, Gefühle und Einstellungen der anderen Person zu verstehen (Galinsky & Moskowitz, 2000). Einem Perspektivenübernahmeansatz folgend, sollte die Übernahme der Perspektive der Tochter (und

somit einer Frau) durch die Vaterschaft einer Tochter erleichtert werden. So sind sich Männer vor der Geburt einer Tochter oft nicht den Herausforderungen bewusst, denen jungen Frauen in der noch immer männerdominierten Arbeitswelt begegnen. Demnach haben Männer Karriereoptionen bislang primär aus der Perspektive des Selbst (und somit eines Mannes) wahrgenommen. Durch den sozialen Kontakt zur Tochter und ihrer weiblichen Peer-Gruppe entsteht nun hingegen die Möglichkeit, etwas über die Weltansicht der Tochter zu lernen und Karriere- und Zukunftsoptionen aus der Perspektive der Tochter (und somit einer Frau) wahrzunehmen. Die Arbeitswelt aus der Sicht einer jungen Frau wahrnehmend, sollten sich Väter einer Tochter der Ungerechtigkeit traditioneller Geschlechterideologien bewusst werden und es sollte zu einem Hinterfragen bestehender Geschlechterrollenannahmen und Geschlechterstereotype im beruflichen Kontext kommen.

Den Annahmen des Perspektivenübernahmeansatzes folgend, sollte bereits das Aufziehen einer Tochter ausreichend sein, um einen Perspektivenwechsel bei Vätern zu bewirken. So liegt dem angenommenen Mechanismus des Perspektivenwechsels ein binärer Aktivierungscharakter zu Grunde. Hat der angenommene Perspektivenwechsel bereits durch die Geburt einer Tochter stattgefunden, sollte die Anzahl weiterer Töchter keine oder nur noch eine untergeordnete Rolle spielen (vgl. M. S. Dahl et al., 2012). Einem Perspektivenübernahmeansatz folgend, ist demnach vor allem entscheidend, ob ein Vater eine Tochter hat, nicht aber wie viele Töchter dieser hat.

Zudem misst der Perspektivenübernahmeansatz dem erstgeborenen Kind eine besondere Bedeutung in der Beeinflussung geschlechterbezogener Einstellungen des Vaters bei. So geht die erste Vaterschaft eines Mannes mit der Notwendigkeit der Neu-Definition der eigenen Rolle und einer daraus resultierenden stärkeren Formbarkeit bestehender Werte und Einstellungen einher (siehe Kapitel 2.2). Somit ist davon auszugehen, dass die Konfrontation mit der Weltansicht des erstgeborenen Kindes Einstellungen von Vätern stärker beeinflusst.

Geschlechterbezogene Einstellungen von Vätern sollten zudem besonders dann durch die Tochter beeinflusst werden, wenn die Väter eine enge soziale Beziehung zu dieser teilen. So konnte Forschung wiederholt zeigen, dass die Übernahme der Perspektive einer anderen Person leichter fällt, wenn eine enge soziale Beziehung zu dieser besteht (vgl. Shih et al., 2009). Darüber hinaus ergeben sich bei einer engen sozialen Beziehung vermehrt Möglichkeiten, etwas über die Weltansicht der Tochter zu lernen.

Folglich nimmt der Perspektivenübernahmeansatz an, dass die Geburtenreihenfolge der Kinder und die Qualität der sozialen Vater-Kind Beziehung die Stärke eines Tochtereffekts beeinflusst, während die Anzahl der Töchter irrelevant sein sollte (siehe Tabelle 1 für eine Übersicht der Vorhersagen des Perspektivenübernahmeansatzes).



#### 2.4.2. Schutz der Tochter

Ein weiterer möglicher Mechanismus, der dem Tochtereffekt zu Grunde liegen könnte, besteht in dem Schutz der Tochter als ultimatives Ziel der Väter. So haben Menschen das Ziel, Personen zu schützen, mit welchen sie starke persönliche Beziehungen teilen (Aron et al., 1991). Um physisches und emotionales Leiden der eigenen Tochter zu verhindern, sollten Väter eine geschlechterbasierte Diskriminierung der Tochter am Arbeitsplatz verhindern wollen und infolgedessen eine stärkere Chancengleichheit von Männern und Frauen in der Arbeitswelt anstreben.

Dieses Streben sollte dabei mit der Anzahl der Personen (= Töchter), um deren Schutz der Vater besorgt ist, ansteigen, hingegen aber nicht davon abhängen, ob es sich bei der Tochter um das erst- oder zweitgeborene Kind handelt. Der Wunsch, die Tochter vor etwaiger Diskriminierung zu schützen, sollte zudem intensiviert werden, wenn eine enge soziale Beziehung zu dieser besteht (vgl. Aron et al., 1991). Folglich sollte die Anzahl der Töchter sowie die Qualität der Vater-Kind Beziehung die Stärke des Tochtereffekts beeinflussen, während die Geburtenreihenfolge der Kinder irrelevant sein sollte (siehe Tabelle 1).

#### 2.4.3. Altruismus (*kin selection*)

Der Altruismus-Erklärungsansatz baut auf Annahmen der Evolutionspsychologie und der Verwandtenselektion (engl.: *kin selection*, Hamilton, 1998) auf. Grundannahme ist, dass Altruismus primär aus dem Ziel resultiert, die Wahrscheinlichkeit des Überlebens der eigenen Gene zu maximieren. Einem Altruismus-Ansatz folgend, könnte der Tochtereffekt somit ebenfalls auf eine primär biologisch motivierte Nutzenmaximierung zurückzuführen sein. So profitieren Männer (im Gegensatz zu Frauen) meist nicht direkt von einer höheren Geschlechtergleichheit im Arbeitsmarkt. Eher ist eine erhöhte Geschlechtergleichheit für sie zunächst mit Kosten verbunden, etwa durch die Notwendigkeit mehr Aufgaben im Haushalt zu übernehmen oder durch schlechtere Aufstiegsmöglichkeiten, bedingt durch den steigenden Wettbewerbsdruck durch Frauen auf dem Arbeitsmarkt. Ein indirekter Nutzen entsteht jedoch durch den Nutzen, der für die Tochter entsteht, mit welcher sie Gene teilen (*kin selection*).

Der entstehende indirekte Nutzen sollte sich dabei mit der Anzahl der Töchter proportional aufaddieren und somit für Väter mit mehreren Töchtern im Vergleich zu Vätern mit nur einer Tochter höher sein. Die Geburtenreihenfolge der Kinder sollte hingegen vor dem Hintergrund einer primär biologisch motivierten Nutzenmaximierung keine Rolle spielen. Evolutionspsychologischen Überlegungen folgend, ist zudem allein die Weitergabe der Gene von einer biologischen, genetischen Perspektive zentral, weshalb die Qualität der sozialen Vater-Kind Beziehung keinen Einfluss auf die Stärke des Zusammenhangs nehmen sollte (siehe Tabelle 1).

#### 2.4.4. Sozialer Einfluss

Ein weiterer möglicher Mechanismus, der dem Tochtereffekt zu Grunde liegen könnte, ist der soziale Einfluss, der

durch die Tochter in Familien ausgeübt wird. So müssen sich Väter für getroffene Entscheidungen und Standpunkte, die sie vertreten, rechtfertigen oder antizipieren eine solche Rechtfertigung in der Zukunft. Dabei können Einstellungen der Tochter einerseits als Information (informativer sozialer Einfluss; D. G. Myers, 2008) genutzt werden oder eine Einstellungsänderung kann aus dem Ziel resultieren, eine gute Beziehung zur Tochter wahren zu wollen und von dieser gemocht zu werden (normativer sozialer Einfluss; D. G. Myers, 2008). Folglich könnten sich geschlechterbezogene Einstellungen von Vätern ebenfalls primär durch den sozialen Einfluss der Tochter in eine egalitärere Richtung entwickeln.

Wiederholt konnte gezeigt werden, dass die Stärke des sozialen Einflusses, der auf ein Individuum ausgeübt wird, mit der Gruppengröße ansteigt (vgl. Aronson et al., 2004). Somit sollte auch der soziale Einfluss, der auf einen Vater ausgeübt wird, mit der Anzahl der Töchter ansteigen. Dabei übt das erstgeborene Kind in Familien zunächst als Einzelkind alleinigen sozialen Einfluss auf den Vater aus und fungiert auch nach der Geburt weiterer Kinder oft als Vorbild für die Geschwister und somit als Meinungsführer (Brody, 2004). Daher ist anzunehmen, dass das erstgeborene Kind Einstellungen des Vaters besonders stark beeinflusst. Ferner konnte Forschung zeigen, dass wir Einstellungen und Meinungen von für uns relevanten Personen stärker gewichten (D. G. Myers, 2008). Eine soziale Beeinflussung durch die Tochter sollte somit vor allem dann stattfinden, wenn eine enge soziale Beziehung zu dieser besteht. Als einziger der vier Erklärungsansätze geht der Ansatz des sozialen Einflusses somit von einem moderierenden Einfluss jeder der drei Familienstrukturvariablen aus (siehe Tabelle 1).

Auch wenn allen vorgestellten theoretischen Erklärungsmechanismen einen Beitrag in der Entstehung des Tochtereffekts eingeräumt wird, wurde in der vorliegenden Arbeit die Annahme getroffen, dass der Tochtereffekt am besten durch die geförderte Wahrnehmung der Arbeitswelt aus der Perspektive einer Frau verstanden werden kann (Perspektivenübernahmemechanismus). Diese Annahme führte zur Ableitung der Hypothesen in Studie 1 und leitete maßgeblich das versuchsplanerische Vorgehen in Studie 2. Eine systematische Analyse der Bedeutung der drei Familienstrukturvariablen, in Bezug auf welche die vier Erklärungsansätze unterschiedliche Vorhersagen treffen (siehe Tabelle 1), ermöglichte zudem eine empirische Prüfung der getroffenen Annahme.

### Studie 1

Auf den bisherigen empirischen Befunden aufbauend, bestand das Ziel der ersten Studie darin zu prüfen, ob die nachgewiesenen geschlechterfaireren Rekrutierungsentscheidungen (Dasgupta et al., 2018; Gompers & Wang, 2017) sowie die stärkere Frauenförderung (Cronqvist & Yu, 2017) von Managern mit Töchtern (im Vergleich zu Managern ohne Töchter) tatsächlich durch egalitärere geschlechterbezogene Einstellungen der Manager erklärt werden können. Eine solche Erklärung wurde von den Forschern lediglich post hoc angeführt, eine empirische Prüfung der Annahmen fand jedoch



**Tabelle 1:** Vorhersagen der theoretischen Erklärungsansätze im Vergleich. Ein X drückt aus, dass der Erklärungsansatz einen signifikanten Einfluss der Variable auf die Stärke eines Tochtereffekts annimmt.

|                                  | Erklärungsansätze          |        |            |                      |
|----------------------------------|----------------------------|--------|------------|----------------------|
|                                  | Perspektiven-<br>übernahme | Schutz | Altruismus | Sozialer<br>Einfluss |
| <b>Familienstrukturvariablen</b> |                            |        |            |                      |
| Anzahl der Töchter               |                            | X      | X          | X                    |
| Geburtenreihenfolge              | X                          |        |            | X                    |
| Vater-Kind Beziehung             | X                          | X      |            | X                    |

bisher nicht statt und stand daher im Zentrum meiner Masterarbeit. Aus methodischen Gründen (siehe Kapitel 2.1) fokussierte ich mich dabei auf die Betrachtung des Geschlechts des *erstgeborenen* Kindes und folglich auf einen Vergleich geschlechterbezogener Einstellungen von Vätern erstgeborener Töchter und Vätern erstgeborener Söhne (vgl. Greenlee et al., 2018). Diese Betrachtung ermöglichte die Konzeptualisierung des Geschlechts des erstgeborenen Kindes als exogene Zufallsvariable, wodurch die Interpretation der Daten im Sinne eines Quasi-Experiments ermöglicht wurde (siehe Kapitel 2.1). Ferner misst der Perspektivenübernahmeansatz, der in der vorliegenden Arbeit als zentraler Wirkmechanismus angenommen wurde, dem Geschlecht des erstgeborenen Kindes ebenfalls von einem theoretischen Standpunkt eine besondere Bedeutung bei (siehe Kapitel 2.4).

### 3. Hypothesen

Den Perspektivenübernahmeansatz als zentralen Erklärungsansatz zu Grunde legend, nahm ich an, dass die Übernahme der Perspektive einer Tochter (und somit einer Frau) durch die Vaterschaft einer Tochter vereinfacht wird. Mehrfach konnte Forschung zeigen, dass die Übernahme der Perspektive einer stereotypisierten Person (z.B. Minderheit auf Grund von Rasse oder Geschlecht) mit einem Rückgang von Stereotypen gegenüber der stereotypisierten Gruppe, der die Person angehört, einhergeht (Galinsky & Moskowitz, 2000; Galinsky et al., 2008). Die geförderte Perspektivenübernahme der Tochter (Mitglied der Gruppe der Frauen) sollte folglich mit einem Rückgang von Geschlechterstereotypen (Stereotypen gegenüber der Gruppe der Frauen) einhergehen. Die noch immer männerdominierte Arbeitswelt aus der Sicht einer jungen Frau wahrnehmend, sollte es dabei vor allem zu einem Hinterfragen bestehender Geschlechterstereotype und Geschlechterrollenannahmen in einem beruflichen Kontext kommen. Dies sollte sich in einer weniger geschlechterstereotypen Wahrnehmung von Führung und einer positiveren Bewertung weiblicher Führungskräfte zeigen. Diese Annahmen führten zur Ableitung der ersten Hypothese:

**H1.** Väter, deren erstgeborenes Kind eine Tochter ist, zeigen signifikant positivere Einstellungen gegenüber Frauen in Führungspositionen im Vergleich zu Vätern, deren erstgeborenes Kind ein Sohn ist.

Den Annahmen eines Perspektivenübernahmeansatzes folgend, sollten sich Väter erstgeborener Töchter zudem den Herausforderungen junger Frauen in der noch immer männer-dominierten Arbeitswelt stärker bewusst werden. Demzufolge sollten sie Maßnahmen, die eine stärkere Chancengleichheit von Männern und Frauen in der Arbeitswelt zum Ziel haben oder explizit auf die Förderung von Frauen ausgerichtet sind, stärker befürworten. Somit lautete die zweite Hypothese der Studie:

**H2.** Väter, deren erstgeborenes Kind eine Tochter ist, zeigen eine signifikant stärkere Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz im Vergleich zu Vätern, deren erstgeborenes Kind ein Sohn ist.

Ferner sollte sich der angenommene Zusammenhang zwischen der Vaterschaft einer erstgeborenen Tochter und geschlechterbezogenen Einstellungen nicht nur auf einer expliziten Einstellungsebene, sondern ebenfalls auf einer impliziten Einstellungsebene zeigen. Meines Wissens handelt es sich dabei um die erste Studie, die den angenommenen Tochtereffekt nicht nur auf einer expliziten Einstellungsebene, sondern ebenfalls auf einer impliziten Einstellungsebene prüft. Die Lösungswahrscheinlichkeit eines Rätsels, im Folgenden als *Koryphäenproblem* bezeichnet (siehe Kapitel 4.3 für eine detaillierte Beschreibung), diente in der vorliegenden Studie als innovativer Indikator zur Erfassung impliziter geschlechterbezogener Einstellungen im beruflichen Kontext. Durch die Lösungswahrscheinlichkeit des Koryphäenproblems sollte dabei das Ausmaß der Stärke der (unbewussten) Geschlechterstereotypinternalisierung im beruflichen Kontext erfasst werden. Ob Teilnehmende das Koryphäenproblem richtig lösen, sollte somit einen Rückschluss darauf zulassen, ob und inwiefern die Teilnehmenden stereotype Annahmen über Männer und Frauen im beruflichen Kontext verinnerlicht haben (Kollmayer, 2012; Stoeger et al., 2004). Eine geringe Verinnerlichung von Geschlechterstereotypen sollte sich dabei in einer höheren Lösungswahrscheinlichkeit des Koryphäenproblems widerspiegeln (Kollmayer, 2012). Geht man davon aus, dass die Vaterschaft einer erstgeborenen Tochter ebenfalls implizite Geschlechterstereotype von Männern beeinflusst, sollte es Vätern einer erstgeborenen Tochter demnach leichter fallen, das Koryphäenproblem richtig zu lösen. Diese Annahme bildete sich in folgender

Hypothese ab:

**H3.** Väter, deren erstgeborenes Kind eine Tochter ist, zeigen eine signifikant höhere Lösungswahrscheinlichkeit des Koryphäenproblems im Vergleich zu Vätern, deren erstgeborenes Kind ein Sohn ist.

Eine weitere Möglichkeit, implizite geschlechterbezogene Einstellungen zu erfassen, besteht in einer indirekten Ableitung dieser aus einer Verhaltensweise (z.B. Spende an eine wohltätige Organisation), welche in einem Zusammenhang mit dem erfassten Einstellungsobjekt (z.B. prosoziales Verhalten) steht (vgl. Schindler et al., 2014). Diesem Rational folgend, verwendete ich die Entscheidung zu einer Spende an eine wohltätige Organisation, welche sich mit Frauenförderung im beruflichen Kontext befasst, als indirektes Einstellungsmaß zur Erfassung impliziter geschlechterbezogener Einstellungen. Aus der Entscheidung für (vs. gegen) eine Spende an eine Frauenförderorganisation sollten folglich positive (vs. negative) implizite Einstellungen gegenüber Frauen in Führungspositionen und Frauenfördermaßnahmen am Arbeitsplatz abgeleitet werden können. Unterschiede zwischen Vätern erstgeborener Töchter und Vätern erstgeborener Söhne sollten sich damit nicht nur im Selbst-Bericht der Einstellungen, sondern ebenfalls in ihrem Spendenverhalten und somit in einer konkreten Verhaltensmessung zeigen. Diese Annahme wird durch bisherige Forschung zum Tochtereffekt gestützt: So legten bisherige Forschungsarbeiten nahe, dass die Vaterschaft einer Tochter nicht nur Einstellungen, sondern ebenfalls konkrete Verhaltensweisen von Vätern, wie etwa Entscheidungen in der Politik oder vor Gericht, beeinflusst (z.B. Glynn und Sen, 2015; Washington, 2008). Somit erwartete ich:

**H4.** Väter, deren erstgeborenes Kind eine Tochter ist, entscheiden sich signifikant häufiger für eine Spende an eine Frauenförderorganisation im Vergleich zu Vätern, deren erstgeborenes Kind ein Sohn ist.

Welcher Wirkmechanismus dem (erstgeborenen) Tochtereffekt zu Grunde liegt und wie dieser von einer theoretischen Perspektive zu erklären ist, wurde in bisherigen Studien noch kaum untersucht und ist daher noch schlecht verstanden. Durch eine systematische und theorie-basierte Ableitung von vier möglichen Wirkmechanismen wurde in der vorliegenden Arbeit eine stärkere theoretische Fundierung des Tochtereffekts angestrebt. Dabei wurde der Arbeit die Annahme zu Grunde gelegt, dass der (erstgeborene) Tochtereffekt am besten durch die geförderte Perspektivenübernahme einer Frau in der Arbeitswelt verstanden werden kann. Ob sich der angenommene zentrale Erklärungsbeitrag eines Perspektivenübernahmeansatzes auch empirisch zeigen lässt, sollte daher eine zentrale Forschungsfrage der Arbeit sein. Um dies zu prüfen, erfolgte eine systematische Analyse der Bedeutung der drei Familienstrukturvariablen (Geburtenreihenfolge, Anzahl der Töchter, Soziale Vater-Kind Beziehung),

in Bezug auf welche die vier Erklärungsansätze unterschiedliche Vorhersagen treffen (siehe Kapitel 2.4).

### 3.1. Geburtenreihenfolge

So treffen die Erklärungsansätze unterschiedliche Vorhersagen bezüglich der Bedeutung der Geburtenreihenfolge der Kinder: Während der Perspektivenübernahmeansatz und der Ansatz des sozialen Einflusses von einem moderierenden Einfluss der Geburtenreihenfolge ausgehen, nehmen die beiden anderen Erklärungsansätze (Altruismus, Schutz der Tochter) einen moderierenden Einfluss nicht an (siehe Kapitel 2.4). Eine systematische Untersuchung der Bedeutung der Geburtenreihenfolge der Kinder sollte daher ein zentraler Bestandteil der ersten Studie sein. Wichtig ist an dieser Stelle zu beachten, dass eine Fokussierung auf das Geschlecht des erstgeborenen Kindes in der vorliegenden Arbeit aus methodischen Gründen erfolgte, nicht aber da ein Einfluss der Vaterschaft einer Tochter *per se* (Allgemeiner Tochtereffekt) basierend auf theoretischen Überlegungen ausgeschlossen wurde. So nimmt auch ein Perspektivenübernahmeansatz einen allgemeinen Tochtereffekt an - die Geburtenreihenfolge sollte lediglich eine moderierende Variable darstellen, sodass der Tochtereffekt verstärkt wird, wenn es sich bei der Tochter um das erstgeborene Kind des Mannes handelt. In anderen Worten: Geschlechterbezogene Einstellungen von Männern sollten durch das Aufziehen einer Tochter allgemein (unabhängig von der Geburtenreihenfolge) beeinflusst werden, jedoch differentiell stärker von einer erstgeborenen Tochter. Während eine Vielzahl an Studien, konsistent zu dieser Annahme, einen allgemeinen Tochtereffekt nachweisen konnten (z.B. Gompers und Wang, 2017; Washington, 2008), stellten kürzlich veröffentlichte Forschungsarbeiten diesen in Frage. So lieferten diese empirische Evidenz für die Annahme, dass geschlechterbezogene Einstellungen von Männern nicht durch die Vaterschaft einer Tochter *per se* (Allgemeiner Tochtereffekt), sondern allein durch die Vaterschaft einer erstgeborenen Tochter (Erstgeborene Tochtereffekt) beeinflusst werden (z.B. Sharrow et al., 2018). Vor dem Hintergrund der gemischten empirischen Befunde und der unterschiedlichen Vorhersagen der Erklärungsansätze lautete daher eine zentrale Forschungsfrage (FF) der ersten Studie:

**FF1:** Lässt sich ein signifikanter Zusammenhang zwischen der Vaterschaft einer Tochter *per se* (unter Inkaufnahme der methodischen Schwächen dieser Betrachtung) und geschlechterbezogenen Einstellungen im beruflichen Kontext nachweisen? Und wenn ja: Welche Rolle spielt die Geburtenreihenfolge für die Stärke des Zusammenhangs?

### 3.2. Anzahl der Töchter

Zudem treffen die Erklärungsansätze unterschiedliche Vorhersagen bezüglich der Bedeutung der Anzahl der Töchter eines Mannes. Als einziger der vier Erklärungsansätze geht der Perspektivenübernahmeansatz dabei nicht von einem proportionalen Anstieg der Stärke des Tochtereffekts

mit jeder weiteren Tochter aus (siehe Kapitel 2.4). Doch ist tatsächlich - wie von einem Perspektivenübernahmeansatz angenommen - nur die Veränderung von *keiner* Tochter zu *einer* Tochter entscheidend? Bisherige Forschungsarbeiten lieferten initiale Evidenz für diese Annahme. So ließen sich in bisherigen Studien vor allem Einstellungsunterschiede zwischen Vätern ohne Töchter und Vätern mit mindestens einer Tochter nachweisen. Wie viele Töchter ein Mann hatte, beeinflusste die absolute Größe der Einstellungsunterschiede hingegen nur marginal (z.B. Cronqvist und Yu, 2017). Andere Studien wiederum sprachen für einen Anstieg der Stärke des Tochtereffekts mit jeder weiteren Tochter (z.B. Washington, 2008). Vor dem Hintergrund der gemischten empirischen Befunde und der unterschiedlichen Vorhersagen der Erklärungsansätze lautete daher eine weitere Forschungsfrage:

**FF2.** Welche Rolle spielt die Anzahl der Töchter für die Stärke (bzw. das Auftreten) eines Tochtereffekts?

### 3.3. Soziale Vater-Kind Beziehung

Mit Ausnahme des Altruismus-Ansatzes gehen alle Erklärungsansätze von einer zentralen Bedeutung der Qualität der sozialen Vater-Kind Beziehung aus (siehe Kapitel 2.4). Demnach sollten geschlechterbezogene Einstellungen von Vätern vor allem dann durch eine (erstgeborene) Tochter beeinflusst werden, wenn eine enge soziale Beziehung zu dieser besteht. Meines Wissens wurde die Qualität der sozialen Vater-Kind Beziehung in noch keiner der bisherigen Studien zum Tochtereffekt berücksichtigt. Ob und wie sich die Qualität der Vater-Kind Beziehung auf die angenommenen Zusammenhänge auswirkt, sollte daher ebenfalls Gegenstand einer Forschungsfrage der vorliegenden Arbeit sein:

**FF3.** Welche Rolle spielt die Qualität der sozialen Vater-Kind Beziehung für die Stärke (bzw. das Auftreten) eines Tochtereffekts?

## 4. Methode

### 4.1. Stichprobe

Für die Teilnahme an der Studie wurden berufstätige und ehemals berufstätige Väter rekrutiert. Zur Akquirierung der Teilnehmer wurden ein unternehmensinterner Mail-Verteiler, berufliche soziale Netzwerke sowie persönliche Kontakte genutzt. Kontrollfragen zu Beginn der Studie stellten sicher, dass weibliche und kinderlose Teilnehmende vorzeitig aus der Studie ausgeschlossen wurden. Sechs Teilnehmer konnten die Forschungsfrage (Einstellungen in Abhängigkeit des Geschlechts der Kinder) korrekt benennen und wurden auf Grund der potenziellen Verzerrung durch *Demand Characteristics* (zu Deutsch: Anforderungsmerkmale) für weitere Analysen ausgeschlossen. Keine Notwendigkeit bestand im Ausschluss weiterer Teilnehmer auf Grund mangelnder Sorgfalt bei der Fragebogenbearbeitung oder sprachlicher Barrieren. So füllten die Teilnehmer die Studie im Mittel mit einer hohen Sorgfalt aus ( $M = 6.20$ ,  $SD = 0.85$ ,  $Min = 3$ ,  $Max = 7$ ;

theoretisches Range:  $1(\text{überhaupt nicht sorgfältig}) - 7(\text{sehr sorgfältig})$ ) und gaben an, seit mindestens 12 Jahren Deutsch zu sprechen.

Das finale Sample bestand somit aus 184 Teilnehmern mit einem mittleren Alter von 49.50 Jahren ( $SD = 8.49$ ,  $Min = 25$ ,  $Max = 72$ ). Das Ziel, primär berufstätige Führungskräfte und somit Entscheidungsträger in der beruflichen Praxis für die Studie zu akquirieren, wurde erfüllt. So war die Mehrzahl der Teilnehmer in Vollzeit berufstätig (93%) und hatte zum Zeitpunkt der Befragung (oder zu einem früheren Zeitpunkt in der Karriere) eine leitende Funktion am Arbeitsplatz inne (88%). Ferner kennzeichnete sich die Stichprobe durch eine überdurchschnittlich hohe Bildung. So verfügte etwa die Hälfte (51%) der Teilnehmer über einen Hochschulabschluss oder eine Promotion (siehe Anhang B2 für detaillierte demographische Angaben zur Stichprobe). Die Mehrzahl der Teilnehmer gab an, verheiratet zu sein (75%) und zwischen einem und fünf Kinder zu haben ( $M = 1.84$ ,  $SD = 0.73$ ). Das Verhältnis männlicher (51%) und weiblicher (49%) Kinder entsprach dabei den relativen Häufigkeiten, die auf Grund der natürlichen Geburtenraten in Deutschland erwartet wurden (Statistisches Bundesamt, 2019b).

### 4.2. Ablauf

Alle Instruktionen und Präsentationen der Studie wurden in das Online-Portal *unipark.de*, der akademischen Software von *Questback*, implementiert. Die mittlere Bearbeitungszeit der Online-Studie betrug 11 Minuten und 42 Sekunden<sup>1</sup>. Unter allen Teilnehmern wurden Amazon Gutscheine (2x10 Euro) verlost und eine Spende an eine wohltätige Organisation für jede Teilnahme versprochen. Nach einem kurzen Willkommenstext wurden die Teilnehmer zunächst gebeten, eine Einwilligungserklärung zu bestätigen, welche sie über ihre Rechte als Versuchsperson informierte und die vollständige Anonymität der Daten zusicherte. Im Anschluss an die Erhebung grundlegender demographische Daten (z.B. Alter, Bildungsstand) sowie weiterer Kontrollvariablen (z.B. politische Orientierung) erfolgte die Erfassung geschlechterbezogener Einstellungen mit Hilfe von vier abhängigen Variablen (siehe Kapitel 4.3 Material). Die zentralen Familienstrukturvariablen (z.B. Geschlecht und Anzahl der Kinder, Qualität der sozialen Vater-Kind Beziehung) wurden erst nach der Erhebung der abhängige Variablen erfasst, um die Wahrscheinlichkeit zu reduzieren, dass sich die Teilnehmer der zu Grunde liegenden Forschungsfrage bewusst wurden. Am Ende der Studie wurde den Teilnehmern für ihre Teilnahme gedankt und die Möglichkeit zur Teilnahme an dem Gewinnspiel (Verlosung von Amazon-Gutscheinen) geboten.

### 4.3. Material

#### 4.3.1. Einstellungen gegenüber Frauen in Führungspositionen (FiFp)

Mit Hilfe einer übersetzten und adaptierten Form der *Women as Manager Scale (WAMS; Peters et al., 1974)* wurden

<sup>1</sup> Es wird der Median der Bearbeitungszeit auf Grund dessen geringeren Anfälligkeit für Ausreißer mit einer sehr hohen Bearbeitungszeit (> 40 Minuten) berichtet (vgl. Bortz, 2005)

Einstellungen gegenüber Frauen in Führungspositionen erfasst. Die WAMS in ihrer Originalform umfasst 21 Einstellungsitems speziell zu Frauen in Managementpositionen und wurde bereits in einer Vielzahl von Studien in diversen Stichproben genutzt, darunter sowohl Studierende als auch Mitarbeitende und Führungskräfte (z.B. Cortis und Cassar, 2005; Elsaid und Elsaid, 2012). Ergebnisse bisheriger Studien sprachen dabei für die Reliabilität der Skala (Cronbach's  $\alpha > .85$ , z.B. Terborg et al., 1977). Gleichzeitig wurde die Skala jedoch auf Grund ihrer hohen Transparenz und der daraus resultierenden hohen Anfälligkeit für soziale Erwünschtheit kritisiert (z.B. Herbert und Yost, 1978). So zeigte sich gerade in Stichproben mit hoch gebildeten Teilnehmenden eine hohe positive Schiefe der Skala mit Deckeneffekten am egalitären, non-sexistischen Pol der Skala (vgl. Eckes, 2010). Zudem zeigten sich signifikante Korrelationen zu Skalen, die die Tendenz sozial erwünscht zu antworten, erfassen (Herbert & Yost, 1978). Aus diesem Grund musste die Sensitivität der Skala zur Erfassung stereotyper Einstellungen in der vorliegenden Studie (Managerstichprobe mit überdurchschnittlicher Bildung) in Frage gestellt werden, weshalb ich mich für die Verwendung einer adaptierten Form der Skala entschied. Die Adaptation hatte zum Ziel, die Items stärker an kulturelle und zeitliche Veränderungen im 21. Jahrhundert anzupassen und einem Streben nach sozialer Erwünschtheit und politischer Korrektheit entgegenzuwirken. Dazu wurde eine gekürzte Form mit nur 15 Items verwendet (siehe Tabelle A1.1 im Anhang für eine Übersicht der verwendeten Items), die Items ausschloss, die von den Teilnehmern als unpassend erlebt werden könnten (z.B. „Menstruationsprobleme sollten Frauen nicht zu weniger wünschenswerten Arbeitnehmern machen“). Ferner wurde auf eine absolute Eigenschaftszuweisung verzichtet und eine graduelle Abstufung verwendet. So sollten die Teilnehmer jeweils auf einer siebenstufigen Skala angeben, inwiefern sie glauben, dass die beschriebenen Aussagen (z.B. „Eine herausfordernde Tätigkeit ist wichtiger für...“) auf *eher Männer (1)*, *beide Geschlechter gleichermaßen (4)* oder *eher Frauen (7)* zutreffen. Die Konstruktion der Skala orientierte sich dabei an Prozentschätzverfahren, im Rahmen derer angegeben werden soll, auf wie viel Prozent der Frauen (bzw. Männer) ein Merkmal in der Gesellschaft zutrifft. So konnte mehrfach gezeigt werden, dass Verfahren, die zu solchen graduellen Abstufungen auffordern (im Vergleich zu Verfahren, die eine absolute Eigenschaftszuweisung erfordern), auf weniger Widerstände bei den Teilnehmenden stoßen und Tendenzen, sozial erwünscht zu antworten, reduzieren (vgl. Eckes, 2010).

#### 4.3.2. Einstellung zu Frauenförderung

Mit Hilfe einer eigens kreierte Skala wurden Einstellungen der Teilnehmer zu verschiedenen Frauenfördermaßnahmen am Arbeitsplatz erfasst. Die Konstruktion der Skala orientierte sich dabei an der Konzeptualisierung des *modernen Sexismus* (Swim et al., 1995). Nach der Definition des modernen Sexismus zeigen sich sexistische, non-egalitäre Einstellungen in der heutigen Gesellschaft nur noch selten in der Abwertung und Stereotypisierung von Frauen (*traditioneller*

*Sexismus*), sondern primär in einem Widerstand gegen vermeintliche Privilegien von Frauen (Swim et al., 1995). Dieser Definition folgend, sollte moderner Sexismus Ausdruck in einer geringen Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz finden. Das Ziel der Studie bestand daher in der Erfassung von Einstellungen zu Frauenfördermaßnahmen mit einer hohen praktischen Relevanz sowie einer hohen inhaltlichen Bandbreite. So wurden Einstellungen zu Maßnahmen erfasst, die aktuell in der Wirtschaft kontrovers diskutiert werden und eine Vielzahl von Themenfeldern wurden abgedeckt, wie etwa Frauenquote und Bezahlung (z.B. „In Deutschland sollte es eine flächendeckende Frauenquote geben...“), Rekrutierung und Mentoring (z.B. „Unternehmen sollten Förderinstrumente speziell für Frauen anbieten.“) sowie Sprache und Organisationskultur (z.B. „In Unternehmen sollte auf eine geschlechtergerechte Sprache geachtet werden.“). Familienfördermaßnahmen (z.B. „Der Arbeitgeber sollte Eltern bei der Kinderbetreuung aktiv unterstützen“) wurden ebenfalls unter dem Begriff der Frauenförderung subsumiert (vgl. Stahlberg et al., 2009). Eine weitere Dimension des modernen Sexismus ist gekennzeichnet „durch ein Abstreiten, dass sexuelle Diskriminierung weiterhin als Problem besteht, Feindseligkeit gegenüber Frauengruppierungen und durch den Glauben daran, dass Regierung und Medien sich zu sehr mit Maßnahmen für Frauen beschäftigen.“ (Plous, 2003, S. 10). Entsprechend dieser Konzeptualisierung wurden fünf negativ gepolte Items (z.B. „Dem Thema Frauenförderung wird bereits zu viel Aufmerksamkeit geschenkt“) in die Skala inkludiert. Zwei dieser Items sind dabei in Anlehnung an die *Skala zur Leugnung von Diskriminierung* (Eckes & Six-Materna, 1998) entstanden (siehe Tabelle A1.2 im Anhang). Zur Abstufung der Einstellung stand den Teilnehmern eine Likert-Skala von *stimme überhaupt nicht zu (1)* bis *stimme voll und ganz zu (7)* zur Verfügung.

#### 4.3.3. Das Koryphäenproblem

Die Lösungswahrscheinlichkeit des Koryphäenproblems wurde als innovativer Indikator zur Erfassung impliziter geschlechterbezogener Einstellungen im beruflichen Kontext genutzt. Das Koryphäenproblem hatte den folgenden Wortlaut:

Ein Vater und sein Sohn fahren gemeinsam im Auto und haben einen schweren Autounfall. Der Vater ist sofort tot. Der Sohn wird mit Blaulicht ins Krankenhaus gefahren und sofort in den Operationssaal gebracht. Der Arzt besieht ihn sich kurz und meint, man müsse eine Koryphäe zu Rate ziehen. Diese kommt, sieht den jungen Mann auf dem Operationstisch und meint: **„Ich kann ihn nicht operieren, er ist mein Sohn.“**

Die als richtig Konzeptualisierte Lösung des Rätsels ist, dass die Koryphäe die Mutter des Kindes ist.<sup>2</sup> Die Schwierigkeit, das Rätsel zu lösen, besteht darin, sich von der impliziten Assoziation *Koryphäe = Status = männlich* (vgl. TMTM-

<sup>2</sup> Antworten wie *homosexuelles Paar*, *Stiefvater*, *Adoptivvater*, *geistlicher Vater* etc. sind zwar prinzipiell nicht unmöglich, wurden jedoch in Bezug auf die Fragestellung der Masterarbeit als falsch Konzeptualisiert.



Stereotyp, Schein, 1973) zu lösen. So werden Koryphäen hohe Kompetenz und ein hoher Status zugeschrieben. Dabei handelt es sich um Kompetenzeigenschaften (*Agency*), die stärker mit Männern im Vergleich zu Frauen assoziiert werden (siehe Kapitel 1.2). Durch den Begriff der Koryphäe wird folglich das männliche Stereotyp aktiviert - das für die richtige Lösung relevante Charakteristikum *männliches Geschlecht* der Koryphäe scheint vorab bestätigt. Auf der Suche nach der richtigen Lösung werden folglich primär männliche Exemplare berücksichtigt (z.B. Adoptivvater). Die Herausforderung besteht damit darin, das Problem so umzuinterpretieren, dass das Geschlecht der Koryphäe nicht als gegeben gesehen wird (Kollmayer, 2012). Dieses Umdenken sollte leichter fallen, je weniger Geschlechterstereotype im beruflichen Kontext (unbewusst) verinnerlicht wurden.

Trotz der vermeintlichen Einfachheit der Lösung, zeigten Teilnehmende in bisherigen Studien Schwierigkeiten, das Koryphäenproblem richtig zu lösen. So gelang die richtige Lösung in einer Studie von Stoeger et al. (2004) nur 32% der teilnehmenden Personen. Wurde eine umgekehrte Version verwendet, in der von der Mutter beim Autounfall die Rede war, konnten hingegen mehr als 80% der teilnehmenden Personen das Koryphäenproblem richtig lösen. Dies reduziert die Plausibilität von Alternativerklärungen, wie etwa einem allgemeinen Unverständnis der Fragestellung oder mangelnder Konzentration bei der Bearbeitung. In der vorliegenden Version des Rätsels wurde ferner explizit auf die Nutzung des *generischen Maskulinums* (z.B. der Spezialist) verzichtet und ein grammatikalisch weibliches Wort (die Koryphäe) verwendet. Unter dem generischen Maskulinum versteht man in der Linguistik die übergreifende Nutzung eines maskulinen Nomens oder Pronomens, wenn das Geschlecht der Person nicht bekannt oder nicht von Bedeutung ist (Braun et al., 2005). Konsistent mit Annahmen der feministischen Linguistik konnte wiederholt eine Bindung zwischen dem grammatikalischen und dem natürlichen Geschlecht gezeigt werden. So führt die Verwendung des generischen Maskulinums zu einer erhöhten Verfügbarkeit männlicher Exemplare im Gedächtnis, sowohl beim Sprechenden, als auch bei den Zuhörerenden (z.B. Braun et al., 2005; Moulton et al., 1978). Durch die explizite Nutzung einer grammatikalisch weiblichen Form (die Koryphäe statt der Spezialist) wurde daher in der vorliegenden Version des Rätsels sichergestellt, dass die Schwierigkeit, das Rätsel zu lösen, nicht allein auf linguistische Charakteristika des Satzes zurückgeführt werden kann.

Zur Beantwortung der Frage, ob das Rätsel lösbar ist, stand den Teilnehmern ein offenes Antwortformat zur Verfügung. Um zu verhindern, dass Teilnehmer die richtige Lösung recherchierten, wurde ein Zeitlimit von zwei Minuten gesetzt. Weitere Kontrollvariablen erfassten die Vorkenntnis des Rätsels sowie die allgemeine Rätsellöseaffinität und Rätsellösekompetenz der Teilnehmer (Erfahrung mit und Spaß an der Lösung von Rätseln).

#### 4.3.4. Spendenverhalten

Die von den Teilnehmern ausgewählte wohltätige Organisation, an welche die Spende für die Teilnahme erfolgen

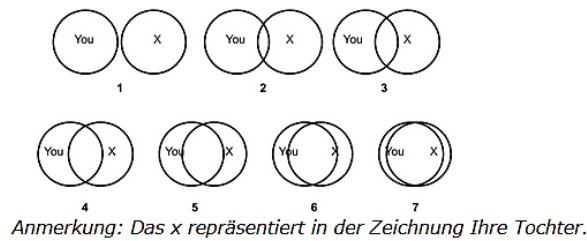
sollte, diente als weitere abhängige Variable. Die Teilnehmer hatten die Möglichkeit zwischen zwei Stiftungen (*Verein zur beruflichen Förderung von Frauen* oder *Verein für Bildung und Wissenschaft*) zu wählen. Zusätzlich bestand die Möglichkeit, sich gegen eine Spende zu entscheiden. Die Erfassung des Spendenverhaltens diente dabei als implizites Einstellungsmaß. So erfolgte eine indirekte Ableitung impliziter Einstellungen aus einer Verhaltensweise (Spende an eine Frauenförderorganisation), welche in Zusammenhang mit dem erfassten Einstellungsobjekt (geschlechterbezogene Einstellungen im beruflichen Kontext) stand. Ein vergleichbares Vorgehen wurde bereits in Studien zur Erfassung prosozialer Einstellungen erfolgreich angewandt (vgl. Schindler et al., 2014).

#### 4.3.5. Soziodemographische Variablen und Kontrollvariablen

Neben soziodemographischen Daten (z.B. Alter, Bildungsabschluss, Erwerbstätigkeit) wurde die politische Orientierung der Teilnehmer mit Hilfe der *Left-Right Self-Placement-Skala* (Breyer, 2015) erfasst. Diese bat die Teilnehmer um die Einstufung ihrer politischen Orientierung auf einer zehnstufigen Skala von *links* nach *rechts*. Auf Grund der ökonomischen Erfassung sowie der hohen Prädiktivität für politische Einstellungen in Bezug auf eine Vielzahl von Themen (vgl. Kroh, 2007) wurde das Maß bereits mehrfach in gesellschaftlichen und politischen Umfragen genutzt (z.B. ALLBUS, vgl. Breyer, 2015). Die Erfassung der politischen Orientierung als Kontrollvariable erfolgte, da Studien wiederholt einen Zusammenhang zwischen der politischen Orientierung von Individuen und deren geschlechterbezogenen Einstellungen zeigen konnten (siehe Kapitel 1.3). Weiterhin wurde die Familienstruktur der Teilnehmer erfasst, darunter die Geschlechterkonstellation der Kinder, die Anzahl und das Alter der Kinder, die bestehenden Wohnverhältnisse sowie die Qualität der sozialen Vater-Kind Beziehung. Zur Erfassung der Qualität der Vater-Kind Beziehung wurde die *Inclusion of the Other in the Self scale (iOS-scale)* (Aron et al., 1992) herangezogen. Bei der iOS-Skala handelt es sich um ein ökonomisches, häufig genutztes Maß zur Erfassung der (subjektiven) Enge sozialer Beziehungen, dessen konvergente Validität mehrfach gezeigt werden konnte (Gächter et al., 2015). Aus einem Set sich unterschiedlich stark überlappenden Kreise (siehe Abbildung 1), die jeweils das eigene Ich (*You*) sowie das Kind (*x*) symbolisierten, sollten Teilnehmer die Zeichnung auswählen, die die Beziehung zu ihrem Kind am besten beschreibt. So drückten niedrige Werte auf der Skala (sich nicht überlappende Kreise) eine schwache soziale Beziehung zur Tochter/zum Sohn aus, während sich eine enge soziale Beziehung zur Tochter/dem Sohn in hohen Werten (sich stark überlappende Kreise) abbilden sollte. Hatten Teilnehmer mehrere Kinder des gleichen Geschlechts wurde aus ökonomischen Gründen nur die Qualität der sozialen Beziehung zu der jüngsten und ältesten Tochter beziehungsweise dem jüngsten und ältesten Sohn abgefragt.



Bitte wählen Sie die Zeichnung aus, die Ihre Beziehung zu Ihrer Tochter am besten beschreibt.



Zeichnung 1  Zeichnung 2  Zeichnung 3  Zeichnung 4  Zeichnung 5  Zeichnung 6  Zeichnung 7

**Abbildung 1:** Inclusion of the Other in the Self (ios) - Skala in Anlehnung an Aron et al. (1992).  
Abgebildet ist die Darstellung für Väter mit einer Tochter.

## 5. Ergebnisse

Aufgrund der Nutzung stark adaptierter oder neu kreierter Skalen erfolgte zunächst eine umfassende Prüfung der Reliabilität sowie der konvergenten Validität der genutzten Skalen. Im Anschluss werden die Ergebnisse der Studie hypothesenorientiert vorgestellt.

### 5.1. Skalenanalyse

#### 5.1.1. FiFp

Invers gepolte Items wurden zunächst so rekodiert, dass hohe Werte eine positive Einstellung zu Frauen in Führungspositionen ausdrückten. Reliabilitätsanalysen sprachen für eine mit Cronbach's  $\alpha = .76$  akzeptable interne Konsistenz (vgl. Konventionen nach Blanz, 2015) der 15 Items umfassenden Skala. Detaillierte Analysen auf Itemebene indizierten jedoch eine geringe Trennschärfe des Items: „Zu weniger erwünschten Arbeitnehmern macht eine Elternschaft...“. So korrelierte das Item nur schwach und nicht signifikant mit den anderen Items der Skala:  $r_{i(t-1)} = .15, p = .08, n.s.$  Dabei lag die Hypothese nahe, dass die geringe Trennschärfe des Items auf die komplexe Satzkonstruktion und einer daraus resultierenden schweren Verständlichkeit zurückzuführen ist. Qualitative Analysen von post hoc durchgeführten Teilnehmerbefragungen bestätigten die Annahme, dass das Item für viele Teilnehmer schwer verständlich oder missverständlich formuliert war. Auf Grund der unklaren Interpretation des Items auf Seiten der Teilnehmer wurde dieses für weitere Analysen ausgeschlossen und die Berechnung des Skalenmittelwerts erfolgte mit den 14 verbleibenden Items (siehe Tabelle A1.1 im Anhang für deskriptive Statistiken). Durch den Ausschluss des Items stieg die interne Konsistenz der Skala auf Cronbach's  $\alpha = .78$  an. Der über alle Teilnehmer gemittelte Skalenmittelwert wich mit  $M = 3.78 (SD = 0.36)$  signifikant vom Skalenmittelpunkt (4: beide Geschlechter gleichermaßen) ab:  $t(183) = -8.05, p < .001, d = 0.59$ . Im Mittel zeigten die Teilnehmer somit positivere Einstellungen gegenüber Männern in Führungspositionen und schrieben diesen

im Vergleich zu Frauen eine höhere Führungskompetenz und Karrieremotivation zu.

#### 5.1.2. Frauenförderung

Negativ gepolte Items der neu entwickelten Skala wurden zunächst so rekodiert, dass hohe Werte eine Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz ausdrückten. Die interne Konsistenz der 16 Items umfassenden Skala lag mit Cronbach's  $\alpha = .86$  nach Blanz (2015) in einem guten bis sehr guten Bereich. Das Item „Sexuelle Belästigung sollte stärkere Konsequenzen für die belästigende Person haben“ zeigte bei Analysen auf Itemebene eine geringe Trennschärfe:  $r_{i(t-1)} = .23$ . Die geringe Trennschärfe konnte auf einen statistischen Deckeneffekt zurückgeführt werden. So lag der Mittelwert des Items mit  $M = 6.34 (SD = 1.1)$  am oberen, egalitären Pol der siebenstufigen Skala. Dies ist inhaltlich plausibel, da eine hohe Zustimmung zu diesem Item hoch sozial erwünscht ist und zudem mit einer hohen Wahrscheinlichkeit der inneren Grundhaltung einer Vielzahl der Teilnehmer entspricht. Auf Grund der inhaltlichen und statistischen Plausibilität der geringen Trennschärfe des Items wurden alle 16 Items zur Berechnung des Skalenmittelwerts herangezogen. Dieser wich mit  $M = 4.52 (SD = 0.97)$  signifikant vom Skalenmittelpunkt (4: neutraler Punkt der Zustimmung) ab:  $t(183) = 7.30, p < .001, d = 0.54$  und indizierte, dass die Teilnehmer im Mittel eine Befürwortung der erfassten Frauenfördermaßnahmen am Arbeitsplatz zeigten.

#### 5.1.3. Koryphäenproblem

Zur Erfassung der Lösungswahrscheinlichkeit des Koryphäenproblems wurden die offenen Antworten der Teilnehmer zunächst dummy-kodiert (0: falsche Lösung, 1: richtige Lösung). Die Kodierung der offenen Antworten erfolgte durch zwei unabhängige Bewerter, zwischen welchen mit einer Interrater-Reliabilität von  $k = .96$  eine substantielle Urteilerübereinstimmung bestand (vgl. Cohen, 1960). Die Kodierung der Antworten mit diskrepanten Kodierungen erfolgte durch Konsensbildung. Sieben Antworten waren nicht eindeutig kodierbar und wurden daher als fehlende Werte (-99:

*Missing Value*) gewertet. Das Rätsel war in der Stichprobe hinreichend unbekannt mit nur 12 Teilnehmern (7%), die angaben, das Rätsel bereits zu kennen. Um eine Konfundierung zwischen der Vorkenntnis des Rätsels und der Lösungswahrscheinlichkeit zu verhindern, wurden in weiteren Analysen ausschließlich Teilnehmer berücksichtigt, die angaben, das Rätsel noch nicht zu kennen ( $n = 165$ ). 25% dieser konnten das Koryphäenproblem richtig lösen, während die Mehrzahl (75%) eine falsche oder keine Lösung nannte. Als Kontrollvariable wurden zudem drei Items zur allgemeinen Erfahrung mit und dem Spaß am Lösen von Rätseln erfasst (siehe Abbildung A2.2 im Anhang). Eine explorative Faktorenanalyse mit orthogonaler VARIMAX-Rotation zeigte, dass eine Reduktion der drei Items zu einem übergeordneten Faktor möglich war. So konnte ein übergeordneter Rätsellösekompetenzfaktor 67% der Varianz der drei Variablen aufklären und vereinte substantielle Ladungen aller Variablen ( $l_s = >.78$ ) auf sich. Daher erfolgte die Zusammenfassung der Items in einen allgemeinen Rätsellösekompetenzwert, der als Maß in weiteren Analysen diene.

#### 5.1.4. Spendenverhalten

Weniger als ein Viertel der Teilnehmer (22%) entschied sich für die Spende an einen Verein zur beruflichen Förderung von Frauen. Die Mehrzahl der Teilnehmer entschied sich hingegen gegen eine Spende an eine Frauenorganisation, indem sie eine Spende an einen Verein für Bildung und Wissenschaft wählten (70%) oder sich gegen eine Spende (8%) entschieden. Für weitere Analysen wurden die letzten beiden Gruppen zusammengefasst und eine Unterscheidung erfolgte ausschließlich in Bezug auf die (für die Hypothese kritische) Verhaltensintention: *Unterstützung Frauenförderung*: 0: nein (78%) vs. 1: ja (22%).

#### 5.1.5. Bivariate Korrelationen

Zur Prüfung der konvergenten Validität der Skalen wurden bivariate Korrelationen zwischen den vier abhängigen Variablen zur Erfassung geschlechterbezogener Einstellungen im beruflichen Kontext berechnet (siehe Tabelle 2). Dabei zeigte sich eine signifikante mittlere Korrelation (vgl. Cohen, 1988) zwischen den beiden expliziten Maßen ( $r(182) = .41, p < .001$ ), welche indiziert, dass Teilnehmer mit positiven Einstellungen gegenüber Frauen in Führungspositionen auch eine stärkere Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz zeigten. Zudem ließen sich signifikante Zusammenhänge zwischen der Lösungswahrscheinlichkeit des Koryphäenproblems und den beiden expliziten Maßen nachweisen:  $r_{pb}(163) = .20 - .25, p_s < .001$ . Die positiven Korrelationen zeigten, dass das Koryphäenproblem eher von Teilnehmern gelöst wurde, die im Selbstbericht (FiFp, Frauenförderung) egalitäre geschlechterbezogene Einstellungen berichteten. Zudem entschieden sich Teilnehmer mit positiven Einstellungen zu Frauen in Führungspositionen und Frauenfördermaßnahmen häufiger für eine Spende an eine Frauenförderorganisation:  $r_{pb}(182) = .20 - .47, p_s < .001$ . Die im Selbstbericht erfassten Einstellungen spiegelten sich

somit auch in einer konkreten Verhaltensmessung (Spendenverhalten) wider. Ebenfalls bestand ein signifikanter positiver Zusammenhang zwischen dem Spendenverhalten und der Lösungswahrscheinlichkeit des Koryphäenproblems:  $r_\phi(1) = .19, p < .05$ . Somit zeigten sich signifikante positive Korrelationen zwischen allen vier Variablen, die die Erfassung geschlechterbezogener Einstellungen im beruflichen Kontext zum Ziel haben (konvergente Validität).

#### 5.2. Prüfung der Hypothesen

Da der Fokus der Analysen, basierend auf methodischen (siehe Kapitel 2.1) und theoretischen Überlegungen (siehe Kapitel 2.4) auf einem Vergleich zwischen Vätern erstgeborener Töchter und Vätern erstgeborener Söhne liegen sollte, wurde zunächst eine Dummy-Variable (*Geschlecht des erstgeborenen Kindes*: 0: Sohn,  $n = 90$  vs. 1: Tochter,  $n = 91$ )<sup>3</sup> gebildet. Hypothesenorientiert erfolgte mit Hilfe dieser Variablen die Prüfung von Einstellungsunterschieden zwischen Vätern, in Abhängigkeit des Geschlechts des erstgeborenen Kindes, in Bezug auf alle vier abhängige Variablen zur Erfassung geschlechterbezogener Einstellungen (FiFp, Frauenförderung, Koryphäenproblem, Spendenverhalten).

Hypothese 1 nahm an, dass sich die Einstellungen von Vätern gegenüber Frauen in Führungspositionen in Abhängigkeit des Geschlechts des erstgeborenen Kindes unterscheiden. Die Ergebnisse lieferten jedoch keine Evidenz für diese Annahme. So zeigten zwar Väter erstgeborener Töchter deskriptiv leicht positivere Einstellungen gegenüber Frauen in Führungspositionen im Vergleich zu Vätern erstgeborener Söhne (siehe Tabelle 3), der Unterschied war jedoch nicht signifikant:  $t(179) = 1.06, p = .29, n.s.$

Hypothese 2 nahm an, dass die Vaterschaft einer erstgeborenen Tochter (im Vergleich zur Vaterschaft eines erstgeborenen Sohnes) mit einer stärkeren Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz einhergeht. Die Einstellung zu Frauenfördermaßnahmen als abhängige Variable nutzend, waren die Ergebnisse sowohl deskriptiv als auch inferenzstatistisch konsistent mit dieser Annahme. So zeigten Väter einer erstgeborenen Tochter eine signifikant stärkere Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz im Vergleich zu Vätern eines erstgeborenen Sohnes:  $t(179) = 2.03, p = .04, d = 0.31$  (siehe Tabelle 3).

Hypothese 3 nahm an, dass Väter erstgeborener Töchter das Koryphäenproblem signifikant häufiger lösen als Väter erstgeborener Söhne. Die Hypothese wurde mit Hilfe einer logistischen Regression unter Aufnahme der mittleren Rätsellösekompetenz der Teilnehmer ( $z$ -standardisiert) als Kovariate im Modell geprüft. Das Gesamtmodell indizierte eine signifikante Vorhersageleistung:  $\chi^2(2, N = 162) = 10.01, p = .01, Nagelkerke Index of NK = .09$ . Eine Analyse der Prädiktoren im Modell zeigte jedoch, dass nur die mittlere Rätsellösekompetenz der Teilnehmer die Lösungswahrscheinlichkeit

<sup>3</sup> 3 Teilnehmer mussten für die Analysen ausgeschlossen werden, da das Geschlecht des erstgeborenen Kindes nicht eindeutig identifizierbar war. So gaben die Teilnehmer für das älteste männliche und das älteste weibliche Kind ein identisches Alter an.

**Tabelle 2:** Bivariate Korrelationen zwischen den vier abhängigen Variablen zur Erfassung geschlechterbezogener Einstellungen.

| Variable                          | (1)   | (2)   | (3)  |
|-----------------------------------|-------|-------|------|
| (1) FiFp                          | (.78) |       |      |
| (2) Frauenförderung               | .41** | (.86) |      |
| (3) Koryphäenproblem <sup>1</sup> | .20** | .25** |      |
| (4) Spende                        | .20*  | .47** | .19* |

Anmerkung. \*  $p < .05$ , \*\*  $p < .001$ , zweiseitige Signifikanztestung,  $N = 184$ .

FiFp: Einstellung zu Frauen in Führungspositionen <sup>1</sup> Nur Teilnehmer ohne Rätselvorkenntnis,  $n = 165$ . Die Reliabilität der expliziten Maßen findet sich in Klammern entlang der Diagonalen.

**Tabelle 3:** Deskriptive Statistiken der vier abhängigen Variablen zur Erfassung geschlechterbezogener Einstellungen als Funktion des Geschlechts des erstgeborenen Kindes.

| Abhängige Variable | Geschlecht erstgeborenes Kind |             | N   |
|--------------------|-------------------------------|-------------|-----|
|                    | Tochter                       | Sohn        |     |
| FiFp               | 3.81 (0.39)                   | 3.75 (0.35) | 181 |
| Frauenförderung    | 4.67 (1.01)                   | 4.37 (0.91) | 181 |
| Koryphäenproblem   | 0.26 (0.44)                   | 0.25 (0.44) | 162 |
| Spende             | 0.26 (0.44)                   | 0.19 (0.39) | 181 |

Anmerkung. Dargestellt sind Mittelwerte und Standardabweichungen (*kursiv, in Klammern*) der abhängigen Variablen. FiFp/Frauenförderung: Hohe Werte drücken positive Einstellungen zu Frauen in Führungspositionen (FiFp)/Frauenförderung aus (Skala 1–7). Koryphäenproblem/Spende: Die Mittelwerte sind als Wahrscheinlichkeiten der mit 1 kodierten Kategorie (Richtige Lösung, Spende an Frauenförderorganisation) interpretierbar.

des Koryphäenproblems signifikant vorhersagen konnte ( $b = .60$ ,  $Wald = 9.17$ ,  $p = .002$ ,  $Odds Ratio = 1.82$ ), nicht jedoch das Geschlecht des erstgeborenen Kindes ( $b = -.03$ ,  $Wald = 0.01$ ,  $p = .93$ , *n.s.*,  $Odds Ratio = 0.97$ ). Hypothese 3 musste folglich verworfen werden.

Hypothese 4 nahm an, dass sich Väter erstgeborener Töchter (im Vergleich zu Vätern erstgeborener Söhne) signifikant häufiger für eine Spende an eine Frauenförderorganisation entscheiden. Rein deskriptiv zeigte sich das postulierte Ergebnismuster mit 26% der Väter erstgeborener Töchter, die sich für eine Spende an die Frauenförderorganisation entschieden im Vergleich zu nur 19% der Väter erstgeborener Söhne. Das Geschlechts des erstgeborenen Kindes erwies sich jedoch auf einer inferenzstatistischen Ebene nicht als signifikanter Prädiktor des Spendenverhaltens:  $b = .43$ ,  $Wald = 1.44$ ,  $p = .23$ , *n.s.*,  $Odds Ratio = 1.54$ .

Die Vaterschaft einer erstgeborenen Tochter sagte folglich ausschließlich die Einstellung zu Frauenfördermaßnahmen am Arbeitsplatz signifikant vorher (H2), nicht jedoch die Einstellung zu Frauen in Führungspositionen (H1) oder die auf einer impliziten Ebene erfassten geschlechterbezogenen Einstellungen (H3 & H4). Dieses Ergebnis zeigte sich sowohl bei Nicht-Kontrolle (siehe Tabelle 4), als auch bei Kontrolle für die politische Orientierung der Teilnehmer im Regressionsmodell (siehe Tabelle D1 im Anhang).

### 5.3. Forschungsfragen und explorative Analysen

#### 5.3.1. Geburtenreihenfolge

Eine Debatte in der empirischen Forschung betrifft die Frage, ob die Vaterschaft einer Tochter *per se* oder ausschließlich die Vaterschaft einer erstgeborenen Tochter für das Auftreten des Tochtereffekts entscheidend ist. Um einen möglichen Einfluss der Vaterschaft einer Tochter *per se* zu prüfen, wurde eine weitere Dummy-Variable gebildet, welche Väter ohne Töchter ( $n = 59$ ) und Väter mit mindestens einer Tochter ( $n = 125$ ) verglich. Gegen den Einfluss der Vaterschaft einer Tochter *per se* sprechend, konnte diese geschlechterbezogene Einstellungen im beruflichen Kontext nicht vorhersagen, weder auf expliziter noch auf impliziter Ebene ( $p_s > .40$ ; siehe Tabelle 4).

#### 5.3.2. Anzahl der Töchter

Um einen möglichen linearen Trend (= zunehmende Egalität geschlechterbezogener Einstellungen mit jeder weiteren Tochter) zu prüfen, wurde zunächst ein Quotient der Anzahl der Töchter dividiert durch die Anzahl der Kinder gebildet.<sup>4</sup> Die (an der Anzahl der Kinder relativierte) Anzahl der

<sup>4</sup> Die Relativierung an der Anzahl der Kinder ist zentral, um für einen reinen Effekt einer geschlechterunabhängigen Kinderanzahl kontrollieren zu können. So ist eine höhere Anzahl an Töchtern gleichzeitig mit einer höheren Anzahl an Kindern assoziiert, wodurch ohne eine entsprechende Relativierung Konfundierungen entstehen. So kann die Anzahl der Kinder in westlichen Ländern nicht als unabhängig von bisherigen Einstellungen der Eltern konzeptualisiert werden (vgl. Washington, 2008).

Töchter konnte die erfassten geschlechterbezogenen Einstellungen jedoch nicht signifikant vorhersagen, weder im Rahmen der berechneten linearen Regressionsanalysen (explizite Maße), noch der logistischen Regressionsanalysen (implizite Maße,  $p_s > .15$ ; siehe Tabelle 4.). Auch Korrelationsanalysen sprachen gegen einen linearen Zusammenhang zwischen der Anzahl der Töchter und der Egalität geschlechterbezogener Einstellungen von Vätern. So zeigten sich niedrige, nicht signifikante Korrelationen nahe null zwischen der Anzahl der Töchter und allen vier abhängigen Variablen ( $r = .05 - r = .10$ ,  $p_s > .15$ ; siehe Tabelle D3 im Anhang).

### 5.3.3. Soziale Beziehung

Um einen moderierenden Einfluss der sozialen Vater-Kind Beziehung zu prüfen, wurden die Daten mit Hilfe multipler Regressionsanalysen mit dem kategorialen Prädiktor *Geschlecht des erstgeborenen Kindes*, dem kontinuierlichen Prädiktor *Soziale Beziehung zum erstgeborenen Kind* sowie dem Produktterm der beiden Prädiktoren analysiert. Um Probleme der Multikollinearität zu reduzieren und eine sinnvolle Interpretation der Haupteffekte zu ermöglichen, wurde eine gewichtete Effektkodierung der kategorialen Prädiktorvariablen vorgenommen und die kontinuierliche Variable wurde z-standardisiert (vgl. Eid et al., 2010). Als abhängige Variablen dienten die beiden expliziten Maße.<sup>5</sup>

Die Einstellung zu Frauen in Führungspositionen als abhängige Variable nutzend, zeigte sich kein signifikanter Haupteffekt des Geschlechts des erstgeborenen Kindes ( $\beta = .07$ ,  $t(177) = 0.96$ ,  $p = .34$ , *n.s.*), während der Haupteffekt der sozialen Vater-Kind Beziehung auf einem 10%-Niveau Signifikanz erreichte ( $\beta = .13$ ,  $t(177) = 1.72$ ,  $p = .09$ ). Ferner zeigte sich die erwartete signifikante Interaktion der beiden Prädiktoren:  $\beta = .18$ ,  $t(177) = 2.45$ ,  $p = .01$ . Das Modell, welches einen Interaktionsterm der Prädiktoren inkludierte, lieferte dabei eine inkrementelle Varianzaufklärung ( $\Delta R^2 = .03$ ,  $p = .01$ ) im Vergleich zu einem rein additiven Modell, welches ausschließlich die Haupteffekte der Prädiktoren berücksichtigte (siehe Tabelle 5).

Der Haupteffekt der sozialen Vater-Kind Beziehung wurde somit durch die Interaktion der beiden Prädiktoren qualifiziert (siehe Abbildung 2). So zeigten *Simple Slope* Analysen für beide Stufen des dichotomen Faktors, dass die Qualität der Vater-Kind Beziehung die Einstellung zu Frauen in Führungspositionen nur für Väter mit einer erstgeborenen Tochter signifikant vorhersagen konnte ( $b = .11$ ,  $t(177) = 2.90$ ,  $p = .004$ ), nicht jedoch für Väter mit einem erstgeborenen Sohn ( $b = -.02$ ,  $t(177) = -0.53$ ,  $p = .60$ , *n.s.*). In anderen Worten: Die Einstellung zu Frauen in Führungspositionen hing von der Qualität der Vater-Tochter Beziehung ab, nicht jedoch von der Qualität der Vater-Sohn Beziehung. Dieses Muster zeigte sich, obwohl sich die im Mittel berichtete Qualität der Vater-Tochter Beziehung ( $M(SD)_{Tochter} = 5.25(1.49)$ ) nicht signifikant von der im Mittel berichteten Qualität der Vater-Sohn

Beziehung ( $M(SD)_{Sohn} = 5.04(1.53)$ ) unterschied:  $t(179) = .93$ ,  $p = .35$ , *n.s.*<sup>6</sup>

Um den vermuteten moderierenden Einfluss der sozialen Vater-Kind Beziehung (FF3) zu prüfen, wurden *Simple Slope* Analysen unter Verwendung des *PROCESS Makro* für SPSS von Hayes (2013) gerechnet. Diese prüften den Einfluss des Geschlechts des erstgeborenen Kindes auf Einstellungen zu Frauen in Führungspositionen bei unterschiedlicher Ausprägung der sozialen Vater-Kind Beziehung. Die Ergebnisse zeigten, dass das Geschlecht des erstgeborenen Kindes Einstellungen zu Frauen in Führungspositionen bei einer unterdurchschnittlich ausgeprägten sozialen Vater-Kind Beziehung nicht vorhersagen konnte ( $-1 SD: b = -.04$ ,  $t(177) = -1.05$ ,  $p = .29$ , *n.s.*), hingegen aber bei einer überdurchschnittlich ausgeprägten sozialen Vater-Kind Beziehung ( $+1 SD: b = .09$ ,  $t(177) = 2.41$ ,  $p = .02$ ; siehe Tabelle D4 im Anhang für detaillierte Ergebnisse). Bei ausschließlicher Betrachtung von Teilnehmern mit einer engen Vater-Kind Beziehung zeigten sich somit die angenommenen Einstellungsunterschiede (H1) zwischen Vätern erstgeborener Töchter und Vätern erstgeborener Söhne (siehe Abbildung 2).

Die Einstellung zu Frauenfördermaßnahmen als abhängige Variable nutzend, erreichten sowohl die beiden Haupteffekte als auch die Interaktion der Prädiktoren auf einem 10%-Niveau Signifikanz (siehe Tabelle 5). Erneut war durch Aufnahme des Interaktionsterms eine signifikante Verbesserung der Vorhersageleistung des Modells möglich:  $\Delta R^2 = .02$ ,  $p = .03$ . Der Haupteffekt der sozialen Vater-Kind Beziehung hing somit erneut vom Geschlecht des erstgeborenen Kindes ab: So konnte die Qualität der sozialen Vater-Kind Beziehung die Einstellung zu Frauenfördermaßnahmen nur für Väter mit einer erstgeborenen Tochter signifikant vorhersagen ( $b = .31$ ,  $t(177) = 3.00$ ,  $p < .005$ ), nicht jedoch für Väter mit einem erstgeborenen Sohn ( $b < .01$ ,  $t(177) = 0.01$ ,  $p > .99$ , *n.s.*)

Um einen moderierenden Einfluss der Vater-Kind Beziehung zu prüfen, wurden erneut mit Hilfe des *PROCESS Makro* für SPSS (Hayes, 2013) bedingte Effekte des Geschlechts des erstgeborenen Kindes bei unterschiedlicher Ausprägung der sozialen Vater-Kind Beziehung berechnet. Das Geschlecht des erstgeborenen Kindes konnte die Einstellung zu Frauenfördermaßnahmen erneut bei einer unterdurchschnittlich ausgeprägten sozialen Vater-Kind Beziehung nicht vorhersagen ( $-1 SD: b = -.02$ ,  $t(177) = -.17$ ,  $p = .86$ , *n.s.*), hingegen aber bei einer überdurchschnittlich ausgeprägten sozialen Vater-Kind Beziehung ( $+1 SD: b = 0.29$ ,  $t(177) = 2.88$ ,  $p = .004$ ). Der signifikante Zusammenhang zwischen dem Geschlecht des erstgeborenen Kindes und der Einstellung zu Frauenfördermaßnahmen (H2) wurde folglich durch die Qualität der sozialen Vater-Kind Beziehung moderiert, sodass sich dieser nur für Teilnehmer mit einer engen Vater-Kind Beziehung nachweisen ließ (siehe Abbildung 2).

<sup>5</sup> Für die logistischen Regressionen mit den dichotomen Maßen (Koryphäenproblem, Spende) als abhängige Variablen ergaben sich keine signifikanten Effekte: alle Haupteffekte und Interaktionen:  $p_s > .05$ .

<sup>6</sup> Der Nachweis eines nicht signifikanten Zusammenhangs ( $t(179) = .07$ ,  $p = .35$ ) zwischen der UV (Geschlecht des erstgeborenen Kindes) und der Moderatorvariable (Qualität der Vater-Kind Beziehung) stellt eine zentrale Voraussetzung für die Durchführung der Moderationsanalysen dar.

**Tabelle 4:** Ergebnisse der linearen (FiFp, Frauenförderung) und logistischen Regressionen (Koryphäenproblem, Spende). Als Prädiktoren dienen verschiedene Spezifikationen der Geschlechterkonstellation der Kinder.

| Abhängige Variable            | Geschlechterkonstellation Kinder |              |               |          |                         |              |               |          |                |              |               |          |
|-------------------------------|----------------------------------|--------------|---------------|----------|-------------------------|--------------|---------------|----------|----------------|--------------|---------------|----------|
|                               | Erstgeborene Tochter             |              |               |          | Mindestens eine Tochter |              |               |          | Anzahl Töchter |              |               |          |
|                               | <i>b</i>                         | <i>SE(b)</i> | <i>t/Wald</i> | <i>p</i> | <i>b</i>                | <i>SE(b)</i> | <i>t/Wald</i> | <i>p</i> | <i>b</i>       | <i>SE(b)</i> | <i>t/Wald</i> | <i>p</i> |
| FiFp                          | .06                              | .05          | 1.06          | .29      | .04                     | .06          | 0.76          | .45      | .09            | .07          | 1.42          | .16      |
| Frauenförderung               | .29                              | .14          | 2.03          | .04*     | .11                     | .15          | 0.71          | .48      | .15            | .18          | 0.85          | .40      |
| Koryphäenproblem <sup>1</sup> | -.03                             | .37          | 0.01          | .93      | -.19                    | .40          | 0.21          | .65      | .07            | .47          | 0.22          | .88      |
| Spende                        | .43                              | .36          | 1.44          | .23      | .32                     | .39          | 0.66          | .42      | .44            | .44          | 1.00          | .32      |

Anmerkung. *b* = unstandardisiertes Regressionsgewicht, *SE(b)* = Standardfehler des Regressionsgewichts, *t* = *t*-Statistik (lineare Regression), *Wald* = Wald-Statistik (logistische Regression), *p* = Signifikanzwert, \**p* < .05, zweiseitiger Signifikanztest. FiFp: Frauen in Führungspositionen. <sup>1</sup> Analyse unter Berücksichtigung der mittleren Rätsellösekompetenz im Regressionsmodell.

**Tabelle 5:** Ergebnisse der hierarchischen Regressionsanalysen für die Einstellung zu Frauen in Führungspositionen (FiFp) sowie für die Einstellung zu Frauenförderung.

| Prädiktor  | FiFp     |                  | Frauenförderung  |                  |
|--|----------|------------------|------------------|------------------|
|  | Modell 1 | Modell 2         | Modell 1         | Modell 2         |
| Geschlecht erstgeborenes Kind                                | .07      | .07              | .14 <sup>†</sup> | .14 <sup>†</sup> |
| Soziale Vater-Kind Beziehung                                 | .12      | .13 <sup>†</sup> | .15 <sup>†</sup> | .16*             |
| Geschlecht erstgeborenes Kind x Soziale Vater-Kind Beziehung | -        | .18*             | -                | .16*             |
| <i>Model F</i>   | 1.85     | 3.29             | 4.24             | 4.43             |
| <i>R</i> <sup>2</sup>  | .02*     | .05*             | .05*             | .07*             |
| $\Delta R^2$ <sup>1</sup>                                    | -        | .03*             | -                | .02*             |

Anmerkungen. Es werden die standardisierten Regressionsgewichte berichtet. Modell 1 = Additives Modell ohne Berücksichtigung des Interaktionsterms, Modell 2 = Interaktives Modell unter Aufnahme des Interaktionsterms. *Model F* = *F*-Statistik des Modells, *R*<sup>2</sup> = Varianzaufklärung durch alle Prädiktoren im Modell.  $\Delta R^2$  = Inkrementelle Varianzaufklärung bei Aufnahme des Interaktionsterms. <sup>†</sup>*p* < .10. \**p* < .05, zweiseitiger Signifikanztest. *N* = 181.

## 6. Diskussion

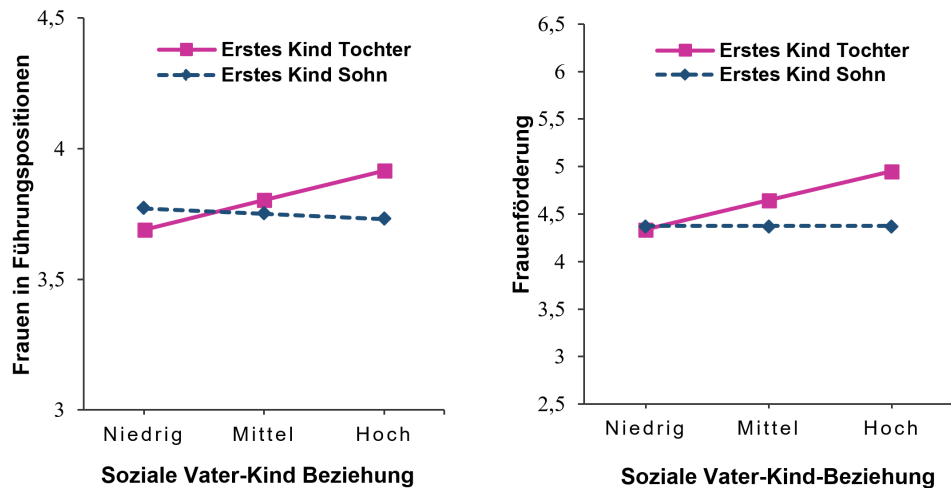
### 6.1. Zusammenfassung der Ergebnisse

Bisherige Forschung zum Tochttereffekt war durch methodische Schwächen sowie durch ein Mangel an theoretischer Fundierung gekennzeichnet. Trotz der hohen Relevanz in der unternehmerischen Praxis (z.B. geschlechterfaire Einstellungsentscheidungen) wurden die angenommenen Zusammenhänge in einem beruflichen Kontext zudem noch wenig untersucht. Aus methodischen Gründen auf das Geschlecht des erstgeborenen Kindes fokussierend, untersuchte die vorliegende Studie erstmalig einen Zusammenhang zwischen der Vaterschaft einer erstgeborenen Tochter und geschlechterbezogenen Einstellungen leitender Angestellter in einem beruflichen Kontext und strebte durch eine systematische Analyse von Moderatorvariablen eine stärkere theoretische Fundierung des Tochttereffekts an.

Die Ergebnisse der ersten Studie lieferten nur teilweise Evidenz für die Annahme, dass die Vaterschaft einer erstgeborenen Tochter geschlechterbezogene Einstellungen im beruflichen Kontext positiv beeinflusst. So ließ sich der angenommene Zusammenhang zwischen der Vaterschaft einer

erstgeborenen Tochter und egalitären geschlechterbezogenen Einstellungen nur in Bezug auf eine der vier abhängigen Variablen nachweisen - der Einstellung zu Frauenförderung am Arbeitsplatz. Konsistent zu den Annahmen bestand so ein signifikanter Zusammenhang zwischen der Vaterschaft einer erstgeborenen Tochter und der Einstellung zu Frauenfördermaßnahmen am Arbeitsplatz, in der Form, dass Väter einer erstgeborenen Tochter (im Vergleich zu Vätern eines erstgeborenen Sohnes) eine stärkere Befürwortung der Maßnahmen zeigten. Ein signifikanter Zusammenhang zwischen der Vaterschaft einer erstgeborenen Tochter und Einstellungen zu Frauen in Führungspositionen ließ sich hingegen nicht nachweisen. Ebenfalls lieferten die Ergebnisse keine Evidenz für die angenommenen Zusammenhänge auf einer impliziten Einstellungsebene: So zeigten zwar Väter erstgeborener Töchter deskriptiv eine erhöhte Wahrscheinlichkeit an eine Frauenförderorganisation zu spenden, der Unterschied zu Vätern erstgeborener Söhne erreichte jedoch keine Signifikanz. Zudem lieferten die Ergebnisse keinerlei Evidenz für die Annahme, dass es Vätern erstgeborener Töchter leichter fiel, das Koryphäenproblem richtig zu lösen. So konnten





**Abbildung 2:** Graphische Darstellung des bedingten Effekts des Geschlechts des erstgeborenen Kindes auf die Einstellung zu Frauen in Führungspositionen (links) sowie Frauenförderung (rechts) bei niedriger (-1 SD), mittlerer (M) und hoher (+1 SD) Ausprägung der sozialen Vater-Kind Beziehung.

Anmerkung. Hohe Werte drücken positive Einstellungen zu Frauen in Führungspositionen/Frauenförderung aus (Skala: 1-7). Für eine bessere Visualisierung ist nur der mittlere Skalenbereich ( $\sim M \pm 2 SD$ ) abgebildet.

allein interindividuelle Unterschiede in der Rätsellösekompetenz der Teilnehmer vorhersagen, ob das Rätsel richtig gelöst wurde, nicht jedoch das Geschlecht des erstgeborenen Kindes.

Weitere Analysen zeigten zudem, dass der signifikante Zusammenhang zwischen der Vaterschaft einer erstgeborenen Tochter und der Befürwortung von Frauenfördermaßnahmen durch die Qualität der sozialen Vater-Kind Beziehung moderiert wurde. So ließ sich ein signifikanter Zusammenhang nur für Teilnehmer mit einer überdurchschnittlich ausgeprägten Vater-Kind Beziehung nachweisen, nicht jedoch für Teilnehmer mit einer unterdurchschnittlich ausgeprägten Vater-Kind Beziehung. Bei ausschließlicher Betrachtung von Vätern mit einer engen Vater-Kind Beziehung zeigte sich zudem der in Hypothese 1 angenommene Zusammenhang zwischen der Vaterschaft einer erstgeborenen Tochter und der Einstellung zu Frauen in Führungspositionen. Die soziale Vater-Kind Beziehung erwies sich somit als bedeutsame Moderatorvariable der Zusammenhänge: Demnach scheinen geschlechterbezogene Einstellungen von Vätern vor allem dann durch die erstgeborene Tochter beeinflusst zu werden, wenn die Väter eine enge soziale Beziehung zu dieser teilen.

Konsistent zu den theoretischen Annahmen eines Tochtereffekts konnte dabei allein die Qualität der sozialen Vater-Tochter Beziehung geschlechterbezogene Einstellungen im beruflichen Kontext vorhersagen, während dies für die Qualität der sozialen Vater-Sohn Beziehung nicht der Fall war. Die differentielle Vorhersageleistung der Qualität der Vater-Kind Beziehung in Abhängigkeit des Geschlechts des erstgeborenen Kindes stellt dabei einen wichtigen Robustheitstest für die theoretischen Annahmen des Tochtereffekts dar. So konnte durch das gewählte Querschnittsdesign in der aktuellen Studie nicht ausgeschlossen werden, dass die Ergebnisse

eigentlich durch einen *Sohneffekt* zu erklären sind. Demnach wäre es ebenso möglich, dass Einstellungsunterschiede zwischen Vätern erstgeborener Töchter und Vätern erstgeborener Söhne daraus resultieren, dass Männer nach der Geburt eines Sohnes konservativere (d.h. weniger egalitäre) geschlechterbezogene Einstellungen entwickeln. Empirische Befunde aus Studien, die eine Veränderung hin zu egalitären geschlechterbezogenen Einstellungen nach der Geburt einer Tochter unter Nutzung eines Längsschnittsdesigns zeigen konnten (z.B. Shafer und Malhotra, 2011) sowie die theoretischen Annahmen der Erklärungsansätze, welche aus etablierten psychologischen Theorien abgeleitet wurden (siehe Kapitel 2.4), lieferten initiale Evidenz für die Interpretation der Ergebnisse im Sinne eines Tochtereffekts. Die Tatsache, dass geschlechterbezogene Einstellungen von Vätern allein durch die Qualität der Vater-Tochter Beziehung vorhergesagt werden konnten, nicht jedoch durch die Qualität der Vater-Sohn Beziehung, erhöht zusätzlich das Vertrauen in die vorgenommene Interpretation der Daten. Wären die Ergebnisse tatsächlich durch eine Veränderung hin zu konservativeren Einstellungen durch das Aufziehen eines Sohnes zu erklären, sollte dieser Effekt bei einer engen Vater-Sohn Beziehung verstärkt werden, während die Qualität der sozialen Vater-Tochter Beziehung irrelevant sein sollte. Empirisch zeigte sich jedoch das umgekehrte Muster: So scheint allein die Qualität der sozialen Beziehung zur erstgeborenen Tochter entscheidend für die Frage zu sein, ob Väter über egalitäre Einstellungen im beruflichen Kontext verfügen.

Eine weitere Forschungsfrage war, welche Rolle die Anzahl der Töchter eines Mannes für die Stärke (bzw. das Auftreten) eines Tochtereffekts spielt. Die Ergebnisse der Studie lieferten keine Evidenz für einen (linearen) Zusammenhang zwischen der Anzahl der Töchter und der Egalität der be-

richteten Einstellungen der Väter. Dieses Ergebnis ist konsistent mit den Annahmen eines Perspektivenübernahmeansatzes (siehe Kapitel 6.3) sowie mit Ergebnissen bisheriger Studien, die nur einen marginalen Anstieg der Stärke des Tochtereffekts mit einer steigenden Anzahl von Töchtern nachweisen konnten (z.B. Cronqvist und Yu, 2017). Entscheidend scheint somit allein zu sein, ob ein Vater eine Tochter hat, nicht aber wie viele Töchter dieser hat.

Eine weitere zentrale Fragestellung der Arbeit war, ob geschlechterbezogene Einstellungen im beruflichen Kontext durch die Vaterschaft einer Tochter *per se* (unter Inkaufnahme der methodischen Schwächen dieser Betrachtung) beeinflusst werden. Explorative Analysen lieferten keine Evidenz für diese Annahme: So unterschieden sich Väter mit mindestens einer Tochter und Väter ohne Töchter nicht signifikant in ihren geschlechterbezogenen Einstellungen, weder auf einer expliziten noch auf einer impliziten Einstellungsebene. Die Ergebnisse sind dabei konsistent mit einer Reihe von Forschungsarbeiten, die einen Tochtereffekt ausschließlich unter Berücksichtigung der Geburtenreihenfolge der Kinder fanden (M. S. Dahl et al., 2012; Greenlee et al., 2018; Sharrow et al., 2018) und stellen einen allgemeinen Tochtereffekt (Einfluss der Vaterschaft einer Tochter *per se*) in Frage. Die Ergebnisse sind hingegen vereinbar mit einer *First Daughterhood* Hypothese (Sharrow et al., 2018), welche dem Geschlecht des erstgeborenen Kindes eine besondere Rolle in der Entstehung des Tochtereffekts beimisst. Vor allem aber sprechen methodische Gründe (siehe Kapitel 2.1) für eine Fokussierung auf das Geschlecht des erstgeborenen Kindes in zukünftigen Studien. So kann nur das Geschlecht des erstgeborenen Kindes als unabhängig von einer möglichen geschlechterspezifischen Familienplanung konzeptualisiert werden und ermöglicht so die Interpretation der Zusammenhänge im Sinne eines natürlichen Quasi-Experiments (vgl. Greenlee et al., 2018).

Insgesamt zeigen die Ergebnisse der Studie, dass eine rein binäre Betrachtung (Vater einer Tochter: ja vs. nein) zu kurz greift, um den Tochtereffekt in seiner Wirkweise und Bedeutsamkeit verstehen zu können. Die Familienstruktur und -konstellation von Vätern besser zu verstehen, scheint demnach wichtiger als bisher angenommen, wobei der Berücksichtigung der Geburtenreihenfolge (aus empirischen und methodischen Gründen) sowie der Qualität der sozialen Vater-Kind Beziehung eine besondere Bedeutung zukommt. So scheint eine Beeinflussung geschlechterbezogener Einstellungen von Vätern vor allem dann stattzufinden, wenn die Vaterschaft einer Tochter die erste Vaterschaft eines Mannes darstellt und zusätzlich eine enge soziale Beziehung zur Tochter besteht. Meines besten Wissens prüfte die vorliegende Studie erstmalig die Möglichkeit, dass die angenommenen Zusammenhänge in Abhängigkeit von Charakteristika der Familienstruktur unterschiedlich stark ausfallen. Die Ergebnisse zeigen jedoch, dass eine systematische Analyse dieser und anderer moderierender Variablen essenziell ist, um ein besseres Verständnis der Zusammenhänge entwickeln zu können. So könnten bisherige Inkonsistenzen in der empirischen Forschung auf eine mangelnde Berücksichtigung der

Geburtenreihenfolge sowie der sozialen Vater-Kind Beziehung zurückzuführen sein. Ergebnisse, die bisher im Sinne eines allgemeinen Tochtereffekts interpretiert wurden, könnten demnach auf einem Artefakt basieren, resultierend aus der Tatsache, dass primär Väter mit einer engen sozialen Beziehung zum erstgeborenen Kind in Analysen betrachtet wurden.

Vor dem Hintergrund bisheriger Forschungsarbeiten, die einen Tochtereffekt im beruflichen Kontext auch ohne eine Berücksichtigung moderierender Variablen nachweisen konnten (z.B. Dasgupta et al., 2018; Gompers und Wang, 2017), sind die Ergebnisse der Studie jedoch überraschend. Ebenso stellt sich die Frage, wie die mangelnde Evidenz für die angenommenen Zusammenhänge auf einer impliziten Einstellungsebene zu erklären ist. Mögliche Gründe für die diskrepanten empirischen Befunde sowie für die unerwarteten Ergebnisse auf einer impliziten Einstellungsebene sollen im Folgenden diskutiert werden.

## 6.2. Limitationen und zukünftige Forschung

### 6.2.1. Kulturelle Unterschiede

Einerseits könnten die diskrepanten Befunde in kulturellen Unterschieden zwischen Deutschland und den Ländern, in welchen die Mehrzahl bisheriger Studien durchgeführt wurde (USA, Großbritannien), begründet sein. So zeigt eine Studie der Organisation für wirtschaftliche Zusammenarbeit und Entwicklung (Organisation for Economic Co-operation and Development (OECD), 2017), dass Väter in Deutschland (im Vergleich zu Vätern in den genannten Ländern) unterdurchschnittlich viel Zeit mit ihren Kindern verbringen. Vor dem Hintergrund der Evidenz für einen moderierenden Einfluss der sozialen Vater-Kind Beziehung könnte ein Grund für die diskrepanten Ergebnisse folglich darin bestehen, dass sich die durchschnittliche Qualität der Vater-Kind Beziehung über Kulturen hinweg unterscheidet. Während sich der Tochtereffekt demnach in Ländern mit einer überdurchschnittlichen Beteiligung des Vaters in der Kindererziehung übergreifend zeigen sollte, könnte dieser in Ländern mit einer unterdurchschnittlichen Beteiligung des Vaters in der Kindererziehung (z.B. Deutschland) von der Enge der sozialen Beziehung und der damit assoziierten gemeinsam verbrachten Zeit abhängen.

Um diese Hypothese zu prüfen, sollten zukünftige Studien umfassendere Maße zur Erfassung der Qualität der sozialen Vater-Kind Beziehung nutzen. So wurde in der Studie mit der *iOS*-Skala (Aron et al., 1992) nur ein einzelnes Item zur Erfassung der Qualität der sozialen Beziehung genutzt. Zwar sprachen Ergebnisse bisheriger Studien für die konvergente Validität des Maßes (Gächter et al., 2015), jedoch muss dessen Sensitivität zur Erfassung komplexer Vater-Kind Beziehungen in Frage gestellt werden. Für zukünftige Studien ist daher die Nutzung umfassenderer Maße indiziert, welche verschiedene Dimensionen der sozialen Beziehung messen und mit der Kontakthäufigkeit auch eine quantitative Komponente erfassen. Ein Beispiel ist das *Relationship Closeness Inventory* (RCI, Berscheid et al., 1989), welches drei Dimensio-

nen der sozialen Beziehung (Häufigkeit, Vielfältigkeit, Stärke) berücksichtigt.

Das Postulat der zentralen Bedeutung kultureller Unterschiede in der Geschlechterstereotypforschung ist dabei konsistent zu bisherigen Forschungsergebnissen. So konnten auch andere Befunde in der Geschlechterstereotypforschung, wie etwa der *Backlash-Effect* (Heilman & Okimoto, 2007), wiederholt in amerikanischen Stichproben (z.B. Williams und Tiedens, 2016), nicht jedoch in deutschen Stichproben (Otto & Stahlberg, 2014; Weidner et al., 2013), gezeigt werden. Wie bereits Warner (1991) nahelegte, könnte es sich somit um kulturelle Phänomene handeln, welche in Abhängigkeit der bestehenden Geschlechtersysteme in der Gesellschaft unterschiedliche Gültigkeit besitzen. Eine fundierte Analyse wie distinktive Geschlechtersysteme über Kulturen hinweg das Auftreten von Phänomenen wie dem Tochtereffekt oder dem *Backlash-Effekt* beeinflussen, stellt somit ein interessantes Feld für zukünftige Forschungsarbeiten dar.

### 6.2.2. Stichprobencharakteristika

Ein weiterer möglicher Grund für die unerwarteten Ergebnisse könnte in Charakteristika der gewählten Stichprobe liegen. So fand die Rekrutierung der Studienteilnehmer primär in einem Unternehmen statt, in welchem Frauenförderung derzeit ein hoch relevantes und viel diskutiertes Thema darstellt. So wurden beispielsweise zeitnah vor Studienbeginn verschiedene Artikel im unternehmensinternen Intranet veröffentlicht, die sich mit unbewussten Vorurteilen gegenüber Frauen am Arbeitsplatz beschäftigten. Forschung konnte dabei zeigen, dass Bildung zu *Diversity*-Themen Geschlechterstereotype auf multiplen Ebenen reduzieren kann (Rudman et al., 2001). Ferner ist das Unternehmen durch einen hohen Frauenanteil in Führungspositionen charakterisiert. Somit ist davon auszugehen, dass eine Vielzahl der befragten Manager derzeit mit weiblichen Führungskräften zusammenarbeitet oder zu einem früheren Zeitpunkt der Karriere zusammengearbeitet hat. Forschung konnte dabei zeigen, dass die berufliche Zusammenarbeit mit Frauen mit einem Rückgang geschlechterstereotyper Einstellungen einhergeht (Fernández, 2013). Folglich ist davon auszugehen, dass die Sensibilität der Teilnehmer für die eigenen geschlechterstereotypen Annahmen im Vergleich zur Durchschnittspopulation selektiv erhöht war. Vor diesem Hintergrund wäre es möglich, dass die Vaterschaft einer erstgeborenen Tochter vor allem dann eine zentrale Rolle spielt, wenn die Sensibilität für bestehende Geschlechterungerechtigkeiten sowie der bisherige soziale Kontakt zu kompetenten Frauen am Arbeitsplatz eher gering gewesen waren.

Natürlich handelt es sich hierbei um post hoc Erklärungen, die einer weiteren systematischen Prüfung bedürfen. Ein wichtiges Ziel für zukünftige Studien sollte daher darin bestehen, für entsprechende Charakteristika der Arbeitsplatzsituation (z.B. weibliche Führungskraft, Anzahl der *Diversity*-Trainings im Unternehmen) zu kontrollieren. Auch andere in der Studie unberücksichtigte Aspekte, wie etwa das Aufwachsen mit weiblichen Geschwistern oder die Erziehung durch eine berufstätige Mutter, könnten in diesem Zusammenhang

eine Rolle spielen und sollten in weiteren Studien Beachtung finden. Zudem sollte eine weitere Studie den Tochtereffekt im Arbeitskontext erneut in einer weniger selektiven Stichprobe prüfen. Demnach könnte auch die überdurchschnittliche Bildung der Teilnehmer für eine Varianzeinschränkung in den geäußerten geschlechterbezogenen Einstellungen gesorgt haben. So wies vor allem die FiFp eine geringe Standardabweichung ( $SD = 0.36$ ) auf, wodurch die Sensitivität des Maßes zur Erfassung von Einstellungsunterschieden zwischen Gruppen reduziert wurde.

### 6.2.3. Messgüte der impliziten Maße

Zudem stellt sich die Frage, wie die mangelnde Evidenz für die angenommenen Zusammenhänge auf einer impliziten Einstellungsebene zu erklären ist. Die Ergebnisse der Studie legten nahe, dass die Vaterschaft einer erstgeborenen Tochter ausschließlich explizite Einstellungen im Selbstbericht beeinflusst, nicht jedoch implizite geschlechterbezogene Einstellungen. In der vorliegenden Studie wurde der Tochtereffekt erstmalig unter Verwendung impliziter Einstellungsmaße geprüft. Um abschließend beantworten zu können, ob und wie sich die Vaterschaft einer erstgeborenen Tochter auf implizite Einstellungen auswirkt, ist weitere Forschung notwendig. So ergeben sich vor dem Hintergrund der verwendeten impliziten Einstellungsmaße in der vorliegenden Studie eine Reihe von Alternativerklärungen. Demnach könnte die mangelnde Evidenz für die erwarteten Zusammenhänge auch auf die geringe Teststärke der non-parametrischen Verfahren zurückzuführen sein, die auf Grund des dichotomen Charakters der abhängigen Variablen Anwendung fanden. So wird durch deren geringere Teststärke vor allem der Nachweis kleiner Effekte erschwert, wie sie sich in der vorliegenden Studie zeigten. Eine solche Annahme ist jedoch nur in Bezug auf das Spendenverhalten plausibel, für welches sich zumindest deskriptiv das erwartete Muster zeigte.

Ob das Koryphäenproblem richtig gelöst wurde, schien hingegen allein von der Rätsellösekompetenz der Teilnehmer abzuhängen, nicht jedoch vom Geschlecht des erstgeborenen Kindes (vgl. *Odds Ratio* nahe 1). Somit stellt sich die Frage: Bilden Unterschiede in der Lösungswahrscheinlichkeit des Rätsels überhaupt Unterschiede in internalisierten geschlechterbezogenen Einstellungen ab? Bivariate Korrelationsanalysen lieferten initiale Evidenz für diese Annahme: So bestanden signifikante Korrelationen zwischen der Lösungswahrscheinlichkeit des Koryphäenproblems und den drei anderen abhängigen Variablen, die die Erfassung des gleichen Konstrukts (geschlechterbezogene Einstellungen im beruflichen Kontext) zum Ziel haben (konvergente Validität). Wird die Lösungswahrscheinlichkeit jedoch systematisch durch die Rätsellösekompetenz der Teilnehmenden oder durch andere unabhängige Faktoren (z.B. Konzentrationsfähigkeit oder Intelligenz) beeinflusst, muss die diskriminante Validität (d.h. niedrige Korrelation zu unabhängigen Konstrukten) des Maßes in Frage gestellt werden. Ob das Koryphäenproblem das Potenzial bietet, geschlechterbezogene Einstellungen von Teilnehmenden auf einer impliziten Ebene zu erfassen, kann in der vorliegenden Arbeit nicht

abschließend beantworten werden. Vor dem Hintergrund der zunehmenden Bedeutung indirekter Maße in der empirischen Stereotypforschung, welche nicht von Teilnehmenden intentional verfälscht werden können (siehe Kapitel 1.2), stellt jedoch eine nähere Untersuchung der psychometrischen Eigenschaften des Koryphäenproblems ein interessantes Feld für zukünftige Forschungsarbeiten dar. So ergeben sich auch in vielen verwandten Bereichen, wie etwa der Linguistik, interessante Fragestellungen. Zum Beispiel wäre eine detaillierte Prüfung interessant, inwiefern die Verwendung des generischen Maskulinums (im Vergleich zur Verwendung geschlechtergerechter Sprache) in einleitenden oder zuvor gelesenen Texten die Lösungswahrscheinlichkeit des Koryphäenproblems beeinflusst (vgl. Kollmayer, 2012).

#### 6.2.4. Publication Bias

Die diskrepanten Befunde könnten zudem in einer selektiven Veröffentlichung von Forschungsarbeiten mit signifikanten Ergebnissen begründet sein (*publication bias*; vgl. Hopewell et al., 2006). So werden Studien mit signifikanten Ergebnissen (im Vergleich zu jenen ohne signifikante Ergebnisse) mit einer höheren Wahrscheinlichkeit in Fachzeitschriften publiziert. In einer meta-analytischen Betrachtung sollte mit Hilfe eines *Funnel-Plots* (vgl. Light und Pillemer, 1984) geprüft werden, ob eine solche selektive Veröffentlichungstendenz vorliegt. Liegt diese vor, besteht ein wichtiges Ziel in der Durchführung einer Meta-Analyse, welche ebenfalls nicht publizierte Arbeiten einschließt und mit Hilfe der *Trim and Fill*-Methode (Taylor & Tweedie, 2000) eine entsprechende Adjustierung der Effektstärken vornimmt. Um beantworten zu können, wie reliabel und robust das untersuchte Phänomen eines (erstgeborenen) Tochttereffekts tatsächlich ist, sollten zukünftige Studien die angenommenen Zusammenhänge zudem in groß angelegten Panel-Studien prüfen (vgl. Lee und Conley, 2016). Einstellungsmessungen (explizite und implizite Verfahren) sowie objektive Maße (z.B. Rekrutierungsentscheidungen) sollten sich dabei gegenseitig ergänzen. Ferner sollte eine metaanalytische Betrachtung eine Systematisierung anstreben, welche Moderatorvariablen (z.B. Geburtenreihenfolge der Kinder, Qualität der Vater-Kind Beziehung, Anzahl der Geschwister) den Zusammenhang stärken oder schwächen. Dies könnte nicht nur zur Auflösung der Inkonsistenzen in bisherigen Arbeiten, sondern auch zu einem besseren Verständnis der involvierten kognitiven Prozesse beitragen.

#### 6.3. Theoretische Implikationen

Die Ergebnisse der Studie sprechen dafür, dass die Geburtenreihenfolge der Kinder sowie die Qualität der sozialen Vater-Kind Beziehung die Stärke (bzw. das Auftreten) eines Tochttereffekts beeinflussen, während dies für die Anzahl der Töchter nicht der Fall ist. Betrachtet man die Vorhersagen der theoretischen Erklärungsmechanismen (siehe Kapitel 2.4), kann allein der Perspektivenübernahmemechanismus dieses Ergebnis erklären. So geht der Perspektivenübernahmemechanismus als einziger der vier Erklärungsansätze nicht

von einem (linearen) Anstieg der Stärke des Tochttereffekts mit jeder weiteren Tochter aus und nimmt stattdessen eine binären Aktivierungscharakter des Perspektivenwechsels an: Wurde der Perspektivenwechsel bereits durch den sozialen Kontakt zu einer Tochter ausgelöst, sollten weiterer Töchter den Effekt nicht mehr substantiell verstärken können (vgl. M. S. Dahl et al., 2012).

Ebenfalls ist der Perspektivenübernahmemechanismus vereinbar mit einer *First Daughterhood* Hypothese (Sharrow et al., 2018). So sollte vor allem die Konfrontation mit der Weltansicht der erstgeborenen Tochter einen Perspektivenwechsel bei jungen Vätern bedingen können, deren Einstellungen in der Phase des Übergangs in die neue Vaterrolle besonders formbar sein sollten (siehe Kapitel 2.4). Wurde der Prozess der Neu-Definition der Vaterrolle nach Geburt eines erstgeborenen Sohnes bereits beendet, scheint die Geburt einer Tochter als zweit- oder drittgeborenes Kind nicht mehr einen vergleichbaren Einfluss auf geschlechterbezogene Einstellungen von Vätern nehmen zu können.

Auch die Evidenz für einen moderierenden Einfluss der Vater-Kind Beziehung ist vereinbar mit den Annahmen eines Perspektivenübernahmemechanismus. So stellt der mit Hilfe der iOS-Skala erfasste *Self-Other-Overlap* (Aron et al., 1992) einen zentralen Prädiktor für die Fähigkeit zur Perspektivenübernahme einer anderen Person dar (vgl. Davis et al., 1996). Mit zunehmender Enge der sozialen Beziehung sollte es Vätern demnach leichter fallen, sich in die Perspektive der Tochter zu versetzen (vgl. Shih et al., 2009). Darüber hinaus ergeben sich bei einer engen sozialen Beziehung vermehrt Möglichkeiten, etwas über die Weltansicht der Tochter zu lernen. Ist die Beziehung hingegen so schwach ausgeprägt, dass keine Lernerfahrung stattfinden kann, ist auch eine Beeinflussung geschlechterbezogener Einstellungen durch die Tochter unwahrscheinlich.

Insgesamt lieferte die erste Studie somit initiale Evidenz für die Annahme, dass ein Tochttereffekt am besten durch die geförderte Übernahme der Perspektive einer Tochter (und somit einer Frau) in der Arbeitswelt verstanden werden kann. Vor dem Hintergrund der initialen Evidenz für die Plausibilität eines Perspektivenübernahmemechanismus stand eine differenzierte Analyse und empirische Prüfung dessen im Zentrum der zweiten Studie.

#### Studie 2

Der zweite Teil meiner Masterarbeit beschäftigte sich noch stärker mit der Frage: „*Wie ist ein erstgeborener Tochttereffekt zu erklären?*“ und infolgedessen mit einer systematischen Analyse der, dem Effekt zu Grunde liegenden, kognitiven Mechanismen. Der Fokus lag dabei auf einer empirischen Prüfung des angenommenen Perspektivenübernahmemechanismus im Rahmen eines kontrollierten experimentellen Designs. Die Grundlage der zweiten Studie bildete folgende Annahme: Liegt dem erstgeborenen Tochttereffekt tatsächlich eine geförderte Perspektivenübernahme der Tochter als Wirkmechanismus zu Grunde, sollte eine experimentelle



Manipulation, die Teilnehmende zur Übernahme der Perspektive ihrer (vorgestellten) Tochter instruiert, ebenfalls zu egalitäreren geschlechterbezogenen Einstellungen im beruflichen Kontext führen. Das Ziel der zweiten Studie bestand somit darin zu prüfen, ob eine experimentelle Herstellung eines Tochtereffekts auch bei Nicht-Eltern von Töchtern durch eine entsprechende Perspektivenübernahmemanipulation möglich ist. Da das gewählte experimentelle Vorgehen für das Verständnis der Hypothesen der zweiten Studie zentral ist, soll dieses im Zuge der Herleitung der Hypothesen in Kürze vorgestellt werden. Eine detaillierte Beschreibung des Vorgehens ist im Methodenteil der Arbeit zu finden (siehe Kapitel 8.3).

## 7. Hypothesen

### 7.1. Perspektivenübernahme

Um zu prüfen, ob eine experimentelle Herstellung des (erstgeborenen) Tochtereffekts möglich ist, wurden Teilnehmende im Rahmen einer mentalen Simulationsmanipulation zunächst instruiert, sich vorzustellen, Elternteil einer Tochter zu sein. Die experimentelle Manipulation folgte dabei dem Vorbild von Studien, die mentale Simulationen als Substitut für reale Erfahrungen nutzen (Kappes & Morewedge, 2016). So konnte mehrfach gezeigt werden, dass mentale Vorstellungen viele Charakteristika realer Erfahrungen teilen, sowohl auf emotionaler, motivationaler, als auch auf neurologischer Ebene (Blair et al., 2001). Der mentalen Simulation, Elternteil einer Tochter zu sein, folgte die Perspektivenübernahmemanipulation: Diese fand durch gezielte Fragen zu möglichen Gedanken und Gefühlen sowie der erwarteten und erwünschten (beruflichen) Zukunft der Tochter statt (siehe Kapitel 8.3). Die Manipulation zur Perspektivenübernahme erfolgte somit über eine Reflektion, wie sich die Zielperson in einer gegebenen Situation fühlt (*perspective taking*; vgl. Batson et al., 1997) und orientierte sich dabei an einem typischen Vorgehen in Studien, die eine Perspektivenübernahmemanipulation als Intervention zur Stereotypreduktion nutzten (vgl. Batson et al., 1997; Todd et al., 2011).

Ist ein erstgeborener Tochtereffekt tatsächlich durch die geförderte Übernahme der Perspektive der Tochter in der Arbeitswelt zu erklären, sollte die beschriebene experimentelle Manipulation zu positiveren Einstellungen gegenüber Frauen in Führungspositionen sowie zu einer stärkeren Befürwortung von Frauenfördermaßnahmen führen. Um diese Annahme zu testen, wurden zwei Vergleichsgruppen im experimentellen Design betrachtet: Eine experimentelle Bedingung, in der die Perspektivenübernahme eines Sohnes manipuliert wurde (*Perspektivenübernahme Sohn*) sowie eine neutrale Kontrollgruppe, in der eine mentale Simulation zu einer, mit dem Einstellungsobjekt unzusammenhängenden, Thematik durchgeführt wurde. Der positive Einfluss der Perspektivenübernahme einer (vorgestellten) Tochter auf geschlechterbezogene Einstellungen im beruflichen Kontext sollte sich in einem signifikanten Haupteffekt der experimentellen Bedingung zeigen. Dieser sollte auf positivere

geschlechterbezogene Einstellungen nach Übernahme der Perspektive der Tochter (im Vergleich zu den beiden anderen Bedingungen) zurückgehen. Die erste Hypothese der zweiten Studie lautete folglich:

**H1.** Teilnehmende der Bedingung *Perspektivenübernahme Tochter* zeigen im Vergleich zu Teilnehmenden der Bedingung *Perspektivenübernahme Sohn* und einer Kontrollgruppe:

- a) signifikant positivere Einstellungen gegenüber Frauen in Führungspositionen.
- b) eine signifikant stärkere Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz.

Dabei ist zu erwarten, dass die Instruktion zur Perspektivenübernahme eines Sohnes Teilnehmende analog dazu bringt, die Arbeitswelt aus der Perspektive eines Mannes zu sehen. Den Vorhersagen eines Perspektivenübernahmeansatzes folgend (siehe Kapitel 2.4), wäre es demnach möglich, dass die Übernahme der Perspektive eines Sohnes (Mitglied der Gruppe der Männer) eine stärkere Favorisierung männlicher Führungskräfte sowie eine geringere Befürwortung von Frauenfördermaßnahmen zur Folge hat. Vor dem Hintergrund der primär männerdominierten Arbeitswelt stellt sich jedoch die Frage, ob die Wahrnehmung der Arbeitswelt aus der Perspektive eines Mannes überhaupt eine neue Erfahrung für Teilnehmende darstellt und demnach überhaupt einen Perspektivenwechsel bedingt. Somit bleibt unklar, ob es durch die Perspektivenübernahmemanipulation zu einem Überdenken bisheriger geschlechterbezogener Einstellungen (z.B. durch die Entwicklung eines Bewusstseins für bisher unbekannte Herausforderungen für Männer in der Arbeitswelt) kommt. Eine Forschungsfrage der Studie lautete daher:

**FF1.** Zeigen Teilnehmende der Bedingung *Perspektivenübernahme Sohn* im Vergleich zu Teilnehmenden der Kontrollgruppe:

- a) signifikant negativere Einstellungen gegenüber Frauen in Führungspositionen?
- b) eine signifikant geringere Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz?

### 7.2. Geschlechtsunterschiede

Anders als in der ersten Studie wurden in der zweiten Studie ebenfalls weibliche Teilnehmende betrachtet, wodurch die Untersuchung von Geschlechtsunterschieden ermöglicht wurde. Wiederholt konnte das Geschlecht des Individuums als eine der primären Quellen interindividueller Unterschiede im Vorhandensein von Geschlechterstereotypen identifiziert werden (Cordano et al., 2002; Mihail, 2006). So konnte gezeigt werden, dass sowohl männliche Studenten, als auch männliche Mitarbeiter und leitende Führungskräfte (im Vergleich zu weiblichen Individuen) über stereotypere Einstellungen gegenüber Frauen in Führungspositionen verfügen



(Brenner et al., 1989; Cortis & Cassar, 2005). Auf diesen empirischen Befunden aufbauend, erwartete ich einen Haupteffekt des Geschlechts der teilnehmenden Person, welcher auf egalitärere geschlechterbezogene Einstellungen weiblicher Teilnehmerinnen zurückgeht. Diese Annahme bildete sich in der zweiten Hypothese ab:

**H2.** Weibliche Teilnehmende zeigen im Vergleich zu männlichen Teilnehmenden:

- a) signifikant positivere Einstellungen gegenüber Frauen in Führungspositionen.
- b) eine signifikant stärkere Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz.

Doch hat die Perspektivenübernahme einer Tochter für Männer und Frauen einen identischen Effekt oder wirkt sich diese in Abhängigkeit des Geschlechts der teilnehmenden Person unterschiedlich aus? Folgt man den theoretischen Annahmen des Perspektivenübernahmeansatzes, sollte die Perspektivenübernahme einer Tochter geschlechterbezogene Einstellungen von Männern stärker beeinflussen als jene von Frauen. So haben Männer die Arbeitswelt bislang primär aus der Perspektive des Selbst (und somit eines Mannes) wahrgenommen und sind sich den Herausforderungen, mit denen Frauen im Arbeitsalltag konfrontiert werden, häufig nicht oder nur teilweise bewusst. Dieses Bewusstsein sollte somit durch die manipulierte Übernahme der Perspektive einer Tochter (und somit einer Frau) substantiell gesteigert werden. Frauen sollten hingegen ein entsprechendes Bewusstsein bereits durch etwaige eigene Erfahrungen (z.B. mit Geschlechterdiskriminierung am Arbeitsplatz) entwickelt haben - die initiale Expositionsschwelle vor der Perspektivenübernahmemanipulation sollte demnach bereits höher sein. Die Perspektivenübernahmemanipulation sollte folglich einen schwächeren Effekt haben. Anders ausgedrückt: Die Übernahme der Perspektive einer (vorgestellten) Tochter sollte sich vor allem dann auf geschlechterbezogene Einstellungen von Individuen auswirken, wenn diese noch viel über die Weltansicht einer Frau in der Arbeitswelt zu lernen haben - und dies sollte vor allem für Männer der Fall sein. Diese Annahmen bildeten sich in der dritten Hypothese ab:

**H3.** Es besteht eine signifikante Interaktion zwischen dem Geschlecht der teilnehmenden

Person und der experimentellen Bedingung. Die Perspektivenübernahme einer Tochter (verglichen mit den beiden anderen Bedingungen) hat für männliche Teilnehmende im Vergleich zu weiblichen Teilnehmenden einen stärkeren positiven Einfluss auf:

- a) Einstellungen zu Frauen in Führungspositionen.
- b) Einstellungen zu Frauenfördermaßnahmen am Arbeitsplatz.

### 7.3. Implizite Einstellungen

Die Schwierigkeit, das in Kapitel 4.3 vorgestellte Koryphäenproblem zu lösen, bestand darin, sich von der impliziten Assoziation *Koryphäe = Status = männlich* (vgl. TMTM-Stereotyp; Schein, 1973) zu lösen. So wurde durch die Beschreibung einer Koryphäe das männliche Stereotyp aktiviert. Auf der Suche nach der richtigen Lösung wurden daher ausschließlich männliche Exemplare berücksichtigt. Somit können Schwierigkeiten, das Rätsel zu lösen, auch auf eine mangelnde kognitive Präsenz von Frauen in statushohen Berufen zurückgeführt werden. Die Perspektivenübernahme einer Tochter (und somit einer Frau) in der Arbeitswelt sollte die kognitive Präsenz von Frauen in der Berufswelt selektiv erhöhen. Ein Abruf weiblicher Exemplare aus dem Gedächtnis sollte daher leichter fallen. Die Lösung, dass die Koryphäe weiblich (und somit die Mutter des Kindes ist) sollte infolgedessen häufiger gefunden werden. Hypothese 4a lautete somit:

**H4a.** Teilnehmende der Bedingung *Perspektivenübernahme Tochter* zeigen im Vergleich zu Teilnehmenden der Bedingung *Perspektivenübernahme Sohn* und der Kontrollgruppe eine signifikant höhere Lösungswahrscheinlichkeit des Koryphäenproblems.

Zudem konnte Forschung wiederholt eine höhere Salienz des eigenen Geschlechts in der Verfügbarkeit männlicher und weiblicher Exemplare im Gedächtnis zeigen, sowohl im englischen (Moulton et al., 1978), als auch im deutschen Sprachraum (Braun et al., 2005). Die kognitive Präsenz von Frauen in der Berufswelt sollte somit bei weiblichen (vs. bei männlichen) Teilnehmenden höher sein. Frauen sollte es demnach leichter fallen, weibliche Exemplare aus dem Gedächtnis abzurufen. Die Lösung, dass die Koryphäe weiblich (und somit die Mutter des Kindes) ist, sollte somit häufiger gefunden werden. Folglich lautete Hypothese 4b:

**H4b.** Weibliche Teilnehmende zeigen im Vergleich zu männlichen Teilnehmenden eine signifikant höhere Lösungswahrscheinlichkeit des Koryphäenproblems.

## 8. Methode

### 8.1. Design

Im Experiment wurde ein 2 (*Geschlecht der teilnehmenden Person*: weiblich vs. männlich) x 3 (*Perspektivenübernahme*: Tochter vs. Sohn vs. Kontrollgruppe) - faktorielles Zwischen-Subjekt-Design realisiert. Die Zuweisung der Teilnehmenden zu den experimentellen Bedingungen erfolgte randomisiert. Somit wurde ein randomisiertes Kontrollgruppenexperiment (engl.: *randomised controlled trial*, RCT) verwendet, welches als Goldstandard der Forschungsdesigns zur Quantifizierung von Interventionseffekten verstanden wird (Meldrum, 2000).

## 8.2. Stichprobe

Die 241 Teilnehmenden der im Mittel 14-minütigen<sup>7</sup> Online-Studie wurden über einen universitätsinternen Mail-Verteiler, soziale Netzwerke sowie über die Online-Plattform *Survey Circle* rekrutiert. Da die Grundlagen der Perspektivenübernahme für alle Menschen gelten sollten und es sich somit um eine primär grundlagenpsychologische Fragestellung handelte, wurden keine gesonderten Anforderungen an die Zusammensetzung der Stichprobe gestellt. Drei Teilnehmende mussten ausgeschlossen werden, da sie eine geringe Sorgfalt bei der Fragebogenbearbeitung (Sorgfalt < 2, theoretisches Range: 1(überhaupt nicht sorgfältig) - 7(sehr sorgfältig)) angaben und somit von einer nicht erwartungskonformen Fragebogenbearbeitung ausgegangen werden musste. Sechs weitere Teilnehmende wurden ausgeschlossen, da sie korrekte Vermutungen zur zu Grunde liegenden Forschungsfrage äußerten (vgl. Studie 1). Alle Studienteilnehmenden gaben entweder Deutsch als ihre Muttersprache an (97%) oder gaben an, seit mindestens 17 Jahren Deutsch zu sprechen ( $M = 21.86$ ,  $SD = 4.14$ ), weshalb ein Ausschluss weiterer Personen auf Grund möglicher sprachlicher Barrieren nicht notwendig war.

Somit ergab sich eine finale Stichprobe von 232 Teilnehmenden mit einem mittleren Alter von 27.45 Jahren ( $SD = 7.83$ ,  $Min = 18$ ,  $Max = 75$ ). Es handelte sich um eine primär weibliche (66%) und studentische Stichprobe (57%). Studierende kamen aus verschiedenen Studienbereichen, primär jedoch aus den Disziplinen der Psychologie (29%) und der Wirtschaftswissenschaften (23%). Die Stichprobe war zudem durch eine überdurchschnittlich hohe Bildung gekennzeichnet: So verfügte die Mehrzahl der Teilnehmenden (83%) über ein Abitur oder einen höheren Bildungsabschluss (siehe Anhang B2 für detaillierte Angaben zur demographischen Struktur der Stichprobe). Während nur 22% angaben, derzeit eine leitende Position am Arbeitsplatz innezuhaben, gaben 42% der Teilnehmenden an, eine solche Position in der zukünftigen Karriere anzustreben. Anders als in bisherigen Studien (z.B. Abele, 2003) zeigten sich Geschlechtsunterschiede in der Motivation, zukünftig eine leitende Funktion zu ergreifen. So gaben 66% der männlichen Teilnehmer an, eine Führungsposition in der Zukunft anzustreben, während dies nur für 30% der weiblichen Teilnehmerinnen der Fall war. Die Mehrzahl der Teilnehmenden (85%) gab an, ledig oder unverheiratet in einer Partnerschaft zu leben und keine Kinder zu haben. 85% der kinderlosen Teilnehmenden äußerten einen Kinderwunsch in der späteren Zukunft. Konsistent zu Ergebnissen bisheriger Studien (z.B. G. B. Dahl und Moretti, 2008) zeigten männliche Teilnehmer dabei eine leicht stärkere Präferenz für männliche Nachkommen (9%) gegenüber weiblichen Nachkommen (7%), während weibliche Teilnehmerinnen eine stärkere Präferenz für weibliche Nachkommen (10%) im Vergleich zu männlichen Nachkommen (4%) zeigten. Mehrheitlich (85%) zeigten die Teilnehmenden jedoch keine klare Geschlechterpräferenz und gaben

an, sich sowohl weibliche als auch männliche Kinder zu wünschen.

## 8.3. Experimentelle Manipulation und Material

Die Manipulation der unabhängigen Variable (*Perspektivenübernahme*: Tochter vs. Sohn vs. Kontrollgruppe) wurde auf Zwischen-Subjekt-Ebene realisiert. Die Zuweisung der Teilnehmenden zu den experimentellen Bedingungen erfolgte randomisiert.

### 8.3.1. Perspektivenübernahme

Teilnehmende der beiden Experimentalbedingungen (EG) wurden zunächst instruiert, sich vorzustellen, sie hätten eine Tochter (EG1) beziehungsweise einen Sohn (EG2) und an eine gemeinsame Unternehmung zu denken. Die Teilnehmenden wurden dazu angewiesen, sich möglichst aktiv in die Situation hineinzusetzen und sich die Situation so detailreich wie möglich vorzustellen. Fragen zur gemeinsamen Unternehmung sowie zu den eigenen Gedanken und Gefühlen in der Situation hatten die Förderung einer möglichst detailreichen und realitätsnahen mentalen Simulation zum Ziel. Bilder, die Eltern mit ihrer Tochter/ihrer Sohn zeigten (siehe Abbildung C2 und C3 im Anhang), sollten die Realitätsnähe zusätzlich erhöhen und die Kreation eines mentalen Bildes vereinfachen. Die Gestaltung orientierte sich dabei an Handlungsempfehlungen in Studien, die besonders starke Effekte einer mentalen Simulation zeigten, wenn ein positiver affektiver Ton gewählt und eine intensive Elaboration des Kontexts, in dem die Interaktion stattfindet, gefördert wurde (Stathi & Crisp, 2009). Um die psychologische Distanz (engl.: *Construal Level*; Trope und Liberman, 2010) über alle Teilnehmenden hinweg konstant zu halten, wurde eine hypothetische Elternschaft in zehn Jahren gewählt. Nach Kreation des mentalen Bildes wurde die Perspektivenübernahme durch eine Frage zu den vermuteten Gedanken und Gefühlen der Tochter/des Sohnes manipuliert (*perspective taking other*; Batson et al., 1997). Um die Wahrscheinlichkeit zu erhöhen, dass sich die Teilnehmenden in die Perspektive des Kindes in der Arbeitswelt versetzen, sollten im Anschluss, neben allgemeinen Wünschen für die Zukunft des Kindes, ebenfalls Wünsche für die berufliche Zukunft des Kindes aufgelistet werden (siehe Tabelle C1 im Anhang für den genauen Wortlaut der offenen Fragen). Nachfolgend wurden die Teilnehmenden zu einer Einschätzung aufgefordert, wo die Tochter/der Sohn in 20 Jahren (bzw. 40 Jahren) wohlmöglich stehen wird und wo diese(r) idealerweise stehen sollte. Durch die Gegenüberstellung der erwarteten und der erwünschten Zukunft des Kindes sollten Gedanken an Hürden und mögliche Barrieren in der beruflichen und persönlichen Entwicklung des Kindes aktiviert werden. Die Beantwortung der Fragen erfolgte im offenen Antwortformat.

### 8.3.2. Kontrollgruppe

Teilnehmende der Kontrollgruppe wurden ebenfalls zu einer mentalen Simulation aufgefordert, um die kognitiven

<sup>7</sup> Es wird der Median der Bearbeitungszeit auf Grund dessen geringeren Anfälligkeit für Ausreißer berichtet (vgl. Bortz, 2005).

Prozesse in den drei experimentellen Bedingungen maximal konstant zu halten. So fand der Vergleich der beiden Experimentalgruppen nicht zu einer rein passiven Kontrollgruppe (keine Aufgabe) statt, sondern relativ zu einer Kontrollgruppe mit vergleichbaren geforderten mentalen Operationen. Dabei entschied ich mich für eine mentale Simulation zu einer ebenfalls positiv besetzten (Konstanthaltung der Valenz), jedoch mit dem Einstellungsobjekt nicht zusammenhängenden Thematik, um mögliche Konfundierungen und unkontrollierbare Effekte zu vermeiden, die beispielsweise bei der Aktivierung von Gedanken an die eigene Karriere oder durch die Übernahme der Perspektive einer anderen Person entstehen könnten. Teilnehmende der Kontrollgruppe wurden demnach zur mentalen Simulation eines zukünftigen Urlaubs instruiert. Um die psychologische Distanz zwischen Kontroll- und Experimentalgruppe konstant zu halten, wurde ebenfalls ein hypothetischer Urlaub in zehn Jahren gewählt. Analog zu den beiden Experimentalbedingungen wurden Teilnehmende zu einer intensiven und detailreichen Vorstellung des Urlaubsortes aufgefordert und die mentale Simulation wurde durch Bilder aus Urlaubsregionen unterstützt (siehe Abbildung C4 im Anhang). Für die offenen Fragen (Wünsche für zukünftigen Urlaub, Beschreibung des erwarteten und idealen Urlaubs) wurde auf eine maximale Konstanthaltung von Formulierungen sowie durch die Fragen aktivierter Emotionen geachtet (siehe Tabelle C1 im Anhang).

### 8.3.3. Abhängige Variablen

Die verwendeten abhängigen Variablen zur Erfassung geschlechterbezogener Einstellungen im beruflichen Kontext waren weitgehend äquivalent zur ersten Studie und umfassten somit die Erfassung von Einstellungen zu Frauen in Führungspositionen (FiFp) mit der adaptierten Form der WAMS (Peters et al., 1974), die Erfassung von Einstellungen zu Frauenfördermaßnahmen am Arbeitsplatz mit der neu entwickelten Frauenförderungsskala sowie die Lösungswahrscheinlichkeit des Koryphäenproblems (implizites Einstellungsmaß). In der zweiten Studie wurde keine Spende an eine wohltätige Organisation für jede Teilnahme versprochen, weshalb das Spendenverhalten als abhängige Variable entfiel.

### 8.3.4. Kontrollvariablen und Soziodemographische Variablen.

Die Erfassung der sozio-demographischen Variablen sowie der Kontrollvariablen (z.B. politische Orientierung, Rätselfähigkeit) erfolgte weitgehend analog zur ersten Studie (siehe Kapitel 4.3) mit folgenden Änderungen: Neben der in Studie 1 erfassten soziodemographischen Variablen wurden Studierende zusätzlich zu ihrem Studienfach und ihrem aktuellen Fachsemester befragt. Kinderlose Teilnehmende wurden zudem zu ihrer Familienplanung in der Zukunft befragt. Wurde ein Kinderwunsch in der Zukunft angegeben, wurde die gewünschte Anzahl der Kinder sowie deren gewünschte Geschlechterkonstellation (Anzahl weiblicher und männlicher Kinder) erfragt. Zwei Fragen zur Ernsthaftigkeit

und Leichtigkeit der durchgeführten mentalen Simulation dienten zudem zur Prüfung, ob die experimentelle Manipulation erfolgreich war (siehe Kapitel 8.4).

### 8.4. Manipulationsüberprüfung

Die Studie wurde unter dem Titel „*Wie gut ist Ihre Vorstellungskraft?*“ beworben, um zu vermeiden, dass sich die Studienteilnehmenden der untersuchten Forschungsfrage bewusst wurden. Das vorgegebene Studienziel (engl.: *Cover Story*) wurde von der Mehrzahl der Teilnehmenden geglaubt, mit nur 6 Personen (2%), die korrekte Vermutungen zur Forschungsfrage äußerten. Zudem war die randomisierte Zuweisung der Teilnehmenden zu den experimentellen Bedingungen erfolgreich: So zeigte sich eine Verteilung der Teilnehmenden auf die drei Bedingungen, welche nicht signifikant von einer Gleichverteilung abwich:  $\chi^2(1, N = 232) = 0.78$ ,  $p = .68$  und es bestanden keine signifikanten Unterschiede zwischen den Bedingungen in Bezug auf zentrale soziodemographische Charakteristika (z.B. politische Orientierung, Bildungsstand;  $p_s > .05$ ). Eine Auswertung der Manipulation-Check Items indizierte zudem, dass die mentale Simulationsmanipulation erfolgreich war. So gaben 99%<sup>8</sup> der Teilnehmenden an, sich aktiv in die mentale Simulation hineinversetzt zu haben, und das Hineinversetzen in die beschriebene Situation gelang den Teilnehmenden nach eigenen Angaben im Mittel sehr gut ( $M = 5.39$ ,  $SD = 1.34$ ; theoretisches Range: 1(*sehr schlecht*) - 7(*sehr gut*)). Diese Annahme wurde durch eine qualitative Analyse der offenen Antworten der Teilnehmenden bestätigt, welche eine aktive Auseinandersetzung mit der Thematik nahelegten und einen hohen Detaillierungsgrad aufwiesen. Qualitative Analysen lieferten zudem Evidenz für die Annahme, dass die angenommene Perspektivenübernahme des Kindes in den beiden Experimentalbedingungen stattfand. So setzten sich die Teilnehmenden aktiv mit der Weltansicht und den antizipierten Gefühlen und Gedanken des vorgestellten Kindes auseinander. Wie durch die Auswahl der Fragen intendiert, lag der Schwerpunkt dabei auf der beruflichen Zukunft des Kindes. Teilnehmende der Bedingung *Perspektivenübernahme Tochter* äußerten dabei häufig explizit den Wunsch, dass ihre Tochter in einer Gesellschaft aufwächst „in der das Geschlecht kein Hindernis darstellt“, sie „auf Grund ihres Geschlechts keine Nachteile hat“ und in der sie „bei gleicher Arbeit genauso viel verdient wie ihre männlichen Kollegen“. Entsprechende Hindernisse und Probleme in der beruflichen und persönlichen Entwicklung des Sohnes wurden hingegen seltener thematisiert und antizipiert. Die offenen Antworten aller Teilnehmenden sind auf der beiliegenden Daten-CD zu finden.

<sup>8</sup> Ein Ausschluss der Teilnehmenden ( $n = 2$ ), die angaben, sich nicht aktiv in die Situation hineinversetzt zu haben, erfolgte nicht, da qualitative Analysen der offenen Antworten eine hinreichende Auseinandersetzung mit der Thematik nahelegten. Ferner handelte es sich um Teilnehmende der Kontrollgruppe, für welche das aktive Hineinversetzen in die Situation weniger kritisch für die Forschungsfragen war.

## 9. Ergebnisse

Die Ergebnisse der ersten Studie lieferten initiale Evidenz für die Reliabilität und konvergente Validität der verwendeten abhängigen Variablen. Um die Robustheit der Ergebnisse zu prüfen, erfolgte in der zweiten Studie eine erneute Prüfung der Skalenstruktur sowie der Zusammenhänge zwischen den Maßen in einer unabhängigen Stichprobe mit differentiellen soziodemographischen Charakteristika. Im Anschluss werden die Ergebnisse hypothesenorientiert vorgestellt.

### 9.1. Skalenanalyse

#### 9.1.1. FiFp

Reliabilitätsanalysen indizierten eine gute (vgl. Blanz, 2015) interne Konsistenz der Skala, welche mit Cronbach's  $\alpha = .83$  noch über jener in der ersten Studie ( $\alpha = .76$ ) lag. Erneut verfügte das Item „Zu weniger erwünschten Arbeitnehmern macht eine Elternschaft...“, über eine geringe Trennschärfe ( $r_{i(t-i)} = .18$ ), weshalb dieses, wie bereits in der ersten Studie, auf Grund möglicher Verständlichkeitsprobleme ausgeschlossen wurde. Analog zur ersten Studie, zeigten die Teilnehmenden im Mittel positivere Einstellungen gegenüber Männern in Führungspositionen und schrieben diesen eine höhere Führungskompetenz und Karrieremotivation zu:  $M = 3.58$ ,  $SD = 0.56$ . Die Abweichung vom Skalenmittelpunkt (4: beide Geschlechter gleichermaßen) war signifikant:  $t(231) = -11.56$ ,  $p < .001$ ,  $d = -0.8$ .

#### 9.1.2. Frauenförderung

Analog zur ersten Studie ließ sich eine hohe interne Konsistenz der neu konstruierten Frauenförderungsskala nachweisen (Cronbach's  $\alpha = .87$ ). Der Mittelwert der Skala wich mit  $M = 4.84$  ( $SD = 0.94$ ) signifikant vom Mittelpunkt der Skala (4: neutraler Punkt der Zustimmung) ab:  $t(231) = 13.58$ ,  $p < .001$ ,  $d = 0.89$ . Die Teilnehmenden zeigten somit erneut im Mittel eine Befürwortung der erfassten Frauenfördermaßnahmen am Arbeitsplatz.

#### 9.1.3. Koryphäenproblem

Analog zum Vorgehen in der ersten Studie wurden die offenen Antworten von zwei unabhängigen Bewertern ( $k = .97$ ) in eine Dummy-Variable (0: falsche Lösung, 1: richtige Lösung) kodiert. Im Vergleich zur ersten Studie (7%) gaben mehr Personen (15%) an, das Rätsel bereits gekannt zu haben. Wie bereits in der ersten Studie wurden für weitere Analysen nur Teilnehmende ohne Vorkenntnis des Rätsels berücksichtigt ( $n = 198$ ). Etwa ein Drittel (35%) dieser konnte das Koryphäenproblem richtig lösen, während die Mehrzahl keine oder eine falsche Lösung nannte. Erneut war die Reduktion der drei Items zur Rätsel-erfahrung und Rätselaffinität in einen allgemeinen Rätsellosekompetenzfaktor möglich: So vereinte dieser substantielle Ladungen aller drei Variablen auf sich ( $I_s > .73$ ) und konnte 67% der Varianz der Variablen aufklären (Faktorenanalyse mit VARIMAX-Rotation). Ein Mittelwert der drei Items ( $z$ -standardisiert) diente daher als Maß für die mittlere Rätsellosekompetenz der Teilnehmenden in weiteren Analysen (vgl. Studie 1.).

#### 9.1.4. Bivariate Korrelationen

Wie bereits in der ersten Studie bestand eine signifikante positive Korrelation zwischen den beiden expliziten Einstellungsmaßen ( $r(230) = .50$ ,  $p < .001$ ), welche nach Cohen (1988) als hoch einzustufen ist. So gingen positive Einstellungen zu Frauen in Führungspositionen auch mit einer stärkeren Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz einher. Ferner lösten Teilnehmende mit positiven Einstellungen zu Frauen in Führungspositionen häufiger das Koryphäenproblem:  $r_{pb}(196) = .19$ ,  $p < .05$ . Anders als in der ersten Studie ließ sich hingegen kein signifikanter Zusammenhang zwischen der Einstellung zu Frauenfördermaßnahmen und der Lösungswahrscheinlichkeit des Koryphäenproblems nachweisen, wobei eine kleine Korrelation (vgl. Cohen, 1988) in der erwarteten Richtung bestand:  $r_{pb}(196) = .11$ ,  $p = .12$ .

### 9.2. Prüfung der Hypothesen

Die Daten der expliziten Maße wurden im Rahmen einer zweifaktoriellen multivariaten Varianzanalyse mit den Faktoren *Geschlecht der teilnehmenden Person* (männlich vs. weiblich) und der *Experimentellen Bedingung* (Perspektivenübernahme: Tochter vs. Sohn vs. Kontrollgruppe) unter Verwendung zweier geplanter Kontraste ausgewertet. Der erste Kontrast prüfte dabei die angenommenen Gruppenunterschiede (H1) zwischen der Bedingung Tochter ( $\lambda = 1$ ) und den beiden anderen experimentellen Bedingungen ( $\lambda_s = -0.5$ ). Ein weiterer orthogonaler Kontrast prüfte paarweise Unterschiede zwischen der Bedingung Sohn ( $\lambda = -1$ ) und der neutralen Kontrollgruppe ( $\lambda = 1$ ) und sollte somit die erste Forschungsfrage beantworten. Als Schätzer der Effektgrößen dienten das partielle eta-Quadrat ( $\eta_p^2$ ) sowie für Kontrastanalysen  $r_{effect\_size}$ , ein Maß für die Passung zwischen den spezifizierten Kontrastgewichten  $\lambda$  und den beobachteten Werten.

#### 9.2.1. Perspektivenübernahme (H1)

Im Rahmen der durchgeführten 2 x 3 MANOVA zeigte sich ein signifikanter Haupteffekt der experimentellen Bedingung, welcher indiziert, dass die Perspektivenübernahmemanipulation einen Einfluss auf die erfassten geschlechterbezogenen Einstellungen der Teilnehmenden nahm:  $F(4, 452) = 6.09^9$ ,  $p < .001$ ,  $\eta_p^2 = .05$  (siehe Tabelle 6 für Ergebnisse der univariaten Varianzanalysen).

<sup>9</sup> Bericht der Pillai-Spur Statistik, da die Annahme der Varianzhomogenität für die AV Frauen in Führungspositionen (FiFp) verletzt wurde (Levene's F-Test:  $p < .05$ ). Die Pillai-Spur Statistik ist nach Olson (1976) robust gegenüber der Verletzung der Annahme der Varianzhomogenität. Da sich die Standardabweichungen in den einzelnen Bedingungskombinationen nicht substantiell unterschieden (vgl. Tabelle 7) und die Anzahl der Teilnehmenden in jeder Bedingungskombination größer als  $n = 20$  war, wurde von einer hinreichenden Robustheit der univariaten Varianzanalysen ausgegangen (vgl. Bortz, 2005; Howell, 2007). Zudem konnten die Ergebnisse im Rahmen eines non-parametrischen Bootstrapping-Verfahrens (1000 Bootstrap-Stichproben, BCa-Konfidenzintervalle) validiert werden. Die Ergebnisse der Analysen sind auf der beiliegenden Daten-CD zu finden.



Konsistent zu den Annahmen der ersten Hypothese (H1a) zeigten Teilnehmende der Bedingung Tochter signifikant positivere Einstellungen zu Frauen in Führungspositionen ( $M(SD)_{Tochter} = 3.77(0.56)$ ) im Vergleich zur Teilnehmenden der Bedingung Sohn und der Kontrollgruppe ( $M(SD)_{KG/Sohn\_pooled} = 3.49(0.52)$ ,  $t_{Kontrast}(226) = 4.05$ ,  $p < .001$ ). Die spezifizierten  $\lambda$ -Gewichte korrelierten dabei zu  $r_{effect\_size} = .22$  mit den beobachteten Werten, was einer mittleren Effektstärke nach Konventionen von Gignac und Szodorai (2016) entspricht.

Wie angenommen (H1b), zeigten Teilnehmende der Bedingung Tochter zudem eine stärkere Befürwortung von Frauenfördermaßnahmen ( $M(SD)_{Tochter} = 5.13(0.91)$ ) im Vergleich zu Teilnehmenden der beiden anderen experimentellen Bedingungen ( $M(SD)_{KG/Sohn\_pooled} = 4.71(0.92)$ ,  $t_{Kontrast}(226) = 3.78$ ,  $p < .001$ ;  $r_{effect\_size} = .21$ ). Die Daten lieferten folglich Evidenz für die erste Hypothese, die eine positive Beeinflussung geschlechterbezogener Einstellungen durch die Übernahme der Perspektive einer Tochter annahm (siehe Abbildung 3).

Keine signifikanten Unterschiede ließen sich hingegen zwischen den Einstellungen der Teilnehmenden in der Bedingung Sohn und der Kontrollgruppe nachweisen. So zeigten Teilnehmende der Bedingung Sohn im Vergleich zur Kontrollgruppe weder signifikant negativere Einstellungen gegenüber Frauen in Führungspositionen ( $M(SD)_{Sohn} = 3.45(0.66)$  vs.  $M(SD)_{KG} = 3.53(0.40)$ ,  $t_{Kontrast}^{10}(226) = 1.83$ ,  $p = .07$ , *n.s.*), noch eine geringere Befürwortung von Frauenfördermaßnahmen ( $M(SD)_{Sohn} = 4.63(1.05)$  vs.  $M(SD)_{KG} = 4.78(0.80)$ ,  $t_{Kontrast}(226) = 1.84$ ,  $p = .07$ , *n.s.*). Rein deskriptiv zeigte sich jedoch das vermutete Mittelwertmuster (Sohn < KG < Tochter) mit den negativsten Einstellungen gegenüber Frauen in Führungspositionen und Frauenfördermaßnahmen in der Bedingung Sohn und den positivsten geschlechterbezogenen Einstellungen in der Bedingung Tochter<sup>11</sup> (siehe Abbildung 3).

### 9.2.2. Geschlechtsunterschiede (H2)

Hypothese 2 nahm Geschlechtsunterschiede an, welche sich in egalitäreren geschlechterbezogenen Einstellungen weiblicher Teilnehmerinnen zeigen sollten. Konsistent zu dieser Annahme ließ sich im Rahmen der multivariaten Varianzanalyse ein signifikanter Haupteffekt des Geschlechts der teilnehmenden Person nachweisen:  $F(2, 225) = 15.19$ ,  $p < .001$  mit einer mittleren Effektstärke von  $\eta_p^2 = .12$  ( $\eta_p^2 > .06$ ; Cohen, 1988). So zeigten Frauen im Vergleich zu Männern positivere Einstellungen gegenüber Frauen in Führungspositionen ( $M(SD)_{Frauen} = 3.63(0.42)$  vs.  $M(SD)_{Männer} =$

$3.46(0.74)$ ;  $F(1, 226) = 6.50$ ,  $p = .01$ ,  $\eta_p^2 = .03$ ) sowie eine stärkere Befürwortung von Frauenförderung am Arbeitsplatz ( $M(SD)_{Frauen} = 5.06(0.85)$  vs.  $M(SD)_{Männer} = 4.42(0.98)$ ;  $F(1, 226) = 30.48$ ,  $p < .001$ ,  $\eta_p^2 = .12$ ).

Der Haupteffekt des Geschlechts auf die Einstellung zu Frauen in Führungspositionen wurde jedoch durch die signifikante Interaktion *Experimentelle Bedingung x Geschlecht* qualifiziert:  $F(2, 226) = 4.89$ ,  $p = 0.08$ ,  $\eta_p^2 = .04$ . So hing der Einfluss des Geschlechts der teilnehmenden Person auf die erfassten Einstellungen zu Frauen in Führungspositionen von der experimentellen Bedingung ab: Signifikante Einstellungsunterschiede zwischen Männern und Frauen ließen sich nur in der Bedingung Sohn nachweisen ( $F(1, 226) = 15.93$ ,  $p < .001$ ,  $\eta_p^2 = .07$ ), nicht jedoch in der Kontrollgruppe und der Bedingung Tochter ( $F_s < 0.11$ ,  $p_s > .75$ ). Der Einfluss des Geschlechts der teilnehmenden Person auf die Einstellung zu Frauenfördermaßnahmen hing hingegen nicht von der experimentellen Bedingung ab (siehe Tabelle 6). So zeigten Frauen im Vergleich zu Männern, unabhängig von der experimentellen Manipulation, eine signifikant stärkere Befürwortung von Frauenfördermaßnahmen ( $F_s(1, 226) > 4$ ,  $p_s < .05$ ,  $\eta_{ps}^2 > .01$ ; siehe Tabelle 7 für deskriptive Statistiken).

### 9.2.3. Interaktionshypothese (H3)

Konsistent zu den Annahmen der dritten Hypothese, indizierte die signifikante Interaktion zwischen der experimentellen Bedingung und dem Geschlecht der teilnehmenden Person ( $F(4, 452) = 2.74$ ,  $p = .03$ ,  $\eta_p^2 = .02$ ), dass sich die Perspektivenübernahmemanipulation für männliche und weibliche Teilnehmende unterschiedlich auswirkte (siehe Abbildung 4 für eine graphische Inspektion des Interaktionsplots).

Um zu prüfen, ob die Perspektivenübernahme einer Tochter geschlechterbezogene Einstellungen männlicher Teilnehmer stärker beeinflusste als jene weiblicher Teilnehmerinnen (H3), wurden bedingte Kontrasteffekte für jede Stufe des dichotomen Faktors Geschlecht gerechnet. Diese prüften Unterschiede in geschlechterbezogenen Einstellungen zwischen der Bedingung Tochter ( $\lambda = 1$ ) und den beiden anderen experimentellen Bedingungen ( $\lambda_s = -0.5$ ) separat für weibliche und männliche Teilnehmende. Die durch den Kontrast geprüfte Mittelwertdifferenz fiel wie angenommen für Männer ( $M_{Difference} = 0.45$ ,  $CI_{95\%}[0.25, 0.88]$ ) im Vergleich zu Frauen ( $M_{Difference} = 0.18$ ,  $CI_{95\%}[0.00, 0.37]$ ) höher aus. Wie die sich überlappenden Konfidenzintervalle (bonferroni-adjustiert) zeigten, war dieser Unterscheid jedoch nicht signifikant<sup>12</sup>. Auch in Bezug auf die Einstellung zu Frauenfördermaßnahmen fiel der Mittelwertunterschied zwischen der Bedingung Tochter und den beiden anderen Bedingungen bei Männern ( $M_{Difference} = 0.58$ ,  $CI_{95\%}[0.02, 1.14]$ ) im Vergleich zu Frauen ( $M_{Difference} = 0.38$ ,  $CI_{95\%}[0.01, 0.76]$ ) deskriptiv

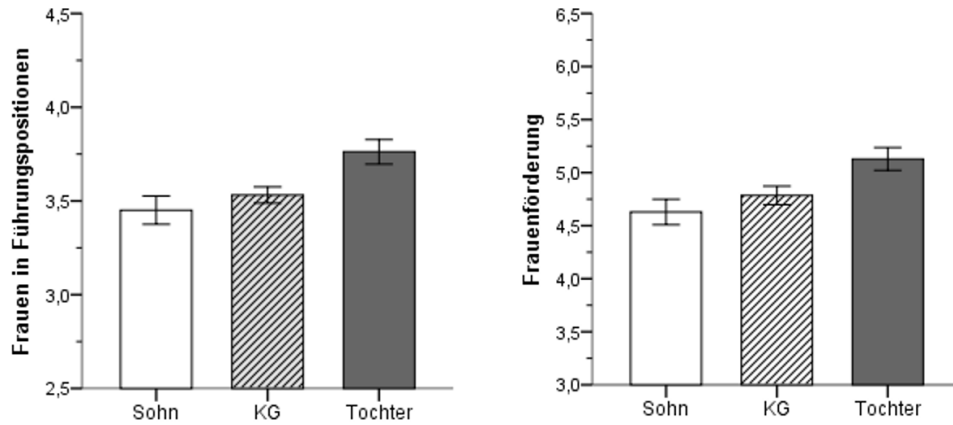
<sup>10</sup> Da es sich streng genommen um eine Forschungsfrage handelte, erfolgte die Analyse zusätzlich mit bonferroni-adjustierten Post-hoc Tests. Die Ergebnisinterpretation änderte sich dadurch nicht:

FiFp:  $M_{Difference} = -.08$ ,  $CI_{95\%}[-.28, .12]$ ,  $p > .99$ ;

Frauenförderung:  $M_{Difference} = -.15$ ,  $CI_{95\%}[-.48, .18]$ ,  $p = .78$ .

<sup>11</sup> Die Ergebnisse halten einer Reihe von Robustheits-Tests stand, wie etwa der Aufnahme der politischen Orientierung als Kovariate in einer 2x3 MANCOVA sowie der ausschließlichen Analyse mit Teilnehmenden ohne Kinder (siehe Daten-CD).

<sup>12</sup> Die Prüfung der Hypothese erfolgte mit Hilfe bonferroni-adjustierter Mittelwertdifferenzen, um eine Kontrolle des  $\alpha$ -Fehlers für multiple Testung zu ermöglichen (für detaillierte Begründungen siehe Dunn (1961) sowie Wiens und Nilsson (2017)).



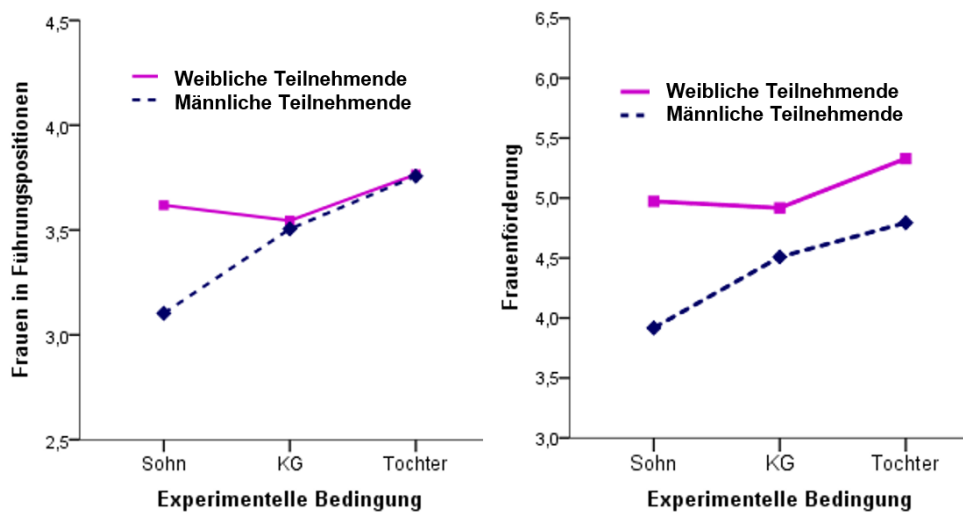
**Abbildung 3:** Vergleich der Mittelwerte in den experimentellen Bedingungen für die Einstellung zu Frauen in Führungspositionen (links) und die Einstellung zu Frauenförderung (rechts).

Anmerkung. Hohe Werte drücken positive Einstellungen zu Frauen in Führungspositionen/Frauenförderung aus (Skala 1-7). Zur besseren Visualisierung der Ergebnisse ist nur der mittlere Bereich der Skalen ( $\sim M \pm 2 SD$ ) dargestellt. Die Fehlerbalken entsprechen dem Standardfehler des Mittelwerts.

**Tabelle 6:** Ergebnisse der 2x3 ANOVA für die Einstellung zu Frauen in Führungspositionen (FiFp) und die Einstellung zu Frauenförderung

| Prädiktor              | Abhängige Variable |    |      |      |       |            |                 |    |       |       |       |            |
|------------------------|--------------------|----|------|------|-------|------------|-----------------|----|-------|-------|-------|------------|
|                        | FiFp               |    |      |      |       |            | Frauenförderung |    |       |       |       |            |
|                        | QS                 | df | MQS  | F    | p     | $\eta_p^2$ | QS              | df | MQS   | F     | p     | $\eta_p^2$ |
| Bedingung              | 5.47               | 2  | 2.73 | 9.72 | <.001 | .08        | 12.91           | 2  | 6.46  | 8.64  | <.001 | .07        |
| Geschlecht             | 1.83               | 1  | 1.83 | 6.50 | .01   | .03        | 22.77           | 1  | 22.77 | 30.48 | <.001 | .12        |
| Bedingung x Geschlecht | 2.75               | 2  | 1.38 | 4.89 | .01   | .04        | 4.05            | 2  | 2.03  | 2.71  | .07   | .02        |

Anmerkung. QS = Quadratsumme, df = Freiheitsgrade, MQS = Mittlere Quadratsumme, F = F-test Statistik, p = Signifikanzwert,  $\eta_p^2$  = partielles eta-Quadrat. N = 232.



**Abbildung 4:** Graphische Darstellung des Effekts der Interaktion Geschlecht x Experimentelle Bedingung auf Einstellungen zu Frauen in Führungspositionen (links) sowie Frauenförderung (rechts).

Anmerkung. Hohe Werte drücken positive Einstellungen zu Frauen in Führungspositionen/Frauenförderung aus (Skala: 1-7). Zur besseren Visualisierung ist nur der mittlere Bereich der Skalen ( $\sim M \pm 2 SD$ ) dargestellt.

höher aus. Erneut war dieser Unterschied jedoch nicht signifikant.

Um die Natur der Interaktion besser zu verstehen, wurden im Rahmen explorativer Analysen bonferroni-adjustierte Post-hoc Tests gerechnet. Diese prüften paarweise Mittelwertdifferenzen zwischen den experimentellen Bedingungen separat für weibliche und männliche Teilnehmende unter strenger Korrektur des  $\alpha$ -Fehlers für multiple Testung (siehe Tabelle 7). Die Ergebnisse zeigten, dass für weibliche Teilnehmende lediglich ein (auf einem 10%-Niveau) signifikanter Gruppenunterschied zwischen der Bedingung Tochter und der Kontrollgruppe in Bezug auf die Einstellung zu Frauenfördermaßnahmen bestand ( $p = .052$ ), während alle anderen paarweisen Mittelwertvergleiche keine Signifikanz erreichten ( $p_s > .10$ ). Ausschließlich männliche Teilnehmende betrachtend, ließen sich hingegen für beide abhängige Variablen signifikante Gruppenunterschiede zwischen der Bedingung Sohn und der Bedingung Tochter ( $p_s < .001$ ) sowie zwischen der Bedingung Sohn und der Kontrollgruppe ( $p_s < .05$ ) nachweisen. Anders als vermutet unterschieden sich die erfassten Einstellungen der männlichen Teilnehmenden in der Bedingung Tochter und der Kontrollgruppe jedoch nicht signifikant ( $p_s > .24$ ).

#### 9.2.4. Implizite Einstellungen (H4)

Die Hypothesen auf einer impliziten Einstellungsebene wurden mit Hilfe einer logistischen Regression mit den Prädiktoren *Experimentelle Bedingung* und *Geschlecht* unter Berücksichtigung der mittleren Rätselföskompetenz als Kovariate geprüft. Hypothese 4a nahm an, dass es Teilnehmenden im Anschluss an die Perspektivenübernahme einer Tochter leichter fällt, das Koryphäenproblem richtig zu lösen. Rein deskriptiv zeigte sich das erwartete Ergebnismuster: So lösten 41% der Teilnehmenden in der Bedingung Tochter das Rätsel richtig im Vergleich zu nur 33% der Teilnehmenden in den beiden anderen experimentellen Bedingungen (siehe Tabelle F1 für detaillierte deskriptive Statistiken). Der geplante Kontrast, der diese Hypothese prüfte, erreichte jedoch keine Signifikanz:  $b = .29$ ,  $Wald = 0.81$ ,  $p = .37$ ,  $Odds Ratio = 1.33$ .

Zudem wurde erwartet (H4b), dass es Frauen im Vergleich zu Männern leichter fällt, das Koryphäenproblem richtig zu lösen. Die Daten lieferten jedoch keine Evidenz für die angenommenen Geschlechtsunterschiede:  $b = -.16$ ,  $Wald = .27$ ,  $p = .60$ ,  $Odds Ratio = .85$ . Entgegen der Erwartungen zeigten männliche Teilnehmer (38%) im Vergleich zu weiblichen Teilnehmerinnen (34%) deskriptiv sogar eine höhere Wahrscheinlichkeit, das Rätsel richtig zu lösen. Wie bereits in der ersten Studie erwies sich allein die mittlere Rätselföskompetenz der Teilnehmenden als signifikanter Prädiktor der Lösungswahrscheinlichkeit des Koryphäenproblems ( $b = .41$ ,  $Wald = 5.69$ ,  $p = .02$ ,  $Odds Ratio = 1.51$ ), während weder die experimentelle Bedingung noch das Geschlecht der teilnehmenden Person eine signifikante Vorhersageleistung lieferten. Die Hypothesen 4a und 4b mussten folglich verworfen werden.

## 10. Diskussion

### 10.1. Zusammenfassung der Ergebnisse

„Gehe hundert Schritte in den Schuhen eines anderen, wenn Du ihn verstehen willst.“ (Indianisches Sprichwort, Anonymer Verfasser)

Die Ergebnisse der Studie sprechen dafür, dass die Instruktion zur Perspektivenübernahme einer (vorgestellten) Tochter die Studienteilnehmenden - konsistent zu dem indischen Sprichwort - dazu brachte, in den Schuhen der Tochter in der Arbeitswelt zu gehen und ein besseres Verständnis für bestehende Herausforderungen für Frauen in der Arbeitswelt zu entwickeln. Wie erwartet (H1) ging so die Perspektivenübernahme einer (vorgestellten) Tochter (im Vergleich zur Perspektivenübernahme eines Sohnes und einer mentalen Simulation in der neutralen Kontrollgruppe) mit signifikant positiveren Einstellung gegenüber Frauen in Führungspositionen sowie mit einer stärkeren Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz einher. Die Stärken einer kontrollierten experimentellen Studie mit randomisierter Gruppenzuweisung zu den experimentellen Bedingungen (RCT-Design) nutzend, sprechen die Ergebnisse demnach dafür, dass geschlechterbezogener Einstellungen durch die verwendete Perspektivenübernahmemanipulation positiv beeinflusst wurden.

Eine Forschungsfrage war, ob die Perspektivenübernahme eines Sohnes (im Vergleich zur mentalen Simulation in einer Kontrollgruppe) mit signifikant negativeren Einstellungen zu Frauen in Führungspositionen sowie zu Frauenfördermaßnahmen am Arbeitsplatz einhergeht. Männliche und weibliche Teilnehmende gemeinsam betrachtend, sprechen die Ergebnisse gegen diese Annahme. Rein deskriptiv zeigte sich jedoch das vermutete Mittelwertmuster: So zeigten Teilnehmende nach der Übernahme der Perspektive eines Sohnes die negativsten Einstellungen zu Frauen in Führungspositionen und Frauenfördermaßnahmen, während Teilnehmende nach der Übernahme der Perspektive einer Tochter über die positivsten geschlechter-bezogenen Einstellungen verfügten.

#### 10.1.1. Geschlechtsunterschiede

Auf bisherigen empirischen Befunden aufbauend, erwartete ich zudem, dass Frauen allgemein (d.h. unabhängig von der experimentellen Bedingung) über egalitärere geschlechterbezogene Einstellungen verfügen als Männer (H2). Konsistent zu dieser Annahme zeigte sich ein signifikanter Haupteffekt des Geschlechts der teilnehmenden Person, welcher auf positivere Einstellungen weiblicher Teilnehmerinnen zu Frauen in Führungspositionen sowie zu Frauenfördermaßnahmen zurückging. Wie erwartet zeigten Frauen im Vergleich zu Männern - unabhängig von der experimentellen Bedingung - eine signifikant stärkere Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz. Überraschenderweise hing der Einfluss des Geschlechts der teilnehmenden Person auf Einstellungen zu Frauen in Führungspositionen jedoch

**Tabelle 7:** Deskriptive Statistiken der expliziten Maße (Frauen in Führungspositionen, Frauenförderung) als Funktion des Geschlechts der teilnehmenden Person und der experimentellen Bedingung.

|                          | Abhängige Variable          |                             |                             |                             |                             |                             |
|--------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                          | FiFp                        |                             |                             | Frauenförderung             |                             |                             |
|                          | Geschlecht                  |                             | Gesamt                      | Geschlecht                  |                             | Gesamt                      |
|                          | Männlich                    | Weiblich                    |                             | Männlich                    | Weiblich                    |                             |
| Experimentelle Bedingung |                             |                             |                             |                             |                             |                             |
| Sohn                     | 3.10 <sup>a</sup><br>(0.91) | 3.62 <sup>a</sup><br>(0.41) | 3.45 <sup>a</sup><br>(0.66) | 3.92 <sup>a</sup><br>(1.00) | 4.97 <sup>a</sup><br>(0.90) | 4.63 <sup>a</sup><br>(1.05) |
| KG                       | 3.51 <sup>b</sup><br>(0.50) | 3.54 <sup>a</sup><br>(0.34) | 3.53 <sup>a</sup><br>(0.40) | 4.51 <sup>b</sup><br>(0.71) | 4.92 <sup>a</sup><br>(0.81) | 4.78 <sup>a</sup><br>(0.80) |
| Tochter                  | 3.76 <sup>b</sup><br>(0.66) | 3.77 <sup>a</sup><br>(0.49) | 3.76 <sup>b</sup><br>(0.56) | 4.80 <sup>b</sup><br>(1.03) | 5.33 <sup>b</sup><br>(0.78) | 5.13 <sup>b</sup><br>(0.91) |

Anmerkung. Dargestellt sind Mittelwerte und Standardabweichungen (*kursiv, in Klammern*). Hohe Werte drücken positive Einstellungen zu Frauen in Führungspositionen (FiFp)/Frauenförderung aus (Skala: 1-7). Unterschiedliche Kleinbuchstaben in einer Spalte indizieren signifikante Mittelwertunterschiede zwischen den experimentellen Bedingungen.

$p < .10$ ; zweiseitiger Signifikanztest mit Bonferroni-Adjustierung für Mehrfachvergleiche.

von der betrachteten experimentellen Bedingung ab. So zeigten sich signifikante Geschlechtsunterschiede in der Einstellung zu Frauen in Führungspositionen nur in der Bedingung *Sohn*, nicht jedoch in den beiden anderen experimentellen Bedingungen.

Versteht man die Kontrollgruppe als neutrale Kontrollgruppe, in der geschlechterbezogene Einstellungen der Teilnehmenden nicht systematisch beeinflusst werden sollten (vgl. mentale Simulation zu zukünftigem Urlaub), indizieren die Ergebnisse, dass sich die Einstellungen von Männern und Frauen gegenüber Frauen in Führungspositionen allgemein (d.h. in Abwesenheit einer Perspektivenübernahmeinstruktion) nicht (mehr) systematisch unterscheiden. Dieses Ergebnis ist vor dem Hintergrund bisheriger Forschungsarbeiten (z.B. Cordano et al., 2002; Cortis und Cassar, 2005; Mihail, 2006), die bedeutsame Unterschiede zwischen Männern und Frauen in den Einstellungen zu Frauen in Führungspositionen nachweisen konnten, überraschend. Vor dem Hintergrund der steigenden Sensibilität für Geschlechterungleichheit in der Gesellschaft im Allgemeinen und in der Arbeitswelt im Speziellen (PageGroup, 2018) sind die Ergebnisse jedoch weniger verwunderlich. So können die Ergebnisse als initiale Evidenz für die Annahme gewertet werden, dass sich geschlechterbezogene Einstellungen von Männern und Frauen in der modernen Arbeitswelt zunehmend angleichen.

Geht man von einer zunehmenden Angleichung geschlechterbezogener Einstellungen von Männern und Frauen in der modernen Arbeitswelt aus, stellt sich die Frage, wie die signifikanten Geschlechtsunterschiede in der Befürwortung von Frauenfördermaßnahmen zu erklären sind, welche sich unabhängig von der experimentellen Bedingung zeigten. Möglich wäre, dass diese zumindest teilweise durch ein Modell der rationalen Wahl (Simon, 1955) zu erklären sind. So sollten Frauen Frauenfördermaßnahmen am Arbeitsplatz nicht nur auf Grund egalitärerer geschlechterbezogener Ein-

stellungen, sondern auch vor dem Hintergrund einer rein rationalen Kosten-Nutzen-Analyse stärker befürworten (vgl. Diefenbach, 2009). Demnach bringt eine Förderung von Frauen in der Arbeitswelt für Frauen einen direkten Nutzen mit sich, etwa durch steigende Karriere- und Aufstiegschancen. Für Männer ist eine stärkere Förderung von Frauen hingegen primär mit Kosten assoziiert, etwa durch den steigenden Konkurrenzdruck durch kompetente Frauen auf dem Arbeitsmarkt oder durch reduzierte Weiterbildungsangebote für Männer. Somit ist es möglich, dass die Geschlechtsunterschiede in der Einstellung zu Frauenfördermaßnahmen nur teilweise auf Unterschiede in der Egalität geschlechterbezogener Einstellungen zurückgehen. Ein Großteil der Unterschiede könnte hingegen durch eine rationale Nutzenmaximierung auf Seiten beider Geschlechter zu erklären sein.

#### 10.1.2. Implizite Einstellungen

Entgegen der Erwartungen ging die Perspektivenübernahme einer Tochter weder mit einer signifikant höheren Wahrscheinlichkeit das Koryphäenproblem richtig zu lösen, einher, noch zeigte sich die angenommene Überlegenheit von Frauen gegenüber Männern im Lösen des Rätsels. Somit lieferten die Ergebnisse keine Evidenz für die angenommenen Zusammenhänge (H4a & H4b) auf einer impliziten Einstellungsebene.

Die Ergebnisse sind vor dem Hintergrund bisheriger Forschungsergebnisse, welche die Wirksamkeit einer Perspektivenübernahmemanipulation auch auf einer impliziten Ebene nachweisen konnten (z.B. Todd et al., 2011), überraschend. Betrachtet man die Lösungswahrscheinlichkeiten in den einzelnen experimentellen Bedingungen, zeigte sich jedoch rein deskriptiv das erwartete Muster, mit der höchsten Wahrscheinlichkeit das Koryphäenproblem richtig zu lösen, nachdem die Perspektive der Tochter eingenommen wurde und



der niedrigsten Lösungswahrscheinlichkeit, nachdem die Perspektive des Sohnes eingenommen wurde. Die mangelnde Evidenz für einen signifikanten Einfluss der Perspektivenübernahmemanipulation könnte somit auch auf eine geringe Sensitivität des Messinstruments zur Erfassung geschlechterbezogener Einstellungsunterschiede zurückzuführen sein (siehe Kapitel 6.2 für eine Diskussion der Messgüte des Koryphäenproblems).

Entgegen der Erwartungen lösten Frauen das Koryphäenproblem jedoch sogar seltener als Männer. Dieses Ergebnis widerspricht dabei nicht nur den Erwartungen (H4b), sondern auch den Ergebnissen auf einer expliziten Einstellungsebene. Auch andere Forscher fanden jedoch bereits eine Diskrepanz von Geschlechtsunterschieden auf einer expliziten und impliziten Einstellungsebene (Ekehammar et al., 2003). So zeigten Ekehammar et al. (2003) in ihrer Studie, dass Frauen (im Vergleich zu Männern) nur auf einer expliziten Ebene über weniger rassistische Einstellungen verfügten, während sich auf einer impliziten Ebene das umgekehrte Muster zeigte. Ob und inwiefern sich Geschlechtsunterschiede in der Egalität der erfassten Einstellungen auf einer expliziten und einer impliziten Einstellungsebene unterscheiden, sollte somit Gegenstand weiterer Forschungsarbeiten sein.

### 10.1.3. Interaktionshypothese

Auf den theoretischen Annahmen des Perspektivenübernahmearbeitsansatzes aufbauend, ging ich zudem von einer differentiellen Wirkung der Perspektivenübernahmemanipulation in Abhängigkeit des Geschlechts der teilnehmenden Person aus. Konsistent zu dieser Annahme zeigte sich eine signifikante Interaktion zwischen der experimentellen Bedingung und dem Geschlecht der teilnehmenden Person, welche indizierte, dass sich die experimentelle Manipulation bei Männern und Frauen unterschiedlich auswirkte. Anders als erwartet ging die signifikante Interaktion jedoch nicht auf eine differentielle Wirkung der Perspektivenübernahme der Tochter für männliche und weibliche Teilnehmende zurück, sondern primär auf eine differentielle Wirkung der Perspektivenübernahme des Sohnes. So zeigten männliche Teilnehmende nach der Perspektivenübernahme des Sohnes (im Vergleich zu Teilnehmenden der Kontrollgruppe) signifikant negativere Einstellungen zu Frauen in Führungspositionen und Frauenfördermaßnahmen. Für weibliche Teilnehmerinnen bestanden hingegen keine signifikanten Gruppenunterschiede zwischen den beiden Bedingungen. Die Perspektivenübernahme eines Sohnes führte demnach speziell bei männlichen Teilnehmenden zu negativen Einstellungen zu Frauen in Führungspositionen und Frauenfördermaßnahmen.

Die Ergebnisse sind mit den theoretischen Vorhersagen eines Perspektivenübernahmearbeitsansatzes nicht vereinbar. So nimmt dieser an, dass sich die Perspektivenübernahme einer Zielperson (der Tochter/des Sohnes) besonders dann auf Einstellungen eines Individuums auswirkt, wenn die Perspektivenübernahme der Zielperson für das Individuum eine neue Erfahrung darstellt, sprich wenn die Arbeitswelt noch selten aus der Perspektive dieser Person betrachtet wurde. Dies sollte für Männer speziell für die Weltansicht einer Frau

gelten, für Frauen hingegen insbesondere für die Weltansicht eines Mannes. Wieso sich die Perspektivenübernahme eines Sohnes bei Männern im Vergleich zu Frauen substantiell stärker auswirkt, kann ein Perspektivenübernahmearbeitsansatz somit nicht erklären. Folglich stellt sich die Frage, wie die differentielle Wirkung der Perspektivenübernahme eines Sohnes bei männlichen und weiblichen Teilnehmenden zu erklären ist und worauf die vergleichsweise stark negativen geschlechterbezogenen Einstellungen männlicher Teilnehmer in der Bedingung *Sohn* zurückzuführen sind. Im Folgenden sollen drei mögliche Erklärungen für die unerwarteten Ergebnisse diskutiert werden.

### *Sohneffekt statt Tochtereffekt*

Die Ergebnisse der Studie indizierten, dass die Übernahme der Perspektive eines Sohnes geschlechterbezogene Einstellungen von Männern negativ beeinflusste, sodass sich diese in eine konservativere (d.h. weniger egalitäre) Richtung bewegten. Versteht man die Perspektivenübernahmemanipulation als eine Möglichkeit zur experimentellen Herstellung eines Tochtereffekts, wäre es möglich, dass Einstellungsunterschiede zwischen Vätern (erstgeborener) Töchter und Vätern (erstgeborener) Söhne fälschlich als Tochtereffekt konzeptualisiert wurden und es sich eigentlich um einen Sohneffekt handelt. Demnach würde die Vaterschaft eines Sohnes zu konservativeren Einstellungen führen (Sohneffekt) und nicht etwa die Vaterschaft einer Tochter zu egalitäreren Einstellungen (Tochtereffekt). Das Querschnittsdesign der ersten Studie (bei gleichzeitiger Fokussierung auf das Geschlecht des erstgeborenen Kindes) ermöglichte nicht, die Alternativerklärung eines erstgeborenen Sohn-effekts empirisch zu testen und so zwischen den beiden möglichen Erklärungen zu differenzieren. Initiale Evidenz für die Interpretation der Ergebnisse im Sinne eines Tochtereffekts lieferte jedoch der Nachweis, dass lediglich die Qualität der Vater-Tochter Beziehung ein Prädiktor für die Egalität der erfassten Einstellungen war, nicht jedoch die Qualität der Vater-Sohn Beziehung (siehe Kapitel 6.1). Zudem sprachen empirische Befunde aus Längsschnittstudien (Shafer & Malhotra, 2011) sowie die theoretische Herleitung, welche auf etablierten psychologischen Theorien aufbaute (siehe Kapitel 2.4), für die in der ersten Studie vorgenommene Interpretation der Daten. Die Ergebnisse der zweiten Studie erhöhen jedoch erneut die Plausibilität der Alternativerklärung eines Sohneffekts. Eine systematische und empirische Prüfung der Alternativerklärung sollte somit ein zentraler und essenzieller Bestandteil zukünftiger Studien sein. Forscher sollten dazu vermehrt eine längsschnittliche Betrachtung wählen (vgl. Shafer und Malhotra, 2011), um die Veränderung geschlechterbezogener Einstellungen im Zeitverlauf vor und nach dem kritischen Ereignis der Geburt des ersten Kindes beobachten zu können.

### *Soziale Erwünschtheit im Selbstbericht*

Eine Alternativerklärung für die Ergebnisse ist, dass die Perspektivenübernahme eines Sohnes primär den Selbst-Bericht der Einstellungen männlicher Teilnehmer differentiel beeinflusste. Das unerwartete Ergebnis könnte somit auch auf die

Tatsache zurückzuführen sein, dass erst durch die Aufforderung zur Perspektivenübernahme eines Sohnes Tendenzen zur sozialen Erwünschtheit abgebaut wurden. So könnten die männlichen Teilnehmer durch die vorgestellte Vaterschaft eines Sohnes eine Legitimation darin gesehen haben, eine Befürwortung männlicher Führungskräfte sowie einen Widerstand gegen Frauenfördermaßnahmen am Arbeitsplatz offen zu zeigen. Für diese Annahme spricht, dass sich ein signifikanter Gruppenunterschied zwischen der Bedingung *Perspektivenübernahme Sohn* und der Kontrollgruppe nur auf einer expliziten Einstellungsebene nachweisen ließ, nicht jedoch auf einer impliziten Einstellungsebene. Ob die Perspektivenübernahme eines Sohnes tatsächlich primär den Selbstbericht der Einstellungen männlicher Teilnehmer beeinflusste oder ob die mangelnde Evidenz für die angenommenen Zusammenhänge auf einer impliziten Ebene auf ungeklärte psychometrische Eigenschaften des Koryphäenproblems als Messinstrument zurückzuführen ist (siehe Kapitel 6.2), kann in der vorliegenden Studie nicht abschließend beantwortet werden und sollte Gegenstand zukünftiger Forschungsarbeiten sein.

#### *Neutralität der Kontrollgruppe*

Eine dritte mögliche Erklärung für die unerwarteten Ergebnisse ist, dass es sich bei der Kontrollgruppe nicht - wie intendiert - um eine neutrale Kontrollgruppe handeln könnte. Ziel der Gestaltung der mentalen Simulation in der Kontrollgruppe war es, eine in Bezug auf Valenz und psychologische Distanz vergleichbare, aber trotzdem mit der Geschlechterthematik unzusammenhängende, mentale Simulation zu gestalten. Vor dem Hintergrund der Ergebnisse ist es möglich, dass dieses Ziel nicht erreicht wurde. So zeigt eine qualitative Analyse der Antworten in der Kontrollgruppe, dass durch den gewählten Zeithorizont der Urlaube (20 bzw. 40 Jahren) bei der Mehrzahl der männlichen Teilnehmer Gedanken an einen Familienurlaub aktiviert wurden. Eine Analyse der Familienplanung zeigte dabei, dass sich 81% der befragten Männer in der Kontrollgruppe Kinder und 95% dieser mindestens eine Tochter wünschen. Somit sollten Gedanken an einen Familienurlaub in der Zukunft auch mit Gedanken an die Vaterschaft einer Tochter verbunden sein. Geht man davon aus, dass die mentale Simulation, Elternteil einer Tochter zu sein, hinreichend ist, um einen Mechanismus der Perspektivenübernahme auszulösen (siehe Kapitel 2.4), wäre es möglich, dass in der Kontrollgruppe Prozesse stattfanden, die zu den Prozessen in der Bedingung *Perspektivenübernahme Tochter* vergleichbar waren. Folglich könnte es sich nicht (wie intendiert) um eine neutrale Kontrollgruppe handeln, sondern um eine weitere Experimentalgruppe, in der die Übernahme der Perspektive der Tochter (unbeabsichtigt) gefördert wurde. Folgt man dieser Überlegung, könnten die Unterschiede zwischen der Kontrollgruppe und der Bedingung *Perspektivenübernahme Sohn* nicht ausschließlich auf einen negativen Einfluss der Perspektivenübernahme des Sohnes zurückgehen, sondern ebenfalls durch eine positive Beeinflussung geschlechterbezogener Einstellungen durch die mentale Simulation in der Kontrollgruppe erklärt werden.

Das Studiendesign der vorliegenden Arbeit ermöglichte keine empirische Prüfung, welche der drei Erklärungen am wahrscheinlichsten zutrifft. Diese und andere Limitationen der Studie sollen im Folgenden diskutiert werden.

## 10.2. Limitationen und zukünftige Forschung

### 10.2.1. Manipulationsüberprüfung

Eine methodische Schwäche der Arbeit besteht in der mangelnden systematischen Prüfung, welche Prozesse in den einzelnen experimentellen Bedingungen abliefen. So ermöglichte eine rein qualitative Analyse der offenen Antworten der Teilnehmenden nur eingeschränkte Aussagen darüber, ob es sich a) bei der Kontrollgruppe tatsächlich um eine neutrale Kontrollgruppe handelte und ob b) in den beiden Experimentalgruppen tatsächlich die Perspektivenübernahme der Tochter/des Sohnes stattfand. Zukünftige Studien sollten daher alternative Kontrollgruppen nutzen und eine systematische Prüfung anstreben, ob die aktivierten Gedanken in der Kontrollgruppe tatsächlich unabhängig vom erfassten Einstellungsobjekt sind. Um die Neutralität der Kontrollgruppe sicherzustellen, ist dabei vor allem die Durchführung entsprechender Vortests indiziert. Um zu prüfen, ob die angenommene Perspektivenübernahme der Tochter/des Sohnes in den Experimentalgruppen erfolgte, sollten neben qualitativen Analysen objektive Maße Anwendung finden. So könnten Teilnehmende beispielsweise auf einer Likert-Skala um eine Einschätzung gebeten werden, inwieweit sie sich in die Perspektive der Tochter/des Sohnes (in der Arbeitswelt) hineinversetzt haben und wie gut ihnen dies gelungen ist (vgl. Galinsky und Moskowitz, 2000). Ebenfalls könnten Verfahren aus dem Bereich des kognitiven Interviewens, wie etwa Protokolle des lauten Denkens, Anwendung finden und zu einem besseren Verständnis beitragen, welche kognitiven Prozesse in den einzelnen Bedingungen abliefen (vgl. Prüfer und Rexroth, 2005).

### 10.2.2. Ausschluss alternativer Wirkmechanismen

Ebenso bleibt in der vorliegenden Studie unklar, ob die mentale Simulation, Elternteil eines Kindes zu sein, bereits hinreichend war, um geschlechterbezogene Einstellungen der Teilnehmenden zu beeinflussen. Dies macht eine gewisse Konfundierung im Rahmen der gewählten experimentellen Manipulation deutlich: So kann nicht klar differenziert werden, zu welchem Anteil die Wirksamkeit der experimentellen Manipulation durch die mentale Simulation, Elternteil einer Tochter zu sein, einerseits (Tochtereffekt) und die Perspektivenübernahme eines Mitglieds der stereotypisierten Gruppe andererseits (Perspektivenübernahmeeffekt), zu erklären ist. Die experimentellen Bedingungen unterscheiden sich somit nicht nur in einem Merkmal, sondern in zwei Merkmalen (mentale Simulation und Perspektivenübernahme), wodurch eine mögliche Konfundierung entsteht. Diese mögliche Konfundierung im experimentellen Design muss als zentrale methodische Schwäche der Studie betrachtet werden.

War die mentale Simulation, Elternteil einer Tochter zu sein, bereits hinreichend, um geschlechterbezogene Einstellungen der Teilnehmenden positiv zu beeinflussen, kann

nicht ausgeschlossen werden, dass einer der anderen in Kapitel 2.4 diskutierten theoretischen Erklärungsmechanismen (Schutz der Tochter, Altruismus, Sozialer Einfluss) zur Wirksamkeit der experimentellen Manipulation beigetragen hat. So könnte durch die mentale Simulation, Elternteil einer Tochter zu sein, beispielsweise ebenfalls der Wunsch, die Tochter vor etwaiger Geschlechterdiskriminierung zu schützen, aktiviert worden sein. Die Studie liefert somit zwar initiale Evidenz für einen Perspektivenübernahmemechanismus als zentralen Wirkmechanismus des Tochtereffekts, ein Beitrag der anderen drei Wirkmechanismen kann jedoch nicht abschließend ausgeschlossen werden.

Die entwickelte mentale Simulationsmanipulation liefert jedoch das Potenzial, die theoretischen Erklärungsansätze in zukünftigen Studien empirisch gegeneinander testen zu können. So könnte beispielsweise die Wirksamkeit einer mentalen Simulation, die die Perspektivenübernahme der Tochter fördert, mit der Wirksamkeit einer mentalen Simulation verglichen werden, die primär an die Motivation, die Tochter vor Geschlechterdiskriminierung am Arbeitsplatz zu schützen, appelliert. Um die Vorhersagen eines Altruismus-Ansatzes zu prüfen, könnte in der mentalen Simulationsmanipulation beispielsweise differenziert werden, ob es sich bei der vorgestellten Tochter um eine leibliche Tochter oder um eine Adoptivtochter handelt (Prinzip der *kin selection*; siehe Kapitel 2.4). Zukünftige Studien sollten das entwickelte Paradigma nutzen, um die Ansätze empirisch gegeneinander zu testen. Ein solches Vorgehen ermöglicht nicht nur Rückschlüsse darauf, wie die Wirksamkeit der verwendeten experimentellen Manipulation zu erklären ist, sondern trägt vor allem substantziell zu einem besseren theoretischen Verständnis des Tochtereffekts bei.

### 10.2.3. Perspektivenübernahme Tochter vs. Frau

Weiterhin stellt sich die Frage, ob für den Erfolg der experimentellen Manipulation tatsächlich die Perspektivenübernahme der Tochter entscheidend war oder ob die Perspektivenübernahme eines anderen Mitglieds der Gruppe der Frauen (z.B. Arbeitskollegin, Ehefrau) zu identischen Ergebnissen geführt hätte. In anderen Worten: Wieso sollte man überhaupt den Umweg über die mentale Simulation, Elternteil einer Tochter zu sein, gehen und die Teilnehmenden nicht direkt zur Perspektivenübernahme der Ehefrau oder einer Kollegin am Arbeitsplatz auffordern? Qualitative Daten aus der Studie *An Insight into the Modern American Man* (Hart Research Associates, 2015) lieferten Hinweise darauf, dass speziell die Perspektivenübernahme einer Tochter entscheidend sein könnte. So zeigte die Studie, dass sich Eigenschaften, die Männer für ihre Tochter (vs. ihre Frau) als wünschenswert betrachten, stark unterscheiden. So stuften Männer für ihre Töchter vor allem Eigenschaften als wünschenswert ein, die finanzielle und emotionale Autonomie fördern und zentral für den Erfolg im Arbeitsleben sind (Kompetenzeigenschaften wie Stärke und Unabhängigkeit). Für die eigene Frau wurden hingegen häufiger Eigenschaften, wie Attraktivität, Sensibilität und ein süßes Äußeres (Emotionseigenschaften) als wichtig eingestuft. Väter scheinen sich somit vor allem

für die eigene Tochter eine erfolgreiche berufliche Karriere zu wünschen (Erwerbsarbeitsrolle), während für die eigene Ehefrau die Familienarbeitsrolle noch eher akzeptiert zu sein scheint. Ein traditionelles Geschlechterrollenverständnis scheint somit erst mit der Geburt der Tochter aufgebrochen zu werden. Diese Annahme ist konsistent mit Forschungsergebnissen von Moors (2003), welche nahelegten, dass Männer nach einer Heirat ein traditionelleres Rollenverständnis entwickeln.

Als mögliche Erklärung für den Befund kann die kognitive Dissonanz-Theorie (Festinger, 1957) herangezogen werden. Diese postuliert, dass Menschen nach Konsistenz in ihren Gedanken, Einstellungen und Verhaltensweisen streben. Sich widersprechende (dissonante) Kognitionen lösen hingegen einen aversiven, unangenehmen Spannungszustand aus, woraus sich eine Motivation zur Auflösung der bestehenden Dissonanzen ergibt. Im vorliegenden Zusammenhang werden folgende Annahmen getroffen: Auch in westlichen Ländern übernehmen Frauen noch immer mehr Aufgaben in der Kindererziehung und im Haushalt (Horne et al., 2018) - eine Aufgabenverteilung, die primär einem traditionellen Geschlechterrollenverständnis entspricht. Die Vertretung egalitärer Geschlechterrollenideologien (gleiche Teilhabe in Kindererziehung und Haushalt), trotz gleichzeitiger ungleicher Aufgabenverteilung in der Partnerschaft, erzeugt kognitive Dissonanz und einen Wunsch zur Reduktion dieser. Neben der Möglichkeit einer Verhaltensänderung (egalitäre Verteilung von Aufgaben), kann eine Dissonanzreduktion auch einstellungsbasiert erfolgen. Möglichkeiten bestehen beispielsweise in der Abwertung dissonanter Information (z.B. Ehefrauen für den Beruf relevante Eigenschaften wie Unabhängigkeit und Stärke absprechen) oder dem Hinzufügen konsonanter Information (z.B. Ehefrauen stereotyp weibliche Emotionseigenschaften wie Sanftheit zusprechen). Durch die zugeschriebenen (bzw. abgesprochenen) Eigenschaften der Ehefrau kann somit die primäre Eignung dieser für die Familienarbeitsrolle (bzw. Nicht-Eignung für die Erwerbsarbeitsrolle) gerechtfertigt und die bestehende kognitive Dissonanz reduziert werden. Ein solcher Mechanismus würde ebenfalls erklären, wieso erst die Geburt einer Tochter einen Perspektivenwechsel bei Männern auszulösen scheint und nicht etwa bereits der soziale Kontakt zur Lebenspartnerin. In zukünftigen Studien sollte diese Annahme empirisch geprüft werden. Dazu sollte eine weitere Kontrollgruppe in das Studiendesign aufgenommen werden, im Rahmen derer Teilnehmende zur Übernahme der Perspektive der Ehefrau in der Arbeitswelt aufgefordert werden. Ob sich durch die Perspektivenübernahme einer Tochter im Vergleich zur Perspektivenübernahme einer Ehefrau (bzw. eines anderen Mitglieds der Gruppe der Frauen) ein Mehrwert ergibt, ist nicht nur für theoretische, sondern auch für praktische Fragestellungen von hoher Relevanz (siehe Kapitel 11.2).

### 10.2.4. Langfristigkeit der Effekte

Ferner stellt sich die Frage, wie langfristig der gezeigte Interventionseffekt ist. So fand die Erfassung geschlechterbezogener Einstellungen nur in einem kurzen zeitlichen Ab-

stand zur experimentellen Manipulation statt. Somit kann nicht ausgeschlossen werden, dass ebenfalls *Demand Characteristics* (d.h. Versuche der Teilnehmenden im Sinne der Hypothese zu antworten, vgl. Nichols und Maner, 2008) die Ergebnisse systematisch beeinflusst haben. Die Plausibilität dieser Alternativerklärung wird jedoch durch die geringe Anzahl an Teilnehmenden (2%), die korrekte Vermutungen zur Forschungsfrage äußerten, reduziert. Nicht ausgeschlossen werden kann hingegen, dass (meist kurzfristige) *Priming-Effekte* (d.h. eine unterschwellige Aktivierung von Assoziationen, vgl. Higgins et al., 1977) die Ergebnisse systematisch beeinflusst haben. Eine wichtige Frage, die in zukünftigen Studien adressiert werden sollte, ist folglich, wie langfristig die gezeigten Effekte sind. Dazu sollten zukünftige Studien multiple Messzeitpunkte mit einem höheren zeitlichen Abstand zur Perspektivenübernahmemanipulation wählen.

## 11. Allgemeine Diskussion

### 11.1. Theoretische Implikationen

#### 11.1.1. Skalenentwicklung

Eine zentrale Kontribution der Studie besteht in der Entwicklung und Weiterentwicklung reliabler Verfahren zur Erfassung geschlechterbezogener Einstellungen in der empirischen Geschlechterstereotypforschung. So wurden in der Studie eine stark adaptierte (FiFp) sowie eine neu entwickelte Skala (Frauenförderung) zur Erfassung geschlechterbezogener Einstellungen in einem beruflichen Kontext verwendet. Reliabilitätsanalysen in zwei unabhängigen Stichproben mit differentiellen soziodemographischen Charakteristika sprachen dafür, dass die entwickelten Maße Einstellungen zu Frauen in Führungspositionen sowie Einstellungen zu Frauenfördermaßnahmen reliabel erfassen. Die Ergebnisse zeigten dabei, dass eine reliable Verwendung der Skalen nicht nur in studentischen Stichproben (Studie 2), sondern auch in Manager-Stichproben (Studie 1) möglich ist.

Zudem lieferten die Ergebnisse der Studie initiale Evidenz für die Annahme, dass die Tendenz, sozial erwünscht zu antworten, durch die Adaptation der Originalform der WAMS (Peters et al., 1974) reduziert werden konnte. So schrieben Teilnehmende in beiden Studien Männern (im Vergleich zu Frauen) höhere Führungskompetenz und Karrieremotivation zu. Anders als in einer Vielzahl bisheriger Studien (z.B. Sczesny et al., 2006), zeigte sich somit kein *Women-are-wonderful-effect* (Eagly & Mladinic, 1994), welcher die Tendenz beschreibt, Frauen bei ausreichender kognitiver Kontrolle äquivalente oder sogar höhere Führungsfähigkeiten zuzusprechen. Teilnehmende scheinen durch die graduelle Abstufung der adaptierten Rating-Skala demnach eine geringere Notwendigkeit zu sehen, für bestehende Stereotype zu (über-)korrigieren. Ferner lieferten die Ergebnisse initiale Evidenz für die Annahme, dass die entwickelte Frauenfördermaßnahmenskala das Konstrukt des modernen Sexismus (Swim et al., 1995) adäquat erfasste. Eine Stärke der Skala liegt dabei in der hohen Praxishöhe sowie der Vielzahl verschiedener Themenbereiche, die durch die Skala

abgedeckt werden. Gerade vor dem Hintergrund der inhaltlichen Bandbreite der erfassten Frauenfördermaßnahmen (vgl. *Brandbreite-Fideliätsdilemma*, Cronbach und Gleser, 1965), kann die interne Konsistenz der Skala ( $\alpha_s > .85$ ) als sehr gut gewertet werden. Insgesamt sprechen die Ergebnisse der beiden Studien somit dafür, dass die entwickelten Skalen geeignete Maße darstellen, um veränderten Einstellungen zu Frauen in Führungspositionen sowie einer primär subtilen Form des Sexismus (Swim et al., 1995) in der Arbeitswelt des 21. Jahrhunderts gerecht zu werden.

Zudem trägt die Studie zur Weiterentwicklung von Methoden zur Einstellungserfassung auf einer impliziten Ebene bei. So wurden zwei bisher selten verwendete Indikatoren (Koryphäenproblem, Spendenverhalten) zur Erfassung impliziter geschlechterbezogener Einstellungen genutzt. Korrelationsanalysen lieferten initiale Evidenz für die konvergente Validität der Maße mit signifikanten positiven Korrelationen zwischen allen Maßen, die die Erfassung geschlechterbezogener Einstellungen im beruflichen Kontext zum Ziel hatten. Versteht man das Spendenverhalten als relevantes Außenkriterium, können die Korrelationen zwischen dem Spendenverhalten und den abhängigen Variablen (Studie 1) zudem als Maß für die konkurrente Kriteriumsvalidität der Maße verstanden werden (Moosbrugger & Kelava, 2008). Somit lieferten die Ergebnisse der Studie initiale Evidenz für die Annahme, dass die beiden Maße (Koryphäenproblem, Spendenverhalten) ökonomische und ökologisch valide Instrumente zur Erfassung impliziter geschlechterbezogener Einstellungen im beruflichen Kontext darstellen. Dies ist gerade vor dem Hintergrund der wenigen validen und ökonomischen Verfahren zur impliziten Einstellungserfassung bedeutsam. So wurden auch die wenigen prominenten Messinstrumente, wie etwa der *Implicit Association Test* (IAT, Greenwald et al., 1998), in der Vergangenheit häufig für die ungeklärten zu Grunde liegenden Prozesse kritisiert und die psychometrischen Eigenschaften des Messinstruments bleiben unklar (Fiedler et al., 2006). Jedoch sind auch die psychometrischen Eigenschaften des Koryphäenproblems und des Spendenverhaltens noch schlecht verstanden und bedürfen einer weiteren systematischen Prüfung. Dabei stellt sich vor allem die Frage nach der diskriminanten Validität (niedrige Korrelation zu unabhängigen Konstrukten wie z.B. Rätselfähigkeit oder Prosozialität) der beiden Maße. Die Stärke der beiden Messinstrumente besteht jedoch in deren ökonomischen und einfachen Implementierbarkeit in Online-Studien. So liefern diese das Potenzial, implizite Einstellungen zukünftig schnell, kostengünstig und einfach zu erfassen. Eine weiterführende Untersuchung der Reliabilität und Validität der Messinstrumente sollte daher Gegenstand zukünftiger Arbeiten sein.

#### 11.1.2. Identifikation von Moderatorvariablen

Ferner trägt die Studie zur Identifikation von Moderatorvariablen und Randbedingungen, unter denen der Tochtereffekt auftritt (bzw. verstärkt wird), bei. So wurden in der ersten Studie die Geburtenreihenfolge der Kinder sowie die Qualität der Vater-Kind Beziehung als zentrale Einflussfak-



toren identifiziert. Ein Tochttereffekt scheint demnach nicht allgemein aufzutreten, sondern nur unter bestimmten Randbedingungen und zwar, wenn es sich bei der Tochter um das erste Kind des Mannes handelt und wenn zudem eine enge soziale Vater-Tochter Beziehung besteht. Die Ergebnisse zeigen folglich, dass eine rein kategoriale Konzeption (Vater einer Tochter: ja vs. nein) zu kurz greift, um den Tochttereffekt in seiner Wirkweise verstehen zu können. Eine Berücksichtigung weiterer Charakteristika der Familienstruktur des Mannes ist hingegen essentiell, um Vorhersagen über dessen geschlechterbezogene Einstellungen treffen zu können. Meines Wissens erfolgte in der vorliegenden Arbeit erstmalig eine systematische Prüfung, welche Charakteristika der Familienstruktur (z.B. soziale Vater-Kind Beziehung) die angenommenen Zusammenhänge stärken oder schwächen. Dieses Vorgehen liefert zwei zentrale Kontributionen zur bisherigen Forschung: Einerseits trägt die Identifikation moderierender Variablen zur Auflösung bestehender Inkonsistenzen in der empirischen Forschung bei. So könnte eine mangelnde Berücksichtigung zentraler Aspekte der Familienstruktur erklären, wieso einige Studien den postulierten Tochttereffekt nachweisen konnten (z.B. Gompers und Wang, 2017), während andere Studien keine Evidenz für Einstellungsunterschiede zwischen Vätern in Abhängigkeit des Geschlechts des Kindes fanden (z.B. Lee und Conley, 2016). Andererseits trägt die Identifikation von Moderatorvariablen zur Entwicklung eines besseren Verständnisses der kognitiven Prozesse bei, die dem Tochttereffekt zu Grunde liegen (siehe auch den folgenden Abschnitt zum Wirkmechanismus) und ermöglicht so eine stärkere theoretische Fundierung des Tochttereffekts. Ziel zukünftiger Studien sollte es daher sein, weitere Variablen zu identifizieren, die die angenommenen Zusammenhänge systematisch beeinflussen. Forscher werden zudem dazu aufgerufen, methodische Schwächen von Studien, die eine Geburtenreihenfolge der Kinder nicht berücksichtigen (siehe Kapitel 2.1), zu beachten und diese durch eine Fokussierung auf das Geschlecht des erstgeborenen Kindes in der Datenanalyse und Dateninterpretation zu adressieren.

#### 11.1.3. Identifikation des Wirkmechanismus

In der vorliegenden Arbeit wurden vier mögliche Wirkmechanismen des Tochttereffekts aus psychologischen Theorien abgeleitet und erstmalig in ihren Annahmen und Vorhersagen gegenübergestellt. Eine systematische Analyse der Bedeutung verschiedener Familienstrukturvariablen, in Bezug auf welche die Erklärungsansätze unterschiedliche Vorhersagen treffen, ermöglichte dabei ebenfalls eine Differenzierung der Wirkmechanismen auf einer empirischen Ebene. Die Ergebnisse der beiden Studien lieferten initiale Evidenz für einen - dem Tochttereffekt zu Grunde liegenden - Perspektivenübernahmemechanismus. So waren die Ergebnisse der ersten Studie allein kompatibel mit den Vorhersagen eines Perspektivenübernahmemechanismus, nicht jedoch mit den Vorhersagen der drei anderen Erklärungsansätze (siehe Kapitel 6.3). Diese Annahme wurde durch eine empirische Prüfung des Perspektivenübernahmemechanismus im Rahmen eines kontrollierten, experimentellen Designs (*RCT-*

*Design*) in der zweiten Studie gestützt. So indizierten die Ergebnisse, dass eine experimentelle Herstellung des (erstgeborenen) Tochttereffekts im Rahmen einer Perspektivenübernahmemanipulation möglich ist. Trotz der Stärken des quasi-experimentellen Ansatzes in Studie 1 (vgl. Washington, 2008) ermöglichte der experimentelle Ansatz in der zweiten Studie eine noch stärkere Kontrolle externer Einflussvariablen und liefert somit zusätzliche robuste Evidenz für den angenommenen Mechanismus der Perspektiventübernahme.

Auf Grund bestehender Schwächen im Studiendesign (siehe Kapitel 10.2) konnte eine Beteiligung der anderen drei Wirkmechanismen jedoch nicht abschließend ausgeschlossen werden. Allerdings liefert einerseits die Identifikation weiterer moderierender Variablen, in Bezug auf welche die Erklärungsansätze unterschiedliche Vorhersagen machen (vgl. Studie 1), und andererseits der Vergleich mentaler Simulationsbedingungen, in welchen die Wahrscheinlichkeit der Beteiligung einer der Erklärungsmechanismen (z.B. Appell an Schutz der Töchter) differentiell erhöht wird (vgl. Studie 2), das Potenzial, diese in zukünftigen Studien gegeneinander testen zu können. Die vorliegende Arbeit liefert somit einen zentralen und wichtigen Beitrag zur Entwicklung eines besseren theoretischen Verständnisses des Tochttereffekts, sowohl zum derzeitigen Zeitpunkt, als auch in der Zukunft.

#### 11.1.4. Perspektivenübernahme zur Stereotypproduktion

Zudem liefert die Studie einen wichtigen Beitrag zum Forschungsfeld der Perspektivenübernahme. So lieferten die Ergebnisse Evidenz für die Annahme, dass eine Manipulation zur Perspektivenübernahme einer (vorgestellten) Tochter eine vielversprechende Strategie darstellt, um geschlechterbezogene Einstellungen von Individuen positiv zu beeinflussen. Die entwickelte experimentelle Manipulation hat dabei zudem das Potenzial, auf andere Bereiche übertragen zu werden. So könnten Teilnehmende im Rahmen der entwickelten mentalen Simulationsmanipulation ebenfalls aufgefordert werden, sich vorzustellen, Elternteil eines Kindes mit geistiger oder körperlicher Behinderung zu sein oder Elternteil eines Kindes mit homosexueller oder transsexueller Orientierung. Somit liefert die Studie einen wichtigen Beitrag zur Stereotypforschung, indem sie eine wirksame Intervention zum Abbau von Stereotypen in multiplen Bereichen vorstellt.

#### 11.2. Praktische Implikationen

Doch was bedeuten die Ergebnisse speziell für einen Unternehmenskontext und welche praktischen Implikationen sollten in Betrachtung gezogen werden? Spielt die Frage, ob Führungskräfte Töchter haben, in der Arbeitswelt tatsächlich eine entscheidende Rolle, wie es aktuelle Studien (z.B. Dasgupta et al., 2018; Gompers und Wang, 2017) nahelegen? Die Ergebnisse der ersten Studie sprechen zumindest teilweise für diese Annahme. Vor dem Hintergrund der identifizierten moderierenden Variablen ist jedoch Vorsicht vor einer vereinfachten Kategorisierung (Vater ohne Tochter =

Stereotype, Vater mit Tochter = keine Stereotype) geboten. So scheinen eine Vielzahl an Faktoren, wie etwa die Geburtenreihenfolge der Kinder oder die Qualität der sozialen Beziehung zur Tochter, eine bedeutende Rolle für die Frage zu spielen, ob sich geschlechterbezogene Einstellungen durch die Vaterschaft einer Tochter in eine egalitäre Richtung entwickeln. Die Ergebnisse sprechen jedoch dafür, dass das Aufziehen einer Tochter (unter den genannten Randbedingungen) durchaus einen Perspektivenwechsel bei Männern auslösen kann und diese dazu bringt, in den „Schuhen der Tochter zu gehen“. Somit könnten es tatsächlich Väter von Töchtern sein, die durch eine positive Einstellung zu Frauen in Führungspositionen und eine aktive Unterstützung von Frauenfördermaßnahmen langfristig eine stärkere Chancengleichheit von Männern und Frauen am Arbeitsplatz voranbringen.

Ein Perspektivenwechsel kann bei Vätern beginnen - sollte hier jedoch nicht enden. Die Ergebnisse der zweiten Studie legen nahe, dass auch Nicht-Eltern in der Lage sind, sich bei geeigneter Instruktion in die Perspektive einer Tochter (und somit einer Frau) am Arbeitsplatz zu versetzen. So zeigten Teilnehmende im Anschluss an die Perspektivenübernahme der Tochter nicht nur positivere Einstellungen zu Frauen in Führungspositionen, sondern ebenfalls eine stärkere Befürwortung von Frauenfördermaßnahmen am Arbeitsplatz. Die Ergebnisse indizieren demnach, dass die vorgestellte Perspektivenmanipulation eine wirksame Intervention darstellt, um Geschlechterstereotype am Arbeitsplatz abzubauen (Einstellungen zu Frauen in Führungspositionen) und gleichzeitig die Motivation zu erhöhen, bestehende Geschlechterungleichheiten am Arbeitsplatz (Unterstützung von Frauenförderung) zu adressieren. Folglich ergeben sich zentrale Implikationen für die Entwicklung von *Diversity*-Trainings im Unternehmenskontext. Ein Training, welches auf dem Mechanismus der Perspektivenübernahme einer Tochter aufbaut, ist dabei durch vier zentrale Stärken gekennzeichnet:

Eine zentrale Stärke des Trainings besteht in dessen theoretischen Fundierung sowie der nachgewiesenen mittleren Effektstärke im Rahmen eines kontrollierten, experimentellen *RCT*-Designs. So zeigten Paluck und Green (2009) in einer umfassenden Analyse von rund 1000 Studien, dass ein Großteil der in Unternehmen durchgeführten *Diversity*-Trainings nur marginale Auswirkungen auf Einstellungen der Teilnehmenden gegenüber Mitgliedern der stereotypisierten Gruppen hatte. Der Grund für die geringen Effektstärken der Trainings lag dabei meist in deren mangelnden theoretischen Fundierung (Paluck & Green, 2009) - eine Schwäche, die durch eine Intervention, die auf den theoretischen Annahmen eines Perspektivenübernahmeansatzes aufbaut, adressiert wird.

Zweitens besteht eine zentrale Stärke des Trainings darin, dass das Bewusstsein für bestehende Geschlechterungleichheiten in der Arbeitswelt nicht durch die Intervention reduziert wurde. So nahmen die Teilnehmenden nicht nur Frauen in Führungspositionen positiver wahr, sondern zeigten ebenfalls eine stärkere Befürwortung von Maßnahmen am Arbeitsplatz, die auf eine explizite Förderung von

Frauen ausgerichtet sind und folglich auf einen Abbau von Geschlechterungleichheiten am Arbeitsplatz und in der Gesellschaft abzielen. Dies stellt einen zentralen Vorteil im Vergleich zu (häufig in der Unternehmenspraxis Anwendung findenden) Interventionen dar, welche sich auf eine Betonung von Gemeinsamkeiten zwischen der Eigengruppe und der stereotypisierten Gruppe (d.h. auf Gemeinsamkeiten zwischen Männern und Frauen) fokussieren. So konnte gezeigt werden, dass solche Interventionen häufig mit der impliziten Annahme einhergehen, die Gruppen seien auf gesellschaftlicher Ebene gleichgestellt (vgl. Saguy et al., 2009). Infolgedessen führten die Trainings zwar häufig zu einer Reduktion bestehender Stereotype, jedoch gleichzeitig auch zu einer geringeren Motivation, sich für eine Verminderung bestehender Ungleichheiten zwischen den Gruppen einzusetzen (vgl. Saguy et al., 2009). Die Teilnehmenden wurden demnach gewissermaßen blind gegenüber der Realität - bestehende Unterschiede zwischen den Gruppen wurden verschleiert. Die Übernahme der Perspektive einer Tochter schien Teilnehmende hingegen nicht blind gegenüber der Realität zu machen - ein Bewusstsein für und eine Motivation zur Veränderung bestehender Ungleichheiten in der Arbeitswelt (Unterstützung von Frauenförderung) blieb erhalten. Da das Ziel von Trainings in der Unternehmenspraxis vor allem in der Veränderung von Verhaltensweisen der Mitarbeitenden besteht, ist dies als eine zentrale Stärke der entwickelten Intervention zu werten. Gerade Frauenfördermaßnahmen (z.B. Frauenquoten, spezielle Mentoring-Programme für Frauen) werden in der Gesellschaft und innerhalb von Unternehmen sehr kontrovers diskutiert und häufig kritisiert. Somit ist es zentral, eine höhere Akzeptanz und Befürwortung von durchgeführten und geplanten Frauenfördermaßnahmen herzustellen. Dies sollte nicht nur auf Führungsebene, sondern ebenfalls auf Ebene der Mitarbeitenden erfolgen. Das vorgestellte Training liefert dazu einen wichtigen Ansatzpunkt: Denn soll die eigene Tochter tatsächlich in einer Welt aufwachsen, in der Geschlechterdiskriminierung am Arbeitsplatz noch immer zum Alltag gehört?

Eine weitere Stärke des Trainings besteht in dem vergleichsweise geringen artifiziellen Charakter der Intervention im Vergleich zu direkten Perspektivenübernahmeinterventionen. So legten Forschungsarbeiten nahe, dass Trainings, die Teilnehmende zu einer direkten Perspektivenübernahme einer Frau am Arbeitsplatz auffordern, häufig durch einen stark artifiziellen Charakter gekennzeichnet sind. Im Rahmen eines *Diversity*-Trainings am Arbeitsplatz zeigten sich so beispielsweise negative Effekte, nachdem männliche Mitarbeiter aufgefordert wurden, sich vorzustellen, eine schwangere Polizistin an ihrem Arbeitsplatz zu sein (Likki et al., 2017). Die vergleichsweise künstliche Aufgabenstellung wurde dabei als direkter Beeinflussungsversuch von Seiten des Unternehmens wahrgenommen, was einen internen Widerstand gegen das Training auslöste (*Reaktanzeffekt*, vgl. Brehm et al., 1966). Die Ergebnisse der vorliegenden Arbeit lieferten hingegen keinen Grund zur Annahme, dass durch die Aufforderung zur Perspektivenübernahme einer Tochter Reaktanzeffekte erzeugt wurden. So fiel die mentale Simulation den

Teilnehmenden nach eigenen Angaben leicht und qualitative Analysen der offenen Antworten sprachen dafür, dass sich die Teilnehmenden gut in die beschriebene Situation hineinversetzen konnten. Eine Minimierung von möglichen Reaktanzeffekten ist dabei vor allem vor dem Hintergrund der häufig verpflichtenden Trainings im Unternehmenskontext zentral.

Eine vierte zentrale Stärke des Trainings besteht in den Möglichkeiten zur kostengünstigen Durchführung sowie der einfachen Skalierbarkeit in großen Konzernen. So legen die Ergebnisse der Online-Studie nahe, dass eine kostengünstige und einfache Implementierung des Trainings auf *e-learning* Plattformen der Unternehmen möglich ist. Die Notwendigkeit von Präsenztrainings und der Anwesenheit eines Trainers entfallen folglich, wodurch sich zentrale Zeit- und Kosteneinsparungspotenziale ergeben. Für Unternehmen ergeben sich somit hohe Trainingsrendite (*Return on Investment, ROI* für Weiterbildung) und für Mitarbeitende eine hohe zeitliche und räumliche Flexibilität. Folglich handelt es sich um eine wirksame, jedoch gleichzeitig ökonomische und einfach umsetzbare Intervention zur Stereotypreduktion am Arbeitsplatz.

### 11.3. Konklusion

Ziel der vorliegenden Arbeit bestand in einer stärkeren theoretischen Fundierung des Tochtereffekts und der Entwicklung eines besseren Verständnisses für den zu Grunde liegenden Wirkmechanismus. Die Ergebnisse der ersten Studie stellen die Robustheit eines allgemeinen Tochtereffekts in Frage und sprechen für die Notwendigkeit der Berücksichtigung moderierender Variablen in der Erforschung des Tochtereffekts. So ließ sich ein Zusammenhang zwischen der Vaterschaft einer Tochter und egalitären geschlechterbezogenen Einstellungen am Arbeitsplatz nur unter Berücksichtigung der Geburtenreihenfolge sowie der Qualität der Vater-Kind Beziehung nachweisen. Die Vorhersagen der einzelnen Erklärungsmechanismen vergleichend, kann ein Perspektivenübernahmeansatz die Ergebnisse am besten erklären. Diese Annahme wurde durch die Ergebnisse der zweiten Studie gestützt. So konnte in einer kontrollierten experimentellen Studie gezeigt werden, dass die Instruktion zur Perspektivenübernahme einer (vorgestellten) Tochter mit egalitäreren geschlechterbezogenen Einstellungen im beruflichen Kontext einhergeht. Auf einer theoretischen Ebene liefern die Ergebnisse damit initiale Evidenz für einen - dem Tochtereffekt zu Grunde liegenden - Perspektivenübernahmemechanismus. Von einer praktischen Perspektive liefern die Ergebnisse zudem zentrale Implikationen für die Entwicklung von *Diversity-Trainings* im Unternehmenskontext. So bieten Trainings, die auf der Perspektivenübernahme einer Tochter aufbauen, das Potenzial, bei Mitarbeitenden nicht nur positivere Einstellungen zu Frauen in Führungspositionen, sondern ebenfalls eine stärkere Akzeptanz und Befürwortung von Frauenfördermaßnahmen zu bewirken. Weitere Forschung ist notwendig, um die differentielle Wirkung der Perspektivenübernahmemanipulation bei weiblichen und männlichen Teilnehmenden sowie die Wirkung des

Trainings auf einer impliziten Einstellungsebene, besser zu verstehen.

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## Women in Leadership Positions and Firm Innovation: Are There Differences Between Countries?

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### Abstract

The presence of women on corporate boards has attracted significant attention in recent years due to ongoing political discourse concerning initiatives such as gender quotas in managerial and boardroom positions. *But how does the proportion of women on corporate boards influence firm innovation?* This paper examines this question with reference to the direct and indirect effects of female supervisory board representation. The paper draws on a sample of 60 French firms and is framed in upper echelons theory. In analyzing the proportion of women directors, the paper aims to understand better the relationship between firm innovation and board seats occupied by women. The results suggest that firm innovation is not related to female board representation, which contrasts with empirical evidence that has found a positive relationship for 105 German firms. This deviation from established findings highlights the complexity inherent in understanding the impact of gender diversity on firm-level outcomes and underscores the need for context-specific examinations in this domain.

**Keywords:** corporate boards; female representation; firm innovation; gender diversity; strategic leadership

### 1. Introduction

In the wake of globalization and the interconnectedness of areas that affect our everyday lives, new challenges are constantly emerging. Firms operate in an increasingly complex VUCA world characterized by rapid unforeseen shocks, technological changes, and digital disruption. This is making the business environment more dynamic, unpredictable, and interconnected. So, how can firms ensure success and continued growth in these times of constant change?

Firm innovation has been understood for decades as an approach to achieve a positive impact on the natural life cycle of a company through entrepreneurial activities driving firm

competitiveness, productivity, and hence, firm value (Griffin et al., 2021, p. 124). In times of economic and societal development, the concerns of various stakeholders have led to an additional challenge for firms, which requires their decision-makers to assume corporate responsibility for diversity. This demand has been popularized in recent years by the political discussion on women's quotas in management or boardrooms (Alshirah et al., 2022, p. 2; Grosvold et al., 2016, pp. 1158–1159). In 2003, Norway was the first country to implement a board gender quota in publicly listed Norwegian firms, requiring a minimum of 40 percent of each gender (Grosvold et al., 2007, p. 349). Since this was associated with an increase in the innovation output of Norwegian firms, researchers suggested that the impact of board gender diversity on corporate innovation is likely causal (Griffin et al., 2021, p. 125).

However, firms face a paradoxical situation, as diversity is seen as both a source of creativity and innovation and of misunderstanding and conflict (Bassett-Jones, 2005, p. 169). Accordingly, researchers still do not agree about the extent to which diversity stimulates firm innovation. Against this background, the question arises of how the perspectives on

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diversity's impacts can be reconciled. Given the magnitude of political interventions and the expectations placed on female directors, it is critical to gain a better understanding of the state of literature to inform policy and shape expectations about the impact of gender-diverse boards on corporate outcomes, such as firm innovation. Therefore, it seems timely that firm innovation is analyzed with respect to female board participation.

The purpose of this paper is, therefore, to provide a comprehensive discussion of the literature on the relationship between female directors and firm innovation by addressing the following research question: *How does the proportion of women on corporate boards influence firm innovation?* In this context, the paper refers to corporate boards as the highest leadership level in organizational structures. More specifically, the study focuses on supervisory boards, as they exert great influence on the executive board which shape a firm's corporate vision (Wu et al., 2021, p. 2) and are key determinants of organizational culture and innovation orientation (Schein, 1985, pp. 316–317) Although not involved in day-to-day business, the supervisory board affects the firm's innovation strategy in several ways: First, the supervisory board monitors the executive board and appoints and dismisses its members (Kim et al., 2018, p. 1257). Second, the supervisory board sets targets for the executive board members and determines their remuneration. Third, the supervisory board also advises the executive board, for instance, on innovation-related topics, and must approve fundamental strategy decisions before implementation (Jäger et al., 2021, p. 675).

The study is framed in Hambrick and Mason (1984) upper echelons theory, which suggests that leaders' characteristics partially shape corporate decision-making and, thus, organizational outcomes, such as innovation activity. Referring to gender differences in cognition, the paper hypothesizes that female transformational leadership style is an underlying mechanism through which women on boards positively affect innovation.

The hypothesis is tested based on an ordinary least squares (OLS) regression, using a sample of 60 French firms listed on one of the French exchange stock markets. To obtain data on the proportion of women directors, the analysis relies on data by Refinitiv Eikon (2023). As a proxy for innovation, the number of patents issued in 2022 is used with data provided by World Intellectual Property Organization (2023) and European Patent Office (2023). In contrast to previous studies, the results do not show a statistically significant link between female directors and firm innovation, so the research design must be reconsidered. The analysis is, therefore, compared to a panel data study by Joecks et al. (2023), using a sample of 105 publicly listed German firms and finding that female directors positively influence a firm's innovation performance.

The remainder of the paper is organized as follows: *Section 2* discusses drivers of firm innovation orientated on the main argumentation lines presented in the literature. The paper emphasizes direct and indirect effects, addresses the diversity-innovation paradox, and outlines contextual factors

affecting firm innovation performance. *Section 3* develops the theoretical framework supporting the relationship between women directors and firm innovation, from which a corresponding hypothesis is derived. *Section 4* thus provides an empirical analysis and compares results to existing empirical evidence. *Section 5* presents the main conclusions, draws theoretical and practical implications for women's inclusion in leadership, and identifies limitations and future lines of research on the upper echelons.

## 2. Literature Discussion: Drivers of Firm Innovation

### 2.1. Influence of Women on Corporate Boards on Firm Innovation

#### 2.1.1. Direct Effects of Female Board Representation on Firm Innovation

Corporate innovation capacities and capabilities require a profound knowledge base, systematic knowledge integration, and a suitable leadership style, which means that diversified human capital plays a non-negligible role in firm innovation (OECD/Eurostat, 2019, p. 147). Research from psychology (e.g., Silverman, 2003) and management (e.g., Croson and Gneezy, 2009) found evidence of gender differences in preferences regarding the attitude toward risk, time horizon, and personal values. These gender-specific preferences directly affect information processing, decision-making, managerial behavioral tendencies, and, thus, leadership styles. This, in turn, has implications for corporate decisions and implies that gender-based approaches to innovation exist and that the direct effects of gender diversity on a firm's innovation performance can be identified.

In principle, gender diversity, i.e., a greater presence of women on firm level, expands the knowledge base and leads to greater *knowledge differentiation* and organizational decisions of higher quality. This is because more heterogeneous groups with differing points of view consider a more comprehensive set of alternatives (Dai et al., 2019, p. 509; Dezsö and Ross, 2012, p. 1075) and capitalize on atypical ways of exploring and exploiting innovation opportunities (Guerrero, 2022, p. 38). Heterogeneity in knowledge base thus not only leads to diverse perspective and debates over tasks but also stimulates more diverse approaches to solutions (Dai et al., 2019, p. 509). Women contribute to diversity through their life experiences by having additional insights on key strategic issues, notably in relation to female employees, consumers, and trading partners (Dezsö & Ross, 2012, p. 1075). Men and women also have different socialization experiences, for instance, in their professional careers and social networks, so gender, among other demographic backgrounds, explains differences in intellectual capital, such as human and social capital (Dai et al., 2019, p. 509). Increased female presence accordingly is likely to enhance the diversity of human and social resources, helping identify business opportunities and develop innovative ideas (Guerrero, 2022, p. 35). This is supported by the resource dependency theory cultivating that firms should attract board members with complementing resources that bring additional human and social capital to the

company (Siciliano, 1996, p. 1313), and by Becker (1962, p. 49) human capital theory, emphasizing that an individual's education, skills, and experience enhance organizational capabilities. Given the more differentiated knowledge, gender diversity provides potential during the exploration and exploitation of entrepreneurial opportunities, stimulating firm innovation (Guerrero, 2022, p. 38). This applies notably to tasks requiring a high level of information processing, such as board decisions (Van Knippenberg et al., 2004, p. 1012).

Experimental studies have not found significant differences in innovativeness and creativity between women and men entrepreneurs. However, women and men differ in their cognitive information processing styles and approach to *knowledge integration*, contributing to opportunity identification and recognition (DeTienne & Chandler, 2007, p. 379). In this context, Chung and Monroe (1998, p. 268) refer to the psychological phenomenon of confirmation bias, which indicates the tendency to accept information that confirms rather than refutes their current thinking. Accordingly, men tend to encode fewer details and are more likely to ignore non-confirming information (Meyers-Levy & Maheswaran, 1991, p. 63). In contrast, women are more attentive to subtle cues and more sensitive and tolerant of information that is contrary to established mental schemas and paradigms, allowing for processing information more comprehensively (Chung & Monroe, 1998, p. 266). According to Dai et al. (2019, p. 509), women can recognize ideas dispersed among team members more easily, connect them and identify similarities. Men's information processing style is therefore referred to as "item-specific processing", whereas the female is described as "relational processing" (Putrevu, 2001, pp. 7–8). This also explains the higher monitoring capacity of women, which increases the accountability of board members and their attendance at board meetings (Adams & Ferreira, 2009, p. 292). Furthermore, women promote consensual decision-making and assume a mediating role in the event of disagreements (Joecks et al., 2019, p. 24). According to agency theory (Jensen & Meckling, 1976, p. 308), this helps resolve conflicts of interest between agents (e.g., executives) and principals (e.g., shareholders), by integrating the knowledge of both parties (Brahma et al., 2020, p. 5707). As a result, the increase in women's presence promotes openness toward unfamiliar information, which may at first disrupt current practices and procedures but improve knowledge integration in the long term. Since a firm's ability to improve its innovation performance depends on its capacity to manage knowledge successfully, it can capitalize on both female and male information processing styles by forming gender-diversified teams (Dai et al., 2019, p. 510). This means that item-specific information processing, typically attributed to men, is complemented by female attention to non-confirming information. More female presence, therefore, enables a firm to appropriately consider the signals and information by transferring them to others for item-specific processing. The more interconnected knowledge base provides a broader range of information for this focused investigation, and further exploration of details in

gender-mixed teams can prevent information crucial to the development of ideas from being overlooked, and thus, missing important impulses to innovation processes (Dai et al., 2019, p. 510).

In addition, differences in male and female cognition not only result in complementary information processing styles, but also shape their *leadership styles*. Being more sensitive to relational information processing, women tend to manage in less hierarchical but more democratic and participatory ways (Dai et al., 2019, p. 510). Female leaders thus encourage the exchange of information and emphasize participation, characterizing their interactive style (Johansen, 2007, p. 271). Subsequent studies also concluded that women tend to exhibit a transformational style with emphasis on communication, collaboration, and cooperation, whereas men tend to correlate more with a transactional style with top-down procedures, task-oriented command, and control (Wu et al., 2021, p. 2). In contrast to the male supervisory approach, female supportive style therefore promotes a sense of self-determination, increases intrinsic motivation, and encourages personal initiative beyond self-interest (Dezsö & Ross, 2012, p. 1077). These findings are supported by the self-determination theory by Deci and Ryan (1987, p. 1024), revealing that intrinsic motivation is positively linked to better conceptual learning and creativity. Female empowering leadership promotes autonomy, engages others' self-concepts, and "encourages 'outside-the-box' thinking" (Wu et al., 2021, p. 2), contributing to the generation of ideas (Dezsö & Ross, 2012, p. 1077). As the working climate is a crucial factor governing firm innovation success, female collaborative management is more effective in solving communication difficulties and conflicts that can easily arise in mixed-gender teams (Dai et al., 2019, p. 512). A more significant number of women can thus contribute to better integration of perspectives and legitimize an open, interactive, and inclusive leadership. Coupled with female relational information processing, firms create an environment where employees can freely express themselves and share task-related information and ideas (Dai et al., 2019, p. 511). Gender diversity, especially when a woman joins an all-male team, improves individual and group performance, leading directly to better firm performance (Dezsö & Ross, 2012, p. 1075). However, innovation success requires negotiations among multiple stakeholders to accumulate information and build cooperation. To effectively manage the innovation process, leaders should not attempt to dominate or control but instead collaborate and integrate knowledge. In addition to relational information processing, the cooperative managerial style enables women to fulfill these tasks (Dai et al., 2019, p. 509). Moreover, a complementary effect of varying female and male leadership tendencies can be beneficial so that the command-and-control approach, typically attributed to men, complements the participatory approach of women entrepreneurs. Firms focusing on gender diversity, i.e., women's cooperation with their male counterparts, thus create synergies in improving innovation performance (Dai et al., 2019, p. 520).

### 2.1.2. Indirect Effects of Female Board Representation on Firm Innovation

Furthermore, indirect effects play a considerable role in the influence of gender diversity on firm innovation performance, as gender diversity impacts the functional diversity of teams and the corporate culture due to greater female employee presence.

*Functional team diversity* refers to teams with a variety of expertise or specialization. Organizational diversity studies argue that differing functional backgrounds amplify the knowledge base and promote a diverse domain-specific pool of task-related skills and abilities. This is useful in dealing with non-routine issues, such as innovation activities, and hence, induces the innovation process (Van Knippenberg & Schippers, 2007, p. 518). Consistent with these findings, the study of Simons and Rowland (2011, p. 174) reveals that the functional diversity of both project teams and top managers positively affects the outcomes of the innovation process. Focusing mainly on functional diversity at the group level, their study supports the potential for its moderating role between gender diversity and firm innovation. A subsequent study by Dai et al. (2019, pp. 519–520) confirmed this relationship by conducting simple slope tests with two subsamples of firms with high and low gender diversity. Although the slope for both subsamples is positive, it is steeper for high than low gender diversity. Hence, the observed difference provides evidence not only for the effect of gender diversity on functional diversity but also for the moderating role of functional diversity on the relationship between gender diversity and innovation outcomes. This is compatible with the argument that women may help coordinate and integrate perspectives from different functional backgrounds. Hence, the study results indicate that gender diversity enables the innovation potential of other diversity types, such as functional diversity (Dai et al., 2019, p. 508).

Further, increased gender diversity in companies has an impact on *corporate culture*, representing “a system of shared values [...] and norms that define appropriate attitudes and behaviors for organizational members” (O’Reilly & Chatman, 1996, p. 160). A more equal female representation at the top of a firm’s hierarchical structure signals not only to a firm’s employees but also to stakeholders external to the firm that women are treated equally in the firm (Connelly et al., 2011, p. 40). Hence, gender diversity tends to reduce the impact of societal role expectations on women, partially relieving female employees of the pressure these expectations impose on them (Dai et al., 2019, p. 512). This applies especially to gender-diverse firms in male-dominated industries and patriarchal societies, where the increase in female corporate representation helps improve women entrepreneurs’ situation (Godwin et al., 2006, p. 626). By reducing the pressure on female employees, women are encouraged to interact more frequently with male employees and to communicate their perspectives, potentially differing from those of their male colleagues. This reinforces the positive influence of the relational information processing style,

attributed to women, on synthesizing knowledge (Dai et al., 2019, p. 512). As gender is an observable characteristic, gender diversity can be easily identified on a superficial level. This means that also surface-level diversity can induce the expectation that differing points of view are existent and therefore encourages to openly express divergent perspectives among the male majority, even if superficial gender diversity is, in fact, not necessarily associated with informational diversity (Phillips et al., 2009, p. 347). Consequently, even the presence of women with congruent information may contribute to a broader elaboration of alternatives, impacting corporate culture and improving decision-making (Dezsö & Ross, 2012, p. 1075). A more far-reaching effect is that the greater female presence at the board level promotes an open-minded corporate culture, which is expected to accept differing ideas, not necessarily only those of women. It follows that companies with a high level of gender diversity can encourage the expression of divergent opinions by every member (Dai et al., 2019, p. 512). In addition to informational and social diversity benefits, greater female participation at the top management level or boardrooms motivates women in middle management (Dezsö & Ross, 2012, p. 1073). This is because, despite the barriers to female advancement that may exist in society, a gender-diverse boardroom signals that the firm is committed to implementing equal opportunity. A firm positions itself as a women-friendly firm, increasing women’s organizational commitment, notably in lower-level managerial positions (Dezsö & Ross, 2012, p. 1076). It can be concluded that gender diversity enhances the firm’s ability to activate functional backgrounds and stimulates the innovation potential of female employees. The latter is because board gender diversity fosters an innovative corporate culture and increases diversity among inventors and entrepreneurs, which is conducive to firm innovation (Griffin et al., 2021, p. 125).

### 2.1.3. The Diversity-Innovation Paradox

The stated arguments result in the diversity-innovation paradox. Research on applied social psychology has noted a discrepancy between the societal quest for diversity and people’s individual preference to be surrounded by like-minded others (Hackett & Hogg, 2014, p. 415). Accordingly, diversity, including gender diversity, is also an ambiguous strategic approach in the corporate context. On the one hand, diversity can be considered a source of creativity and innovation, whereas on the other side a source of suspicion, misunderstanding, and conflict (Bassett-Jones, 2005, p. 169). Firms that foster innovation and seek a competitive advantage, therefore, face a paradoxical situation.

On the one side, advocates of the social identity theory argue that heterogeneity among teams harms cohesiveness, reduces communication, and leads to the forming of separate groups (for example, Ibarra, 1993, p. 61; Tajfel, 1974, pp. 69–70; Kanter, 1977, p. 49). This means that diversity, also induced by gender diversity, can potentially negatively impact group cohesion and its performance (Christian et al., 2006, p. 460; Milliken and Martins, 1996, pp. 407–408).

Moreover, the potential of varying points of view of diversified teams leads to increased conflicts (Knight et al., 1999, p. 447) and, therefore, to a slower decision-making process (Hambrick et al., 1996, p. 679). Diversity as a source of suspicion, misunderstanding, and conflict can thus result in poor quality, lack of customer focus and market orientation, and loss of competitiveness (Bassett-Jones, 2005, p. 169).

Contrary, proponents of diversity argue that social cohesion makes teams vulnerable to groupthink so that team homogeneity can restrict the generation and assessment of alternative approaches (for example, Iles and Hayers, 1997, p. 98; Cox and Blake, 1991, p. 51), which leads to inferior decision-making and can be harmful to innovation activities (Hambrick & Mason, 1984, p. 202). Hence, diversity improves creative problem-solving capability when effectively managed, as diverse perspectives generate a greater variety of alternatives (Bassett-Jones, 2005, p. 172). This is why affective discomfort induced by potential conflict does not necessarily lead to inferior performance (Phillips et al., 2009, pp. 337–338). Indeed, some level of dissent amounts to a comprehensive elaboration and critical assessment of alternative opinions (Van Knippenberg et al., 2004, p. 1011), improving decision-making in gender-diverse teams and top management teams' strategic capacity to act (Brahma et al., 2020, p. 5707). Moreover, women's cognitive ability and inclusive leadership style proactively promote a collaborative climate, preventing emotional conflicts and their escalation (Dai et al., 2019, p. 511). A well-managed approach towards diversity thus impedes group thinking as it enhances creativity as a precondition for innovation, leading to increased commitment and job satisfaction (Bassett-Jones, 2005, p. 171). In this context, Griffin et al. (2021) investigated how board gender diversity influences firm innovation activities, using a database of firm-level patents of 12,244 firms and board characteristics across 45 countries. It follows that board gender diversity enables more exploratory and novel innovation and is associated with higher innovative efficiency. However, they also identified a time lag so that an improvement in innovation performance only follows an increase in gender diversity on corporate boards after two or more years (Griffin et al., 2021, p. 125). Despite potential conflicts, the benefits of gender diversity outweigh the costs as a result of the non-routine nature of challenges confronting corporate boards (Dezsö & Ross, 2012, p. 1075).

However, diversity is only apt to foster firm innovation when effectively managed (Bassett-Jones, 2005, p. 173). This emphasizes the need for diversity management. Research by Østergaard et al. (2011, pp. 13–14) identified gender diversity as one of the variables with the most significant influence on a firm's likelihood to innovate and advocate for a moderate degree of diversity, where women as a minority group have a critical mass to contribute to the innovation process. The likelihood of introducing innovation is thus 68 percent higher in groups composed of 60 to 70 percent of the same gender compared to the group dominated by one gender (Østergaard et al., 2011, p. 12). Against this backdrop, Kanter (1977) proposed the critical mass theory and coined

the term of tokenism. Women as minority groups on the corporate level are often viewed through sex-role stereotypes by the majority group, hindering their advancement. This leads to gender-segregated jobs where women focus on secretarial tasks (Kanter, 1977, p. 28) are relegated to "the 'emotional' end of management" (Kanter, 1977, p. 25). It follows that women, when comprising only a marginal fraction of a team or a firm, are viewed as tokens and therefore treated as female representatives rather than as individuals (Kanter, 1977, pp. 214–215), which refers to the effect of tokenism (Kanter, 1977, pp. 207–208). She, therefore, argued that the presence of two or more women in the boardroom attenuates this effect (Kanter, 1977, pp. 237–238). Research on sociology and organizational behavior has further analyzed the critical mass. In this context, Konrad et al. (2008, p. 154) have stated that the positive effect of gender diversity is even more greater when three or more females are appointed to the boardroom compared to lower levels so that women's presence in the boardroom is normalized beyond tokenism. These findings are consistent with further research confirming the critical mass of three or more women on corporate boards (Joecks et al., 2013, p. 61; Torchia et al., 2011, p. 299). However, Torchia et al. (2011, p. 300) stated that the contribution of the critical mass of female directors to the level of firm innovation is mediated by board strategic tasks, i.e., the degree to which board members are involved in the "initiation and implementation phases of the strategic process" (Torchia et al., 2011, p. 305). In principle, most studies reported three as a magic number that may change the dynamics in corporate boards and is conducive to innovation activities. Despite the importance of a greater female presence, it does not imply any superiority of either women or men over their counterparts (Dai et al., 2019, p. 520).

## 2.2. Contextual Factors of Firm Innovation

Researchers highlight that these direct and indirect effects depend on contextual factors, which affect innovation and moderate the impact of gender diversity on firm innovation.

A company's *organizational context*, particularly the degree of innovation orientation, represents a critical contextual factor. Dezsö and Ross (2012, p. 1078) assessed the impact of female representation in top management on firm performance, using panel data of firms that belong to the Standard & Poor's 1,500 index. Their findings showed that female participation improves firm performance only to the extent that a firm is to some degree focused on innovation, i.e., innovation intensity positively influences the effect of female presence on firm performance (Dezsö & Ross, 2012, p. 1084). The more the corporation strategically focuses on tasks requiring innovative solutions, the more valuable gender diversity is. Additionally, this relationship can be transferred to lower hierarchical levels, i.e., the more women in lower-level managerial positions are entrusted with innovation-related tasks, the stronger the impact of females at top management levels or boardrooms for motivation of these women (Dezsö & Ross, 2012, p. 1077). In this respect, Dezsö and Ross



(2012) contrasted their findings with those of firms that are less strategically focused on innovation. If innovation only plays a minor role in strategic orientation, the functions of top management are accordingly highly routinized. In the case of standardized routine tasks, a lengthy elaboration of alternatives can be counterproductive and offset the benefits of gender diversity (Dezső & Ross, 2012, pp. 1085–1086). Therefore, homogenous groups perform slightly better on simple tasks than heterogeneous teams (Hambrick & Mason, 1984, p. 202). Gender diversity in administration teams with highly standardized procedures is hence expected even to weaken a firm's performance (Alshirah et al., 2022, p. 4). This explains that studies drawing on performance measures other than innovation, such as productivity growth and effectiveness, find no significant relationship between gender diversity and firm performance, as these measures are not necessarily related with innovation (Østergaard et al., 2011, pp. 13–14). Further, previous studies have found that board size harms firm performance, as a larger supervisory board ensures better supervision of executives, but agency costs outweigh this advantage due to communication and coordination difficulties (Cao et al., 2021, p. 2). However, financial performance, as often measured by return on equity and leverage ratio, are found to benefit innovation, as better performing firms tend to have more financial resources to conduct research and development (Balsmeier et al., 2014, p. 1804).

In addition to the organizational context, Dai et al. (2019, pp. 520–521) noted that the impact of gender diversity also depends on external factors, such as the *industrial environment*. Using data from male-dominated environments, their study has revealed that gender diversity positively influences innovation performance. This is because, given the premise of a male-dominated industry, such as high-technology industries, women's different cognitive approaches are seen as a valuable source of knowledge, as they tend to provide unique insights into key tasks, thereby diversifying the knowledge base and allowing for more advanced knowledge synthesis (Dai et al., 2019, p. 521). This is supported by previous research supporting that factors external to female entrepreneurs, such as the social structure of an industry, are partially causal to the positive impact of gender diversity on corporate innovation (Godwin et al., 2006, p. 636).

The *institutional context* in which a company operates is another contextual factor. According to institutional theory, organizations are determined to a large extent by an interplay of societal components of the institutional environment, such as political, social, and legal requirements (for example, Scott, 2001, p. 75; North, 1990, p. 3). These requirements also refer to an organization's corporate governance systems. On average, female board representation is greater in countries with mandated or voluntary board quotas (BoardEx, 2022, p. 13). Furthermore, in countries with a two-tier system, as shared in many European countries, women directors' power is greater if they are represented as both shareholder and employee representatives, further strengthening the link between female board members and firm innovation

(Joecks et al., 2023, p. 1209). By focusing on conforming to institutional expectations and societal norms, institutional pressures can shape organizational behaviors and structures (Scott, 2001, pp. 22–23), including processes effectiveness, also innovation-related processes (Yamak et al., 2014, p. 90). This influences the extent to which firms can engage in internal and external knowledge generation and how knowledge gained can be captured for innovation (Torres de Oliveira et al., 2022, p. 1405). Companies thus consider engaging in lobbying as “one of the most frequent tools used for [...] influencing governments” (Yamak et al., 2014, p. 97).

Ultimately, firm innovation is shaped by the *cultural context*. Firstly, Griffin et al. (2021, pp. 137–138) referred to the relevance of culture by stating that the probability of female board members is higher in less masculine cultures with narrower gender gaps and higher female participation in the labor market. To understand cultural differences, it is crucial to introduce the concept by Hofstede (2001, p. 29), in which the social psychologist originally proposed four cultural dimensions: individualism, power distance, uncertainty avoidance, and masculinity. Although Hofstede's cultural dimensions were derived from a sample of IBM employees in the 1960s and 1970s (Hofstede, 2001, pp. 41–42), he identified tendencies prevalent within each culture and laid the foundation for further research. Gender differences in subsequent studies thus mainly relate to different manifestations of Hofstede's masculinity dimension, later considered as an attitude towards gender equality (Hofstede et al., 2017, p. 58). On this basis, a study by Schwartz and Rubel-Lifschitz (2009, p. 171) across 68 countries revealed gender differences in preference for achievement. While females attach more importance to the community and values, such as benevolence and harmony, males tend to place more value on self-direction, power, and individual success. Although these findings were not directly related to the prediction of corporate decision-making, they imply that these gender-based value differences influence female directors' decisions. Research by Griffin et al. (2021, p. 128) revealed that women in an advisory capacity may avoid unprofitable investments driven by an overemphasis on achievement and instead pursue more exploratory innovation projects in the prospect of long-term benefits. Women tend to demand a higher payoff and likelihood of success in agreeing to investment projects, thereby promoting more efficient innovation. Despite this cross-national finding, Schwartz and Rubel-Lifschitz (2009, p. 180), however, stated that these gender-based value differences were more prominent in countries with greater gender equality, which is typically associated with feminine culture (Hofstede et al., 2017, p. 145). How gender diversity affects firm innovation is hence moderated by the attitude towards gender equality imposed by the prevalent culture.

As summarized in *Figure 1*, the situation a strategic decision-maker faces is complex and made up of far more phenomena than can possibly be comprehended. The effect of board gender diversity is determined by the interplay of direct and indirect effects and shaped by contextual factors. No form of gender diversity can be universally applied to

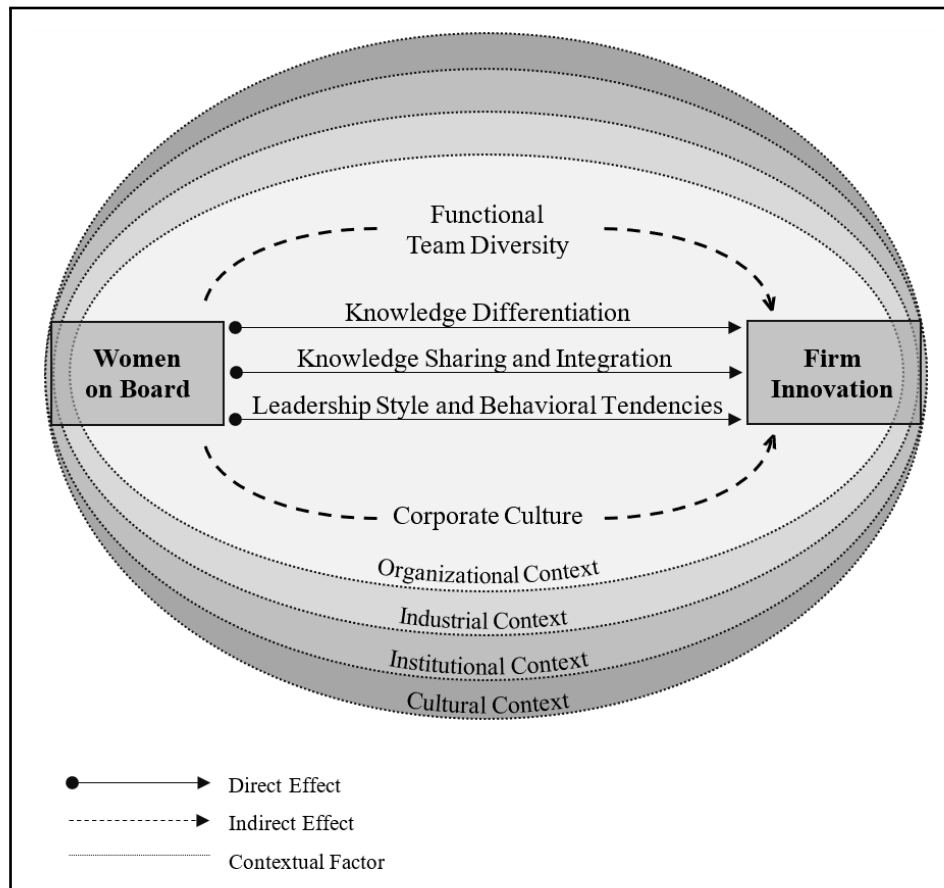


Figure 1: Effects of Female Board Representation on Firm Innovation (Source: Own Illustration)

other firms subject to different contexts, affecting innovation and moderating the impact of board gender diversity on firm innovation. When analyzing the relationship, it is essential to understand the concept as a situational approach, which needs to be evaluated contextually.

Despite sustained and widespread research, academic literature to date predominantly focused on examining single countries and sought to understand dynamics within national boards that explain female board presence and their impact on firm innovation. Although most empirical studies point to a positive link, researchers are not in agreement about the extent to which board gender diversity contributes to firm innovation. One level of analysis that has received comparatively little scholarly attention in this debate is the international level. Aside from a few notable exceptions (for example, Griffin et al., 2021), comparative cross-national research designed to reveal national-level differences in the effect of female board representation on firm innovation remains scarce. It is this gap this study begins to address. The research presented in this paper thus seeks to address this void by first studying the relationship separately on a national level in Germany and France and subsequently comparing results to identify potential underlying components for differing results among countries. This will contribute a cross-country consideration to the existing perspectives and

enhance the understanding of direct and indirect effects and contextual factors that impact the link between women directors and firm innovation.

### 3. Theoretical Framework: Impact of Women on Corporate Boards on Firm Innovation

When analyzing the impact of women on supervisory boards on firm innovation, Hambrick and Mason's (1984) upper echelons theory can be understood as guiding literature. According to neoclassical economic theory, top managers and executives have until then been viewed as homogeneous and rational optimizers who can exert minimal influence on company outcomes or decisions (Weintraub, 1985, p. 26). In contrast, the upper echelons theory describes the idea that upper echelons, i.e., top level leadership including boards, view their situation through their own highly personalized lenses. This is due to differences in their experiences, values, personalities, and other human factors. Hambrick and Mason (1984, p. 198) thus stated that organizational outcomes are determined to some extent by managerial characteristics consisting of psychological traits, such as values and the cognitive base, and observable characteristics, such as age, socioeconomic roots, and education, among other things. Even though gender is not explicitly mentioned as part of the

managerial characteristics, research from psychology (e.g., Silverman, 2003, p. 451) and management (e.g., Croson and Gneezy, 2009, p. 1) has shown gender differences in values and cognitive base, so gender is implicit in the psychological characteristics.

Since introducing the upper echelons theory, a stream of studies has emerged showing that leaders' personal characteristics are critical determinants of organizational decision-making and outcomes. Accordingly, after more than 35 years, this management theory is considered "one of the most influential perspectives in management research" (Neely Jr. et al., 2020, p. 1029). Their theoretical framework laid a critical foundation for the discussion of board gender diversity by describing organizations "as a reflection of its top managers" (Hambrick & Mason, 1984, p. 193). This implies that leaders' psychological characteristics, which differ among genders, enter into strategic choices by affecting managerial perceptions so that information is selectively chosen for processing and "interpreted through a filter woven by one's cognitive base and values" (Hambrick & Mason, 1984, p. 195). This notably applies to strategic decisions, characterized by a substantial behavioral component, such as innovation-related decisions, as opposed to operational choices, such as inventory decisions and credit policy, which are more amenable to a calculable solution (Hambrick & Mason, 1984, p. 195).

In the context of innovation and the exploration of alternatives and new ideas at every stage of the process, it is essential for management and corporate boards to deliberate and for the board members to act as a source of external perspective, providing thoughtful and timely feedback on strategic orientations (Griffin et al., 2021, p. 126). Since women are cognitively different from their male counterparts, women's presence enriches board discussions. In this context, women's relational information processing allows for more precise knowledge integration among divergent opinions and, thus, the realization of synergies of gender-diverse boards and the exploitation of their potential, leading to better strategic decisions. This is why women directors focus more on business strategies that improve performance outcomes in the long-term than short-term results, creating a more failure-tolerant and, thus, more innovative culture in a gender-diverse board (Joecks et al., 2023, p. 1206). This is reflected in women's leadership style shaped by cooperation, coalition building, and collaboration, referred to as the "feminine model of leadership" (Klenke, 1993, p. 334). Hence, the paper ultimately hypothesizes that the female transformational leadership style is an underlying mechanism through which female directors positively influence supervisory board decisions so that board gender diversity is conducive to "innovative corporate culture", as suggested by Griffin et al. (2021, p. 148). For these reasons, the link between female board representation and firm innovation is expected to be positive, leading to the following hypothesis:

**Hypothesis:** *The higher the proportion of women in corporate boards in a given firm, the higher the firm's innovation performance.*

#### 4. Cross-Country Empirical Analysis

Before testing the relationships between female directors and firm innovation in French firms in *Section 4.1.3* and in German firms in *Section 4.2.3*, an explanation for the country selection is provided. In this context, *Table 1* shows the percentage proportion of board seats occupied by women in the most recent year for various European countries and internationally. With a proportion of 44 percent of women on corporate boards, France

is the country with the highest proportion of female board members and was selected for the analysis to investigate whether French firms are correspondingly more innovative. A recent study on German firms by Joecks et al. (2023) is suitable for contrasting the result because Germany represents the midfield in a European and international comparison with a proportion of 31 percent of women directors. Further, the corporate government system of both countries, Germany and France, is characterized by a two-tier board structure including an executive board and a supervisory board (Joecks et al., 2023, p. 1204), which allows for comparability of results. Focusing on a single country at a time also has the advantage that the sampled firms are subject to the same national innovation system and macroeconomic environment.

##### 4.1. Descriptive Analysis of the Impact of Women on Corporate Boards on Innovation in French Firms

###### 4.1.1. Sample and Variables

The initial sample consists of all 120 companies listed on one of the French exchange stock markets, such as CAC40, CAC Next 20, or CAC Mid 60, which together form the SBF 120 index. Data was collected on a one-year period for 2022 to use the most recent available data for the analysis. However, due to missing values for the proxy of firm innovation performance, the initial sample had to be reduced, so the final data set consists of 60 companies, all listed on the index SBF 120, on December 31st, 2022.

*Firm innovation* as the dependent variable, and thus the primary variable of interest, is measured by the number of patents granted to the sampled firm in 2022. Despite various proxy variables for innovation, patent count is a generally accepted indicator among researchers. Focusing on patents as an outcome-based measure of firm innovation, the model follows the recent claim by scholars (for example, Joecks et al., 2023, p. 1207; Griffin et al., 2021, pp. 124–125) who argued that output-based innovation variables are more precise than input-based innovation measures, such as the expenditures on research and development (R&D). This is because patents are more closely related to firm innovation strategy and thus likely to be affected by the corporate board. For these reasons, patents are considered intermediate innovation outputs that measure the success of firm innovation activities more directly than R&D expenditures (Balsmeier et al., 2014, p. 1803), which firms rarely publish. Information on patent count was taken from the PATENTSCOPE database provided by the World Intellectual Property Organization (2023) and

**Table 1:** International Data on Proportion of Board Seats Held by Women (in Percent)  
(Source: Own Illustration based on BoardEx (2022, p. 10))

|                |      |                      |      |
|----------------|------|----------------------|------|
| France         | 44.0 | United States        | 31.1 |
| Italy          | 39.8 | Germany              | 31.0 |
| United Kingdom | 39.8 | Switzerland          | 30.4 |
| Sweden         | 36.4 | Singapore            | 24.2 |
| Australia      | 35.6 | India                | 18.0 |
| Netherlands    | 35.3 | Hong Kong            | 15.8 |
| Spain          | 34.7 | Brazil               | 15.2 |
| Canada         | 34.4 | Russia               | 12.7 |
| South Africa   | 33.8 | Japan                | 12.5 |
| Ireland        | 33.0 | United Arab Emirates | 6.3  |

the ESPACENET database, which has been developed by the European Patent Office (2023). To ensure high data quality, every match was checked manually. Descriptive statistics for the variables in the regression sample are presented in Table 2, thereby providing a way to evaluate the broad characteristics of the data. The number of patents granted to the sampled companies ranges from 1 to 1671, with an average of patents per firm of 132.95 patents. The significant difference in the median and mean suggests that the number of patent data follows a non-normal distribution.

The primary explanatory variable of interest refers to the *proportion of women on supervisory boards* and thus captures the gender composition of supervisory boards. The respective data was collected from the DATASTREAM database of Refinitiv Eikon (2023). According to articles L. 225-27-1 and L. 22-10-7 of the French Commercial Code (Légifrance, 2023), directors representing employees or employee shareholders are not considered for calculating board gender balance. Each supervisory board has, on average, a female representation of 44.58 percent, with the lowest proportion of women directors on the supervisory board at 30.00 percent and the highest at 62.50 percent.

In accordance with the literature and previous studies on board composition (Balsmeier et al., 2014; Griffin et al., 2021; Joecks et al., 2023), the model controls for a set of board and firm variables that impact firm innovation. Information on firm-level and board-level controls is taken from the DATASTREAM database by Refinitiv Eikon (2023). At the board level, the model includes *board size* measured by the overall number of board members. The average board size amounts to 13 members. As firm-level controls, the regression includes *market value*, also known as market capitalization, calculated by multiplying the current stock price by the total number of outstanding shares as a proxy for firm size. Moreover, *return on equity (ROE)* accounts for firm performance. The *leverage ratio*, measured as long-term debt divided by total capital, is used to control a firm's financial potential. The average market value is 36,058 million Euros, the average ROE is 0.13 percent, and the average leverage ratio amounts to 39.69 percent.

#### 4.1.2. Methodology

The operationalization of the dependent variable is decisive in selecting a suitable methodology. Since the number of patents is a non-negative continuously scaled variable, the ordinary least squares method is appropriate for describing the relationship between women directors and firm innovation. This statistical procedure attempts to explain an observed dependent variable by independent variables by minimizing the squared distances between the observation points and the regression line. The model used for this purpose is linear in the parameters, with the dependent variable being a function of the independent variables. The linear estimators obtained by using the method of least squares are those that minimize the variance (Wooldridge, 2016, pp. 64–65).

In the first regression model (I), the overall proportion of women on the board was used as a single explanatory variable to explore whether female board representation is positively linked in the selected sample. This results in the following regression function, where  $i$  denotes the firms in the data set,  $\beta_j$  represents the regression coefficients, and  $\varepsilon_i$  contains unobserved factors for firm  $i$  that affect its number of patents issued (Wooldridge, 2016, p. 74):

$$\text{Model (I): } \text{Number of patents}_i = \beta_0 + \beta_1 \cdot \text{Women}_i + \varepsilon_i$$

However, various board-level and firm-level third variables also impact firm innovation. The effect of the respective independent variable flows into the disturbance term, and the more systematic the disturbance term, the less reliable the results. To avoid an omitted variable bias, which occurs by excluding a relevant variable (Wooldridge, 2016, p. 78), the model is extended to a multiple linear regression by controlling for further explanatory variables and their effects on the dependent variable. This results in the regression function of the model (II):

$$\begin{aligned} \text{Model (II): } \text{Number of patents}_i &= \beta_0 + \beta_1 \cdot \text{Women}_i \\ &+ \beta_2 \cdot \text{Board size}_i + \beta_3 \cdot \text{Market value}_i \\ &+ \beta_4 \cdot \text{Return on equity}_i + \beta_5 \cdot \text{Leverage ratio}_i + \varepsilon_i \end{aligned}$$

The results are to be interpreted in such a way that if the independent variable  $x_i$  increases, depending on the scaling



**Table 2:** Descriptive Statistics (Source: Own Compilation)

| Variables         | Mean   | SD     | Median | Min   | Max     |
|-------------------|--------|--------|--------|-------|---------|
| Number of patents | 132.95 | 276.95 | 8.5    | 1     | 1671    |
| Women – percent   | 44.58  | 6.52   | 44.44  | 30.00 | 62.50   |
| Board size        | 13     | 3      | 13     | 7     | 20      |
| Market value      | 36,058 | 68,737 | 10,598 | 961   | 428,011 |
| ROE               | 0.13   | 0.19   | 0.14   | –0.73 | 0.67    |
| Leverage ratio    | 39.69  | 18.19  | 38.65  | 3.74  | 78.14   |
| N (firms)         |        |        | 60     |       |         |

of the variables, by one unit or by one percentage point, the dependent variable  $y_i$ , the number of patents, increases or decreases, on average, by the size of the regression coefficient  $\beta_i$ , *ceteris paribus*. The estimated regression coefficients  $\beta_i$  are therefore of particular relevance because they have partial effect, or *ceteris paribus*, interpretations, i.e., under the condition of all else being constant (Wooldridge, 2016, p. 66).

To assess how much of the variation in the dependent variable can be explained by the model, the coefficient of determination  $R^2$  is used in statistics as an indicator for model fit. The higher  $R^2$ , the more strongly empirical y-values are determined by theoretical y-values (Bamberg et al., 2017, p. 42). For mathematical reasons, however, the measure increases continuously with the inclusion of further variables. For this reason, in a multiple regression, the *adjusted* coefficient of determination is assessed, which corrects for the degrees of freedom (Stock & Watson, 2020, pp. 223–224).

As with all statistical procedures, multiple regression is subject to certain assumptions that allow for mathematical development and that must be checked accordingly (Cohen et al., 2003, p. 117). Based on econometrics research (for example, Stock and Watson, 2020, pp. 225–227; Wooldridge, 2016, pp. 74–82), six major assumptions referred to as ‘Gauss-Markov Theorem’ must be examined. Firstly, the model must be linear in all predicated parameters and, secondly, defined by a random sample so all variables are independently and identically distributed. Thirdly, there must not be a perfect correlation between the independent variables to rule out multicollinearity. Fourthly, independent variables need to be exogenous so that the error  $u$  has an expected value of zero given any values of the independent variables. Fifthly, the dependent variable must be characterized by homogeneity of variance, often called homoscedasticity. Ultimately, the disturbances must be normally distributed, i.e., the conditional distribution of  $u_i$  given the independent variables is normal (Stock & Watson, 2020, p. 715). Under these assumptions, the estimators are the “best linear unbiased estimators” (Wooldridge, 2016, p. 90), meaning that the estimated sampled coefficients correspond, on average, to the true values of the regression coefficients. Violating one of the assumptions can lead to a biased estimate of the regression coefficients (Cohen et al., 2003, p. 117).

#### 4.1.3. Results

Table 3 presents the bivariate correlations between the regression variables of primary interest. Although correlations cannot be interpreted causally, they provide information about whether the variables are related to some extent. The correlation matrix indicates no significant correlation between the proportion of women and the number of patents, so the magnitude of  $-0.11$  cannot give any indication.

Table 4 presents the regression analysis. In model (I), the coefficient of the variable *women* is statistically not significant different from zero, as the p-value ( $p = 0.42$ ) exceeds common significance levels. The magnitude and direction of the coefficients can thus not be interpreted, and the hypothesis can be rejected, indicating that there is no relationship between female board members and firm innovation. However, this finding may potentially be biased, for instance, caused by omitted variables, reflected in the low value of the determination coefficient ( $R^2 = 0.01$ ). To control for neglected effects, further explanatory variables are included in the model (II). Hence, the model fit increases to 10 percent (*Adjusted*  $R^2 = 0.10$ ), i.e., the model (II) explains 10 percent of the variation in the dependent variable. Nevertheless, despite including further explanatory variables, the coefficient of the variable *women* remains statistically insignificant. Two reasons could potentially underlie this: First, it could be a country effect, i.e., that the link between women directors and firm innovation simply does not exist across French firms. Second, the estimate may be biased due to the methodology, as the number of patents does not seem normally distributed, and due to the coarse data structure, as both the simple and multiple linear regression rely on cross-sectional data from 2022.

Thus, the OLS assumptions must be tested to account for endogeneity frequently associated with studies on board impacts (Brahma et al., 2020, p. 5716). Although the relationship is not strictly linear, the first assumption is not violated since a non-linear relationship is often transformed into a linear relationship by transforming the variables (Wooldridge, 2016, p. 74). Random sampling is fulfilled as firms were randomly selected according to data availability. By calculating variance inflation factors (VIF), all below the usual threshold of 10 (Wooldridge, 2016, p. 86) and the more conservative of 2 (O’Brien, 2007, p. 688), multicollinearity is ruled out. Exogeneity of independent variables is given, as the conditional distribution of the disturbance term given the inde-

**Table 3:** Bivariate Correlations (Source: Own Compilation)

| Variables             | Mean   | SD     | (1)   | (2) |
|-----------------------|--------|--------|-------|-----|
| (1) Number of patents | 132.95 | 276.95 | 1     |     |
| (2) Women – percent   | 44.58  | 6.52   | -0.11 | 1   |

\*p < .10. \*\*p < .05. \*\*\*p < .01.

**Table 4:** Regression Results on Number of Patents (Source: Own Compilation)

| Independent variables   | (I)             | (II)               |
|-------------------------|-----------------|--------------------|
| Women – percent         | -4.52 (5.54)    | -7.56 (5.46)       |
| Constant                | 334.46 (249.75) | 164.89 (291.62)    |
| Board size              |                 | 29.51** (11.95)    |
| Market value            |                 | 0.00 (0.00)        |
| ROE                     |                 | -398.22** (198.58) |
| Leverage ratio          |                 | -0.79 (2.08)       |
| N (firms)               | 60              | 60                 |
| R <sup>2</sup>          | 0.01            | 0.18               |
| Adjusted R <sup>2</sup> | -0.01           | 0.10               |

Note: Estimation is by OLS. Numbers in parentheses are standard errors.

\*p < .10. \*\*p < .05. \*\*\*p < .01.

pendent variables has a mean of zero. However, neither homoscedasticity is fulfilled, as the residuals increase in a funnel shape, indicating heteroscedasticity (Field, 2018, p. 258; Cohen et al., 2003, p. 132), nor are the disturbances normally distributed, as outliers can be detected. The latter is probably due to the small number of observations, as this assumption is usually fulfilled with a sufficiently large sample (Field, 2018, p. 235).

Although the OLS regression provides unbiased estimates of coefficients despite homoscedastic variance, the violation of homoscedasticity distorts the standard error of the coefficients used to compute significance tests based on which the hypothesis decision is made (Field, 2018, p. 239). Hypotheses can thus be falsely rejected due to biased results. This suggests that the insignificance of the results is not caused by a country effect but instead by a bias, for instance, due to the methodology and the data structure. This also explains why previous studies on French firms using more complex regression models and panel data (for example, Galia and Zenou, 2012, p. 635; Galia et al., 2015, p. 123) found a positive relationship between women directors and firm innovation. This provides the motivation to consider empirical evidence investigating companies over a longer period. Two reasons further support this approach: First, there exists a time lag of innovation between the patent issue date and innovation activities (Griffin et al., 2021, p. 125). Therefore, researchers use one-year explanatory variables to account for this time lag (see similar procedure, e.g., Joecks et al., 2023, p. 1208; Balsmeier et al., 2014, p. 1803). Second, panel data allows controlling for potential reversed causality, which might be a concern when analyzing the impact of board composition on

firm innovation, as it cannot be ruled out that “more innovative firms are more likely to appoint women to their boards or that women self-select onto the boards of more innovative firms” (Joecks et al., 2023, p. 1208).

#### 4.2. Empirical Evidence on the Impact of Women on Corporate Boards on Innovation in German Firms

##### 4.2.1. Sample and Variables

Using panel data on a 16-year period of 105 companies listed on one of the German stock exchange indices, such as DAX30, MDAX50, SDAX, and Tec-DAX30, Joecks et al. (2023, p. 1207) found a positive link between female board representation and firm innovation. Since German firms are analyzed, the corporate governance system of all sampled firms is characterized by a co-determined supervisory board, i.e., consists of both shareholder and employee representatives (Joecks et al., 2023, p. 1204). Firm-year observations were collected in the years from 2000 to 2015, leading to unbalanced data, as not all firms listed in one of the indices on December 31st, 2015, were continuously listed in the indices over the entire observation period.

As a dependent variable, the researchers use *patent propensity* as an outcome-related measure of firm innovation efficiency with data powered by the IPLYTICS database by the European Patent Office (2023). In accordance with previous studies (e.g., Belderbos et al., 2010, p. 876), the patent propensity is calculated by putting the number of firm patent filings in a given year in relation to R&D expenditures of 1000 Euros. In this context, patent filing dates instead of issue dates were chosen, as the former more closely reflects the time of the invention and allows an estimate with

more accurate data. The average patent propensity is 0.30, i.e., R&D expenditures of 1000 Euros result on average in 0.3 patents. To account for a possible time lag, the patent propensity is measured with a lag of one year. To capture gender board composition, the model refers to the *overall proportion of women on the board* as the primary explanatory variable of the model. The analysis draws on hand-collected data from annual reports and information provided in a report by Weckes (2016). On average, supervisory boards consist of 12.2 percent female members, with the highest proportion of women directors at 50 percent.

Further variables are included in the model to control for board-level and firm-level effects that impact firm innovation performance. Data on board-level controls is provided by Weckes (2016) and data on firm-level controls is taken from the DATASTREAM database integrated into Refinitiv Eikon (2023). Joecks et al. (2023, p. 1207) include *board size*, *one-third co-determination*, *outside directorships* as indicator of multiple directorships, and *board tenure*. The variable *outside directorships* measures the external knowledge inflow and thus is calculated by the average supervisory board memberships a board member holds in one of the listed companies. The average board size amounts to 14.59, the average outside directorship is 1.28, and the average board tenure is 6.62 years. At the firm level, the model contains *market value*, *return on equity (ROE)*, and *leverage ratio* to account for firm size and performance. The average market value is 11.48 million Euros, the average ROE is 11.34 percent, and the average leverage ratio is 29.19 percent.

#### 4.2.2. Methodology

Joecks et al. (2023, p. 1208) panel data investigation is based on a Poisson regression. The Poisson estimator is used when the dependent variable comprises counts, for instance, the number of patents, not containing negative values but zero observations (see for similar procedure, e.g., Balsmeier et al., 2014, p. 1806). Thus, the outcome variable is nominally assumed to have a Poisson distribution, conditional on the explanatory variables (Wooldridge, 2016, pp. 543–544). This mathematical distribution is used to describe the probability of occurrence of count data. As a count variable can take on values of zero, it cannot be logarithmized, so the link is approached by modeling the expected value as an exponential function (Wooldridge, 2016, p. 544). The count data model is moreover estimated with fixed effects so that the model accounts for unobserved firm heterogeneity that is time-invariant and constant across industries (see similar procedure, e.g., Balsmeier et al., 2014, p. 1806). The following equation results:

$$\begin{aligned} E(y_{it}|\mathbf{x}) = & \exp(\beta_0 + \beta_1 \cdot \text{Women}_{it} + \beta_2 \cdot \text{Board Size}_{it} \\ & + \beta_3 \cdot \text{One Third Co-Determination}_{it} \\ & + \beta_4 \cdot \text{Outside Directorships}_{it} + \beta_5 \cdot \text{Board Tenure}_{it} \\ & + \beta_6 \cdot \text{Market Value}_{it} + \beta_7 \cdot \text{ROE}_{it} \\ & + \beta_8 \cdot \text{Leverage Ratio}_{it} + \alpha_i + \lambda_t + \varepsilon_{it}) \end{aligned}$$

where  $y_{it}$  describes the patent propensity of firm  $i$  in year  $t$ , the vector  $\mathbf{x}$  is shorthand for all explanatory variables,  $\beta_j$  represent the regression coefficients,  $\varepsilon_{it}$  contains unobserved factors that affect the patent propensity of a firm,  $\alpha_i$  denotes the time-fixed effects and  $\lambda_t$  denotes the industry-fixed effects (Stock and Watson, 2020, pp. 372–373, 369; Wooldridge, 2016, p. 544). The logarithm of the expected values can be modeled by a linear combination of parameters (Wooldridge, 2016, p. 544):

$$\begin{aligned} \log[E(y_{it}|\mathbf{x})] = & \beta_0 + \beta_1 \cdot \text{Women}_{it} + \beta_2 \cdot \text{Board Size}_{it} \\ & + \beta_3 \cdot \text{One Third Co-Determination}_{it} \\ & + \beta_4 \cdot \text{Outside Directorships}_{it} + \beta_5 \cdot \text{Board Tenure}_{it} \\ & + \beta_6 \cdot \text{Market Value}_{it} + \beta_7 \cdot \text{ROE}_{it} \\ & + \beta_8 \cdot \text{Leverage Ratio}_{it} + \alpha_i + \lambda_t + \varepsilon_{it} \end{aligned}$$

Hence, the Poisson regression takes the form of a log-linear model. However, similar to probit, logit, and Tobit models, the magnitude of the estimates of an exponential function as a nonlinear function cannot be interpreted as the OLS estimates of a linear function but can only be approximated (Wooldridge, 2016, p. 544):

$$\% \Delta E(y_{it}|\mathbf{x}) \approx (100\beta_j)\Delta x_j$$

More accurate estimation can only be identified by calculating discrete changes in the expected values (Wooldridge, 2016, p. 544). The study of Joecks et al. (2023, p. 1209) uses the pseudo maximum likelihood method, typically applied to Poisson models (Gouriéroux et al., 1984, p. 701). The above approximation is thus not sufficient for interpretation (Wooldridge, 2016, pp. 544–546); instead, the coefficient's algebraic sign gives an indication of the direction of the relationship. The log pseudo-likelihood value shown in Table 5 measures the model fit, ranging from negative infinity to positive infinity (Gouriéroux et al., 1984, p. 703). Although higher values indicate a better model fit, the absolute value cannot be interpreted; it can only be compared between multiple models.

#### 4.2.3. Results

Table 5 presents the Poisson regression analysis on *patent propensity*. Several robustness checks were conducted, for instance, to account for the differing industries in the sample (Joecks et al., 2023, p. 1209). The coefficient of the variable *women* is highly statistically significant different from zero on a one percent significance level, and has a positive value of 2.612. The direction of the coefficient indicates that the percentage of women on supervisory boards is positively related to firm innovation, which is in line with the vast majority of previous studies and supports the hypothesis in Section 3.

#### 4.3. Comparison of Descriptive Analysis and Empirical Evidence

As the data analysis in Section 4.1 provides insignificant results, findings are contrasted with further empirical evi-

**Table 5:** Poisson Regression Results on Patent Propensity (Source: Own Illustration based on Joecks et al. (2023, p. 1209))

| Independent variables  | Coefficient (Standard errors) |
|--|-------------------------------|
| Women – percent  | 2.612*** (0.589)              |
| Board size   | 0.15 (0.12)                   |
| One third co-determination ( <i>reference: parity co-determination</i> ) | -2.37*** (0.40)               |
| Outside directorships  | 1.31 (2.34)                   |
| Board tenure   | 0.09*** (0.03)                |
| Market value   | -0.27 (0.43)                  |
| ROE  | 0.02** (0.008)                |
| Leverage ratio   | 0.043 (0.03)                  |
| Year and Industry FE   | Yes                           |
| Log pseudo-likelihood  | -1752.1                       |
| N (obs)  | 745                           |
| N (firms)  | 74                            |

Note: Estimation is by Poisson regression. Numbers in parentheses are standard errors.

\*p < .10. \*\*p < .05. \*\*\*p < .01.

dence from Section 4.2, which argues for a positive relationship between women directors and firm innovation. Differences in the results are, among other things, due to methodological differences that make comparisons difficult:

First, studies on board composition are generally difficult to compare across countries as they are subject to contextual factors. This aligns with Section 2.2, which emphasizes contextual factors and a situational approach at national levels.

Second, data availability determines model specifications and, thus, its explanatory power, leading to differing results. Regarding the operationalization of variables, both analyses selected other variables to capture firm innovation quantitatively. While the patent count is used as a proxy for innovation in the descriptive analysis, the empirical evidence by Joecks et al. (2023, p. 1207) relies on patent propensity. The latter is considered to capture innovation activity more accurately by using patent applications per year instead of patent grants per year (Balsmeier et al., 2014, p. 1803). Furthermore, the analysis by Joecks et al. (2023, p. 1207) controls for outside directorships, which is a variable of particular relevance, as external directors are perceived to provide “scarce specific knowledge and experience” (Balsmeier et al., 2014, p. 1801). As only unreliable data was available, this variable could not be included in the descriptive analysis, potentially leading to an omitted variable bias.

Third, differences in data structure can also be identified. While the empirical study based on German firms assesses panel data with firm-year observations collected over 15 years (Joecks et al., 2023, p. 1207), the descriptive analysis uses cross-sectional data limited to the year 2022. However, as recent data on patent grants in 2022 was not available for some firms in the initial samples of 120 firms, the data set had to be reduced considerably. This causes a loss of valuable data and leads to the data being subject to the circumstances in 2022, such as the Covid-19 pandemic. This would explain significant differences in the variables com-

pared to the following year (e.g., ROE for Arcelor Mittal: 0.19 percent in 2022 and 7.69 percent in 2023) (Refinitiv Eikon, 2023). This is supported by the central limit theorem, which states that the more observations a model contains, the more accurately the parameters can be estimated (Field, 2018, p. 233). According to Balsmeier et al. (2014, p. 1803), panel data is moreover crucial to account for possible time lags in innovation. Most previous studies, therefore, relied on panel data analyses, as noted in Joecks et al. (2023, p. 1205).

Fourth, an important factor determining the quality of the results is the choice of an estimation method. Using the Poisson regression as a non-linear function may capture the link between women on boards and firm innovation better than a linear function, as the distribution may deviate from a normal distribution if the dependent variable takes on very few values (Wooldridge, 2016, p. 544). This is presumably the reason why the analysis of Joecks et al. (2023, p. 1209) leads to statistically significant results.

## 5. Conclusion

The question of the extent to which gender diversity on supervisory boards contributes to firm innovation and thus to the long-term success of a company was investigated on the basis of Hambrick and Mason’s (1984) upper echelons theory and empirically tested on the basis of a bivariate analysis of French firms with non-significant results and a panel data study of German firms, arguing for a positive relationship. Among the arguments presented in the literature, particular emphasis is placed on the female leadership style, which promotes cooperation, collaboration, and participation and, thus, an open-minded and more innovative corporate culture. However, this is put into perspective by contextual factors that need to be considered.

Several policy, managerial, and practical implications emerge from this result. The dynamic business environment



forces firms to consider factors that promote innovation performance to ensure corporate survival or even to gain an edge over competitors. Thus, entrepreneurial and forward-thinking firms should focus on modernizing human resource management practices by viewing gender diversity as a key innovation component. This may create more gender-diverse teams that motivate identifying and implementing novel marketable ideas or even inspire employees to transform their entrepreneurial aspirations into actual entrepreneurial acts by creating ventures under their organizations' umbrella. These actions will generate multiple benefits at an individual level due to professional advancement, at an organizational level through sustainable innovation, and at the social level due to economic and social outcomes. Gender diversity, therefore, holds great potential for a firm's innovation performance. In addition, further political requirements will establish gender diversity as a business imperative of the early twenty-first century so that, sooner or later, it will be part of the strategic orientation of most companies.

However, given the framework conditions under which the studies were conducted, no claim to general validity can be made. Regional, cultural, and industrial differences make it difficult to compare study results. A further obstacle to the systematic analysis was the loose application of the term 'innovation', which is often employed as a substitute for creativity, knowledge, or change. Researchers not only use different input or output-based proxies for innovation, such as the number of patents, patent propensity, or R&D expenditures but also refer to performance measures other than innovation outcomes, such as productivity growth and effectiveness. Moreover, using patents as an innovation indicator can be misleading to the extent that not every invention is patented and some granted patents are not used to introduce a novel process or product or to improve established processes or products (Balsmeier et al., 2014, p. 1803). Even if granted patents result in innovation activity and outputs, they take several years to develop, so it is uncertain whether granted patents will prove novel and impactful (Griffin et al., 2021, p. 124). These circumstances impede making generally valid statements and question the accuracy of previous studies and their results. This inevitably leads to the question of how firm innovation can be quantitatively captured and made comparable in the context of studies on the board composition of supervisory boards.

Forthcoming studies should, therefore, focus on examining the concept of innovation more closely, for instance, by differentiating between the forms of innovation, such as product innovation, process innovation, marketing innovation, and organizational innovation. In addition, future studies should examine more intensively the impact of gender diversity and complementary attributes of women and men that create synergy in improving innovation performance. Additional qualitative interviews may help to deepen our understanding of the relationship between board members and innovation. Gender diversity could also be explored in the context of corporate venturing activities, and the effect of either a male or female entrepreneur on the firm's strategic fo-

cus examined. Gender-based differences in the engagement in corporate venturing and the application of corporate venturing strategies could be identified to enrich the discussion on gender diversity. Due to the rise of a younger generation of managers and executives to the corporate top, including supervisory boards, subsequent research should explore how the effects of gender diversity on firm innovation may change. It would be interesting to investigate whether the advantages of female representation remain when greater gender equality is achieved in the upper echelons. Although innovation can be seen as a gender-biased phenomenon, focusing only on gender diversity and innovation, gender diversity is not the only component impacting firm innovation. Indeed, it is an interplay of several dimensions that collectively contribute to organizational diversity, such as diversity of age, nationality, and culture. Therefore, researchers should investigate how the impact of gender diversity varies when not only other genders, such as non-binary, but also other diversity dimensions are considered. These and other questions can be answered by further empirical research on diversity and innovation.

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## Spitzeder, Schmider, Marsalek: Welche Rolle spielt der Faktor Mensch in Bilanzskandalen?

## Spitzeder, Schmider, Marsalek: What Role Does the Human Factor Play in Accounting Scandals?

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### Abstract

The human factor is a significant influence that is difficult to quantify when analyzing accounting fraud cases. Despite several studies on accounting scandals, there has been a lack of systematic comparisons of different cases concerning the impact of personal behavior on their emergence, prevention, and processing. The objective of this thesis is to investigate the extent to which the human factor contributed to the success of the fraud schemes using the cases of Wirecard (2020), Flowtex (1999) and Dachauer Bank (1872). After reviewing the three cases based on literature, the key characters Jan Marsalek, Manfred Schmider, and Adele Spitzeder, are analyzed using the sociological model of the Fraud Diamond. This analysis finally derives approaches for dealing with fraud schemes. The study reveals that the human factor is not only relevant when considering the perpetrators in terms of motivation, justification, and their ability to commit fraud, but also when considering other parties involved. Furthermore, the human factor is the basis for a fraud case becoming a scandal.

### Zusammenfassung

Der Faktor Mensch – eine Einflussgröße, die bei der Analyse von Bilanzbetrugsfällen schwer zu quantifizieren ist. Trotz zahlreicher Untersuchungen über Bilanzskandale, mangelt es bislang an systematischen Vergleichen verschiedener Fälle bezüglich des Einflusses persönlichen Verhaltens auf Entstehung, Prävention und Aufarbeitung von Bilanzskandalen. Es ist das Ziel dieser Arbeit, anhand der Fälle von Wirecard (2020), Flowtex (1999) und der Dachauer Bank (1872) zu erforschen, inwiefern der Faktor Mensch dem Erfolg der Betrugssysteme zuträglich war. Nach einer literaturbasierten Aufarbeitung der drei vorliegenden Fälle, werden die handelnden Akteure Jan Marsalek, Manfred Schmider und Adele Spitzeder mithilfe des soziologischen Modells des Fraud Diamonds analysiert. Daraus werden abschließend Herangehensweisen für den Umgang mit Betrugssystemen abgeleitet. Zentrale Erkenntnis ist, dass der Faktor Mensch nicht nur bei der Betrachtung der Täter hinsichtlich der Motivation, Rechtfertigung und Fähigkeit zum Betrug relevant ist, sondern auch bei der Betrachtung anderer Akteure von Bedeutung ist. Zudem ist der Faktor Mensch die Grundlage dafür, dass aus einem Betrugsfall ein Skandal wird.

**Keywords:** fraud diamond; fraud schemes; human factor; Wirecard

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## 1. Einleitung

Die exorbitant hohen Summen, um die es geht, die lange Zeit, in der ein Bilanzbetrug funktioniert und die damit einhergehende Überraschung, sobald er bemerkt wird, sind Gründe für das öffentliche Interesse an Fällen wie der Dachauer Bank, Flowtex oder Wirecard. Doch was macht einen Bilanzbetrug zum Bilanzskandal? Welche Rolle spielt der Faktor Mensch in dieser Frage? Und welche Rolle spielt er in den in der folgenden Arbeit dargestellten Fällen?

Um diese Fragen zu beantworten, ist es notwendig, den Begriff des Faktors Mensch zu erläutern. Die Schwierigkeit dabei liegt darin, dass diesem Begriff anders als bei hilfreichen Definitionen im Controlling und Accounting die Quantifizierbarkeit fehlt. Dabei wird die Begriffsdefinition umso komplexer, desto mehr Menschen in verschiedenen Rollen zu betrachten sind und interpersonelle Konstellationen von Relevanz sind. Daher werden in dieser Arbeit Motive, Emotionen, Eigenschaften und Handlungen einer Person unter dem Begriff Faktor Mensch zusammengefasst. Betrachtet werden dabei im Übrigen nicht nur die Täter. Insbesondere in der Verhinderung, Erkennung und Aufarbeitung von Bilanzbetrugsfällen gilt es z.B. für Wirtschaftsprüfer ebenfalls den Faktor Mensch bei sich selbst und den zu Prüfenden zu berücksichtigen.

Ebenfalls ist es notwendig, den Begriff des Bilanzskandals von dem des Bilanzbetrugs abzugrenzen. Während der Betrug einen juristischen Tatbestand darstellt, der laut §263 Abs. 1 Strafgesetzbuch (StGB): „[...] *in der Absicht* [begangen wird], *sich oder einem Dritten einen rechtswidrigen Vermögensvorteil zu verschaffen, das Vermögen eines anderen dadurch beschädigt, dass er durch Vorspiegelung falscher oder durch Entstellung oder Unterdrückung wahrer Tatsachen einen Irrtum erregt oder unterhält* [...]“, hat der Begriff Skandal andere Ebenen und Bedingungen als alleine den juristischen Tatbestand.

Der Soziologe John B. Thompson betont in seinem Werk „Political Scandal – Power and Visibility in the Media Age“ fünf Charakteristika, die Handlungen oder Umstände zum Skandal machen: Das erste dieser Charakteristika ist die Überschreitung von Grenzen, Normen oder Moralvorstellungen (vgl. Thompson, 2000, S.13f.). Diese liegen nicht nur auf juristischer Ebene und sind bei Betrugsfällen bzw. Gesetzesverstößen gegeben.

Die anderen Charakteristika beinhalten, „*non-participants*“ (ebd., S.14). Diese Personen sind nicht direkt in den Vorgang des Betrugs oder der Aufarbeitung involviert. Sie glauben stark an ein für einen Skandal notwendiges Element des Verschweigens oder Geheimnisses oder wissen davon, verurteilen die Geschehnisse und drücken ihre Missbilligung öffentlich aus, was die von Thompson aufgestellten Charakteristika zwei bis vier beschreiben. Das letzte Charakteristikum des Skandals ist, dass der Ruf der verantwortlichen Person durch die Offenlegung geschädigt werden kann (vgl. ebd., S.14).

Im Fall des juristischen Betrugs sind nur der Täter und der geschädigte Dritte notwendig. Die Beteiligung der „*non-participants*“ und deren Handlungen ist das, was den Betrug

zum Skandal macht. In den begriffsdefinierenden Charakteristika glauben sie an etwas, treffen ein (negatives) Urteil und drücken dies öffentlich aus. Dies sind emotionale und gesellschaftliche Elemente, ebenso wie es der Ruf der am Betrug beteiligten Person ist. Das Interesse der „*non-participants*“, durch das der Skandal entsteht, wird typischerweise eher durch interessante Personen und deren Verhalten, also Menschen, geweckt, als nur durch das Betrugssystem an sich. Dafür spricht, dass die in den folgenden Kapiteln behandelten Betrugsfälle in Unterhaltungsmedien behandelt wurden und in diesen Darstellungen den Protagonisten mehr Beachtung geschenkt wird als den Details der Betrugsmaschen. Beispielhaft sind dort der Fernsehfilm „*Die Verführerin Adele Spitzeder*“ aus einer Koproduktion des ORF und Bayerischen Rundfunks aus dem Jahr 2012 oder der SWR-Fernsehfilm „*Big Manni*“ aus dem Jahr 2019 zu nennen.

Dies lässt den Schluss zu, dass der Faktor Mensch dasjenige ist, was den Betrug zum Skandal und somit auch den Bilanzbetrug zum Bilanzskandal macht. Folglich kann ein Betrug zum Skandal werden, wenn Thompsons Charakteristika erfüllt sind, jedoch liegt nicht jedem Skandal ein Betrug zugrunde. Nachdem der Faktor Mensch nun in Thompsons Charakteristika 2-5 verortet wurde, stellt sich nun die aus einer Controlling- beziehungsweise Accountingperspektive interessante Frage, welche Rolle der Faktor Mensch in Bilanzbetrugsfällen spielt. Die Bilanz als solche ist Gegenstand des Controllings und so ist es insbesondere für das Risikocontrolling von Wichtigkeit, Bilanzbetrug zu verhindern. Der Faktor Mensch ist bei diesen Vorfällen sowohl auf Täterseite, als auch auf der Seite derer, die in verschiedenen Rollen bei der Prävention, Intervention und Aufarbeitung mitarbeiten, interessant zu betrachten.

Zur Beantwortung der Fragen, welche Rolle der Faktor Mensch im Bilanzbetrug spielt und wie ein solcher Vorfall zu verhindern ist, werden daher Modelle angewandt, die sich mit Voraussetzungen für Betrugsfälle befassen. Das Fraud Triangle ist ein Konzept, welches der amerikanische Soziologe Donald R. Cressey entwarf, der drei Bedingungen für Betrug definiert. Diese Voraussetzungen stellen jeweils eine Ecke dieses Modells des Betrugsdreiecks dar. Der Betrug hat für Cressey den Bruch finanziellen Vertrauens zwischen Täter und Geschädigtem als Kernattribut. So ist laut ihm erstens ein finanzielles Problem des Täters notwendig, welches er nicht imstande ist, anderen mitzuteilen. Die Täter müssen zweitens der Ansicht sein, dass durch einen Bruch finanziellen Vertrauens dieses Problem aus der Welt zu schaffen möglich sei. Drittens ist es für sie notwendig, die Handlungen vor sich und ihrem Selbstbild rechtfertigen zu können (vgl. Cressey, 1953, S.30).

Die Voraussetzungen im Modell Cresseys wurden im Laufe der Zeit verallgemeinert. So wurde aus der finanziellen Lage, die man glaubt, für sich behalten zu müssen, die Motivation (*Incentive*), aus der Möglichkeit sich durch einen Vertrauensbruch einen Vorteil zu verschaffen, die Gelegenheit (*Opportunity*) und aus der Wahrung des Selbstbildes und dem gedanklichen Abwägen der Tat und ihrer Folgen die Rechtfertigung (*Rationalization*) (vgl. Wolfe und Hermanson, 2004,

S.38). Wolfe und Hermanson ergänzen dieses Modell um den Faktor der persönlichen Fähigkeit (*Capability*), einen konkreten Betrug zu begehen. Dadurch wurde aus dem Konzept des Betrugsdreiecks, das des Betrugsdiamanten (Fraud Diamond).

Um die zu Beginn aufgeworfenen Fragen zu beantworten, werden in Kapitel 2 die im Titel genannten Fallbeispiele dargestellt. Dort wird der Fall von Adele Spitzeder aus den 1870er Jahren beschrieben, indem zuerst auf die Person Adele Spitzeder und anschließend auf ihr Betrugssystem, die Dachauer Bank, eingegangen wird. Auf dieselbe Weise werden in diesem Kapitel der Fall Manfred Schmiders und dessen Firma Flowtex und anschließend die Person Jan Marsalek und der Fall Wirecard dargestellt.

Daraufhin werden mithilfe des Fraud Diamonds nach Wolfe und Hermanson Ausprägungen des Faktors Mensch in den Betrugsfällen aufgezeigt, indem zuerst in Kapitel 3.1 thematisiert wird, inwieweit der Mensch als Variable in diesem Modell auszumachen ist und welche anderen Faktoren relevant sind, woraufhin in Kapitel 3.2 die verschiedenen personenbezogenen Merkmale innerhalb der Betrugssysteme im Fraud Diamond analysiert und illustriert werden.

Anschließend beschäftigt sich das Kapitel 4 mit der Frage nach Möglichkeiten der Prävention von Bilanzbetrugsfällen. Dort werden in Kapitel 4.1 Unzulänglichkeiten im Umgang mit dem Betrugssystem thematisiert, während in Kapitel 4.2 die auf die Bilanzskandale folgenden Maßnahmen erläutert und anhand des in Kapitel 3 verwendeten Modells Ansatzpunkte für Maßnahmen zur Verhinderung aufgezeigt werden. In Kapitel 4 werden insbesondere die Erkenntnisse aus Kapitel 3 hinsichtlich der *Fähigkeiten* und *Gelegenheiten* betrachtet. Dies hat den Grund, dass diese Aspekte im Kontext der Betrugserkennung und -prävention relevanter sind, als die *Rechtfertigung* und *Motivation*. Zuletzt werden die Ergebnisse zusammengefasst, aus denen abschließend ein Fazit gezogen wird.

## 2. Biographien, Betrugssysteme, Bilanzskandale

### 2.1. Adele Spitzeder und ein Ponzisystem im Raum München zur Gründerzeit

Die sogenannte Dachauer Bank war ein von Adele Spitzeder betriebenes Betrugssystem, das letztendlich über 30.000 Anleger um ein Vermögen von ca. 8 Millionen Gulden brachte (vgl. FAZ, 2009). Ein Gulden wäre umgerechnet im Jahr 2017 ca. 11 Euro wert gewesen (vgl. SZ, 2017).

Problematisch bei der Forschung zu diesem Fall ist die dürftige Quellenlage, deren Grundlage hauptsächlich die Memoiren Adele Spitzeders sind. Bei der Betrachtung dieser gilt es, sich dessen bewusst zu sein, dass es sich hierbei um ein Selbstzeugnis handelt, welches sie selbst zum Zweck ihrer Verteidigung aus dem Gefängnis verfasst hat und das nach der Freilassung zur Rechtfertigung von ihr veröffentlicht wurde (vgl. Spitzeder, 1878, Vorwort S. 6).

Die 1832 in Berlin geborene Adele Spitzeder kam aus einer Schauspielerfamilie (vgl. Spitzeder, 1878, S.3). Nachdem ihre Eltern kurz nach Adeles Geburt mit ihr und ihren

sechs Halbgeschwistern väterlicherseits aufgrund eines Stellenwechsels ans Hoftheater nach München zogen, verstarb ihr Vater dort früh (vgl. ebd., S.4f.). Ihre Kindheit und Jugend verbrachte sie zu Teilen in Berlin, Graz und Wien, wo sie verschiedene Erziehungseinrichtungen besuchte (vgl. ebd., S.8). Früh habe sie die Erfahrung gemacht, dass ihre Mutter durch ihren zweiten Ehemann einem Betrug finanzieller Art zum Opfer gefallen sei (vgl. ebd., S. 7 f.). Nachdem sie laut eigener Aussage in vielen verschiedenen Sprachen und anderen Bereichen unterrichtet wurde und diese gemeistert habe, entschloss sie sich, Schauspielerin zu werden (vgl. ebd., S.11-16). Als sie als solche ausgebildet war, spielte sie an verschiedenen Theatern. Dabei stand sie allerdings vor dem Problem, dass ihr Lebensstil, insbesondere das Leben in Gasthöfen und das Zahlen der Theatergarderobe durch monatliche Zahlungen ihrer Mutter in Höhe von 50 Gulden und die Theatergagen nicht ausgeglichen werden konnte, weshalb sie sich verschulden musste und Kredite aufnahm (ebd., S.30). Hierbei klagte sie über eine zu hohe Zinslast (vgl. ebd., S.35)). Schließlich zog sie mit sechs Hunden und einer Begleiterin zurück nach München und lebte im Hotel „Deutsches Haus“ (vgl. ebd., S.33). Dort wurde ihre Geldnot erheblicher und ihre Schulden höher (vgl. ebd., S. 36).

Die Frau eines Zimmermanns aus der Au soll im Herbst 1869 (vgl. SZ, 2017) die erste Kundin der „Dachauer Bank“ gewesen sein (vgl. FAZ 2009 nach Spitzeder 1878, S.39). Diesen Namen bekam das sich entwickelnde Geschäft Adele Spitzeders. Er entstand aus einem zunächst spöttischen Hintergrund aufgrund der Herkunft der Kundschaft aus dem überwiegend ländlichen Raum um München (vgl. FAZ, 2009). Später wurde er jedoch auch von der Betreiberin selbst übernommen. Spitzeder bot ihren ersten Kunden anfangs einen Zinssatz von 10% monatlich auf deren Einlagen. Die Zinsen für die ersten beiden Monate zahlte sie gleich aus (vgl. Spitzeder, 1878, S.39). Zu späterer Zeit habe sie aufgrund der Vielzahl an Anlegern die Zinsen nach und nach gesenkt (vgl. ebd., S.50 & S.102). In ihren Memoiren betont die Betreiberin der Dachauer Bank häufig, dass die Geldanlage bei ihr nur auf Vertrauen basierte und sie stets offen damit umging, dass sie keine Deckung oder Sicherheit für die Einlagen gehabt habe (vgl. ebd., S.39).

Das Geld, das sie damit zur Verfügung hatte, verwendete sie zunächst dazu, um ihre vorher aufgenommenen Schulden abzubezahlen (vgl. ebd., S.40), doch auch ihrem Lebensstil kam ihre Tätigkeit zugute. Es war ihr möglich, ihre Geschäfte in ein von ihr erworbenes Haus zu verlegen (vgl. ebd., S. 63). Außerdem gibt sie an, mehrere Häuser gekauft und eine Volksküche eingerichtet zu haben (vgl. ebd., S. 173-182). Ob es Wollens- oder Könnensdefizite waren, die Spitzeder dazu veranlassten, weder zwischen Geschäfts- und Privatvermögen noch zwischen Vermögen und kurzfristigem Zugang zum Geld anderer zu unterscheiden, kann nicht mehr beantwortet werden. Doch sah sich Spitzeder selbst als Millionärin an (vgl. ebd., S.104).

Ebenfalls beschreibt sie, dass sie mit dem eingezahlten Geld anderer, selber Kredite vergeben hätte. Den anfallenden Zinssatz wählte sie nach dem sozialen Stand desjenigen

aus, der den Kredit nachfragte. So hätten „Cavaliere, Offiziere und dergleichen“ (ebd., S.41.) 15-20% Zinsen zahlen müssen, während „minder bemittelte Leute, Kaufleute, Handwerker, Subalternbeamte“ (ebd., S.41f.) von ihr „Geld zum ermäßigten Zinsfuß, manchmal sogar ohne Zins“ (ebd., S.42) erhielten.

Aufgrund der großen Nachfrage der Menschen aus München und dessen Umland, ihr Geld bei Adele Spitzeder anzulegen, war sie gezwungen, mit dem Wachstum ihres Betrugssystems Mitarbeiter einzustellen. Allerdings waren diese häufig ungelernt und hatten zuvor andere Berufe ausgeübt. So übernahm eine Theateragentin die Buchführung der Dachauer Bank (vgl. ebd., S.42).

Zusätzlich zu diesem Geschäftsgebaren, welches eher anhand kurzfristiger Planung ausgerichtet zu sein schien, gab es das Problem, dass keine angemessene Buchführung existierte (vgl. FAZ, 2009). In ihrer Gerichtsuntersuchung gab sie ihren Memoiren zufolge an, Bücher geführt zu haben, allerdings habe sie aus dem Grund keine Beträge notiert, dass es „eine kolossale und unentwirrbare Schreibung gemacht hätte“ (Spitzeder, 1878, S. 228). All diese Faktoren führten dazu, dass Spitzeders System nur solange bestehen konnte, bis nicht mehr eingezahlt wurde, als auszuzahlen war. Wenn also die Wechsel, die den Einlegern ausgegeben wurden zuzüglich der gewährten Zinsen auszuzahlen sind, ist dies nur durch weitere Einlagen möglich. Dies ist die Definition eines Ponzi-Systems (vgl. Investor.gov, n. d.). Diese Art von Betrugssystemen ist nach Charles Ponzi benannt, der ein solches System in den 1920er Jahren in den USA betrieb (vgl. Kilian, 2009, S.285f.).

Am 12.11.1872 brach ihr System zusammen und sie wurde verhaftet (vgl. Spitzeder, 1878, S.107). Sie wurde am 20.07.1873 zu einer Haftstrafe von drei Jahren und zehn Monaten wegen betrügerischen Bankrotts verurteilt (vgl. FAZ, 2009).

Damit ihr System in diesem Maße und über einen längeren Zeitraum funktionieren konnte, gab es neben den attraktiven Konditionen der Anlage weitere wichtige Faktoren. Spitzeder war darauf bedacht, dass das, wie sie selbst betonte, wichtige Vertrauen zu ihr nicht beeinträchtigt wurde (vgl. Spitzeder, 1878, S.66). Dafür beauftragte sie Personen, die ihr alle Gerüchte über sie und ihr Geschäft zutragen sollten. Sie stellte durch finanzielle Zuwendungen das Vertrauen zu Zeitungen her, die positiv über sie berichteten (vgl. ebd., S.80) und traf verschiedene Vorkehrungen dafür, dass das Vertrauen der Anleger nicht beschädigt wurde (vgl. ebd., S. 66) und es zu einem Bank-Run kommen würde, der selbst regulierte Banken zum Einsturz bringen kann.

## 2.2. „Big Manni“ und ein umfangreicher Etikettenschwindel

Manfred Schmider, dessen Spitzname „Big Manni“ war, wurde im Jahr 1949 in Karlsruhe geboren (vgl. Heck, 2006, S.28). Schon zur Schulzeit habe er Lebensversicherungen verkauft und während des Studiums Autos, erzählt Manfred Schmider selbst in der Dokumentation des SWR aus dem Jahr 2019 „Wie ein Geschäftsmann Banken um Milliarden

betrog - Big Money“. Den „Ehrgeiz“, wie er es dort beschreibt, habe er immer schon gehabt (vgl. SWR, 2019, 01:35).

Im Mai 1986 ereignete sich ein Raubüberfall auf Manfred Schmider. Bei diesem wurden aus dem Haus der Schmiders angeblich Bargeld und Gegenstände im Wert von ca. zwei Millionen DM erbeutet (vgl. Landtag BW, 2005, S.51). Dieser Fall brachte Manfred Schmider nicht nur einen Platz in der Sendung „Aktenzeichen XY ungelöst“ ein, sondern zusätzlich eine Versicherungssumme von 1,85 Mio. DM (vgl. Heck, 2006, S.34). Aufgrund verschiedener Indizien wie der Tatsache, dass er kurz zuvor Schmuck nachversichern ließ und, dass es für einen großen Teil des als gestohlen gemeldeten Schmucks keine Rechnungen gab, wurde gegen Manfred Schmider wegen Versicherungsbetrugs ermittelt (vgl. Landtag BW, 2005, S.769 i.V.m. Heck, 2006, S.33f.). Etwa 16 Jahre später wurde das letzte Verfahren in dieser Causa eingestellt, nachdem es mehrfach aufgrund von neuen, belastenden Aussagen neu aufgerollt worden war, aber wegen unzureichender Beweislast eingestellt wurde (vgl. Landtag BW, 2005, S.51f.).

Meinrad Heck stellt in seinem Buch: „Der Flowtexas-Skandal. Wie Politik und Fiskus jahrelang von einem gigantischen Wirtschaftsbetrug profitieren“ die Hypothese auf, dass „die ausbezahlte Versicherungssumme [...] eine Art Startkapital für Flowtexas gewesen“ sei (Heck, 2006, S.34).

Denn vierzehn Tage vor dem Raubüberfall, am 28. April 1986, ließ Manfred Schmider die im baden-württembergischen Ettlingen ansässige Firma Flowtexas ins Handelsregister eintragen, nachdem er und sein Geschäftspartner Dr. Klaus Kleiser sich im Januar desselben Jahres die Vertriebsrechte für ein Horizontalbohrsystem aus den USA gesichert hatten (vgl. ebd., S.32). Diese Systeme sollten es ermöglichen, Tiefbauarbeiten zu erledigen, ohne die für derartige Arbeiten typischen Nachteile, wie die Problematik offener Straßen, in Kauf nehmen zu müssen. FlowMole, ein Unternehmen aus Kalifornien hatte das System entwickelt, welches sich mittels Wasserstrahlen mit Hochdruck durch den Boden fräste und dabei ein Kabel unterirdisch ziehen konnte (vgl. ebd.). Im Vergleich zum Boden an der amerikanischen Pazifikküste, gab es jedoch in Deutschland größere Probleme mit der Beschaffenheit des Untergrunds. So stellten Weltkriegsbomben, Steine und alte Leitungen Hindernisse für die Technik dar (vgl. ebd., S.35).

Dies und der Widerstand der herkömmlich arbeitenden und lobbyierenden Konkurrenz sorgten dafür, dass Flowtexas der Einstieg in den Markt nicht gut gelang (vgl. ebd.). Der Versuch des Ingenieurs Kleiser, das System durch eine neue, gebogene Bohrlanze zu verbessern und durch neue Systeme zu ergänzen, war zunächst aufgrund des dafür aufgetragenen hohen zeitlichen Aufwands nicht von Erfolg gekrönt (vgl. ebd., S.36), woraufhin Flowtexas unter Druck geriet. Daraufhin entwickelte sich nach und nach das Betrugssystem.

Um die Bohrmaschinen zu finanzieren, gewährten ihre Hausbanken den Geschäftspartnern Schmider und Kleiser Kredite in Höhe von zunächst 800.000 DM und später bis zu 1,1 Mio. DM pro Stück. Zur Gewährung dieser reichte es, einen Kfz-Brief für einen LKW auf dem das Bohrsystem



angebracht werden sollte, vorlegen zu können (vgl. ebd.). Dies öffnete die Tür dafür, sich die Kreditsumme auszahlen zu lassen, ohne tatsächlich produzierte Maschinen anzuschaffen, und die entsprechenden Rechnungen allerdings auszustellen. Zunächst wurden dafür noch entsprechende LKW angeschafft, später geschah dies nicht mehr und die Kfz-Briefe wurden gefälscht (vgl. ebd.).

Schmider gaukelte den betrogenen Leasinggebern und Banken das Geschäftsmodell in Abbildung 1 vor. Demnach übte Manfred Schmider als Geschäftsführer und Inhaber der *Flowtex Technologie GmbH & Co. KG* Kontrolle auf diese Firma aus. Die *KSK guided microtunneling technologies Spezialtiefbaugeräte GmbH* (KSK) lieferte Flowtex die Maschinen, die sie aus Spanien vom Unternehmen *La Maquinista de Levante* bezogen. Flowtex finanzierte die Maschinen durch Leasingverträge von Leasinggesellschaften, die den Kaufpreis an KSK zahlten und durch monatliche Zahlungen von Flowtex entlohnt wurden und Bankkrediten. Flowtex wiederum stellte die Maschinen Servicegesellschaften zur Verfügung, die die Maschinen für Bauaufträge nutzten und so für Einnahmen für Flowtex sorgen sollten (vgl. Lenz, 2012, S. 193f.).

In Wirklichkeit sah das Konstrukt, verborgen für die betrogenen Unternehmen, wie in Abbildung 2 aus. In Wirklichkeit war das System Flowtex ein Schneeballsystem, welches sich nur aufgrund von Scheingeschäften aufrechterhalten konnte. Zusätzlich zu Flowtex hatte Manfred Schmider insgeheim die Kontrolle über die Servicegesellschaften und über eine Treuhänderin auch über KSK inne, wodurch der Finanzierungskreislauf innerhalb des Systems offensichtlich wird, sofern, wie es im Fall von Flowtex war, keine operativen Einnahmen verbucht werden können. Um dies zu kaschieren und seine Kreditwürdigkeit beizubehalten, wurde ein florierendes Geschäft vorgespielt (vgl. Lenz, 2012, S.194).

So standen im Jahr 1991 bereits 129 Bohrsysteme in den Büchern, allerdings existierten davon nur zwölf (vgl. Heck, 2006, S.37). Der Anteil der nicht erfundenen Maschinen blieb in den folgenden Jahren ähnlich hoch. Ca. 8% betrug dieser im Jahr 2000, als der Betrug auffiel. Über 3400 Systeme standen in den Büchern, während nur etwas weniger als 300 Maschinen tatsächlich gebaut wurden (vgl. Peemöller et al., 2020, S.92 & Heck, 2006, S.10).

Durch die Kontrolle über KSK war es Schmider möglich, das durch die Verkäufe der nicht existenten Maschinen eingenommene Geld über zahlreiche Konten zu Flowtex zu transferieren. Damit entstand zwar zunächst Liquidität, jedoch standen durch die fehlende operative Geschäftstätigkeit keine anderen Einnahmen zur Verfügung, um das Konstrukt gewinnbringend zu betreiben. Damit man weiter operieren konnte, war man also auf weitere Scheingeschäfte angewiesen. Den Erlösen aus den Scheinverkäufen standen nicht nur die monatlichen Leasingzahlungen gegenüber. Das Geld der Banken floss ebenfalls in große Marketingkampagnen und nicht zuletzt in das Vermögen Schmiders, der ersten Berechnungen nach dem Aufliegen des Systems zufolge mindestens 325 Millionen DM durch Transferierung zu seiner Stiftung in Liechtenstein oder durch seine luxuriöse Lebensführung ausgegeben haben sollte (vgl. Heck, 2006, S.132).

Der angebliche Hersteller der Maschinen aus Spanien existierte in Wirklichkeit gar nicht als solcher (vgl. Lenz, 2012, S.195), ebenso wie viele der angeblichen Servicegesellschaften, die teilweise kein Personal hatten, den Betrieb eingestellt hatten, in einer anderen Branche ansässig waren oder gar keinen Telefonanschluss hatten (vgl. Heck, 2006, S.87). Dies fanden Steuerfahnder bereits 1996 im Zuge von Ermittlungen heraus. Trotzdem wurden bei der Prüfung, ob die angeblich dorthin gelieferten Maschinen vorhanden seien, keine Mängel festgestellt, da die angegebenen Fahrgestellnummern auf den Typenschildern stimmten, wodurch deren Existenz durch Prüfer testiert wurde. Tatsächlich wurden die wenigen tatsächlich existenten Maschinen von Schmiders Helfern mit unterschiedlichen Typenschildern versehen und je nachdem, wohin die Wirtschaftsprüfer zur Kontrolle der Maschinen als nächstes reisten, wurden dieselben Maschinen mit neuen Schildern ebenfalls vorher an diesen Ort gebracht (vgl. ebd., S.85-87).

Neben der Betrugsmasche selber waren noch einige andere Faktoren relevant, die halfen, das Schneeballsystem und die Scheingeschäfte unentdeckt zu halten und den Glauben an den gespielten Unternehmenserfolg zu erhöhen.

Manfred Schmider unterhielt gute Beziehungen zur Politik, insbesondere den zu der Zeit in Baden-Württemberg regierenden Parteien FDP und CDU (vgl. ebd., S.166). Durch die Anstellung von Jürgen Morlok, dem ehemaligen stellvertretenden Bundesvorsitzenden der FDP (vgl. Heck, 2006, S.40) als Pressesprecher von Flowtex im Jahr 1994 bekam Schmider Zutritt zu Kontakten aus der Politik. Diese halfen ihm beim Umgang mit Behörden, als bereits im Zuge der Ermittlungen aus 1996 klar wird, dass KSK unter der Kontrolle Schmiders ist und ein Schneeballsystem vorliegt. Denn bereits bei diesen Ermittlungen wird der Fall aufgrund der politischen Verbindungen, insbesondere zur FDP, von Fahndern als sensibel bezeichnet (vgl. Heck, 2006, S.11).

Um den Schein der funktionierenden Bohrtechnik aufrechterhalten zu können und den vermeintlichen Unternehmenserfolg zu präsentieren, rief Schmider teure Marketingkampagnen ins Leben. Unter anderem sollten diese Banken davon überzeugen, Flowtex zu finanzieren (vgl. ebd., S.35). So zeigte ein Werbefilm eine Horizontalbohrmaschine in Aktion, ein anderer zeigte die geplante neue Firmenzentrale mit Baukosten in Höhe von 100 Mio. DM (vgl. ebd., S.30 & i.V.m. SWR, 2019).

Nach Schmiders eigener Aussage ist es erheblich, vermeintlichen Erfolg nach außen zu suggerieren. Dies tat er dadurch, dass er geschäftlich und privat seinen Reichtum zur Schau stellte. So flog er häufig mit dem Hubschrauber vom Landeplatz seines Anwesens zum nahegelegenen Flowtex Gebäude und lud seine Gäste zu luxuriösen Geschäftsessen ein. Zum Zeitpunkt des Scheiterns des Betrugssystems besaß er 14 Luxusautos, 25 Gemälde Chagalls, mehrere Luxusimmobilien und Grundstücke und einen Firmenjet mit goldenen Wasserhähnen. Auf seinem ca. 60.000 Quadratmeter großen Anwesen hatte er bis zu 13 Bedienstete (vgl. Heck, 2006, S. 28). Als größtes Statussymbol galt für Manfred Schmider allerdings sein Flughafen, der Baden-Airport, der ab 1996 ein



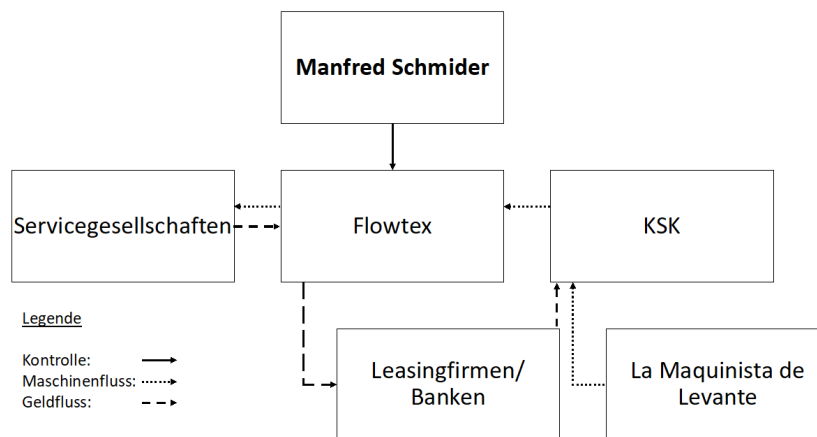


Abbildung 1: Flowtex-System von außen (Nach Lenz, 2012, S.194)

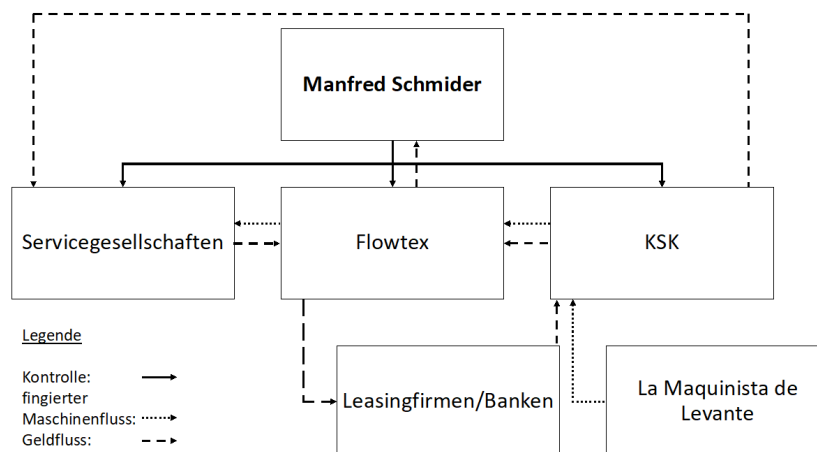


Abbildung 2: Tatsächliches Flowtex-System (nach Lenz, 2012, S.194)

hundertprozentiges Tochterunternehmen von Flowtex war. Auf diesem Gelände hätte die neue Zentrale stehen sollen (vgl. ebd., S.45).

Schmider wurde im Februar 2000 verhaftet und wegen Urkundenfälschung, Krediterschleichung und Bilanzbetrug zu 12 Jahren Haft verurteilt (vgl. Peemöller et al., 2020, S.94 i.V.m. Spiegel, 2001). Insgesamt hinterließ er einen strafrechtlich relevanten Schaden von über 4,9 Mrd. DM (vgl. Heck, 2006, S. 10). Flowtex Abschlussprüfer KPMG widerrief die Testate für die Jahresabschlüsse der Jahre 1997 und 1998 (vgl. Wüstemann, 2001, S.2f.). Damit war dies bis dahin der größte Betrugsfall der Geschichte der Bundesrepublik Deutschland (vgl. SWR, 2019).

### 2.3. Jan Marsalek, die 1,9 Milliarden und Geheimdienste

Dass auch eins der größten Unternehmen Deutschlands Bilanzbetrug begehen kann, zeigt der aktuelle Fall der Wirecard AG, die ein Zahlungsdienstleistungsunternehmen war.

Das Unternehmen war zwischen dem 24. September 2018 und dem 24. August 2020 sogar im DAX notiert und hatte am 31. Dezember 2018, dem Ende des Jahres mit dem letzten testierten Jahresabschluss eine Marktkapitalisierung in Höhe von 16,41 Mrd. Euro (vgl. Statista, 2022). Durch das Publikwerden des Betrugs verloren zahlreiche Anleger ihr in Wirecard investiertes Kapital. Der Insolvenzverwalter fand lediglich 26,8 Mio. Euro auf den Unternehmenskonten, wohingegen Schulden in Höhe von 3,2 Mrd. Euro bestanden (vgl. SZ, 2020a). Insgesamt soll der wirtschaftliche Schaden bei ca. 20 Milliarden Euro liegen (vgl. Lenz, 2020, S.547). Eine zentrale Rolle spielt dabei Jan Marsalek, der Wirecards operatives Geschäft und mindestens ab 2015 das Asien- und Drittparteiengeschäft leitete (vgl. BKA, 2020) und nun auf der Liste der meistgesuchten Flüchtigen der europäischen Polizeibehörde Europol steht (vgl. Europol, 2023). Nach ihm wird unter anderem aufgrund des Verdachts des gewerbsmäßigen Bandenbetrugs und des besonders schweren Falls der Un-

treue gefahndet (vgl. BKA, 2020). Währenddessen läuft seit dem 08.12.2022 ein Verfahren gegen drei weitere Mitarbeiter Wirecards, den Geschäftsführer der Wirecard AG Markus Braun, den ehemaligen Geschäftsführer einer Tochterfirma Wirecards, die ihren Sitz in Dubai hatte, Oliver Bellenhaus, und den ehemaligen Chefbuchhalter des Unternehmens, Stephan von Erffa (vgl. Tagesschau, 2022b i.V.m. Tagesschau, 2022a). Bellenhaus tritt hierbei als Kronzeuge auf. Es wird vermutet, dass dieser Prozess bis ins Jahr 2024 laufen könne (vgl. Tagesschau, 2022b).

Das Geschäftsmodell Wirecards bestand vor allem aus zwei Bereichen, dem *Payment Processing* als Anbieter für „Produkte und Leistungen für elektronische Zahlungsabwicklung, Risikomanagement und sonstige Mehrwertleistungen“ (Wirecard, 2017, S.51) und dem *Acquiring & Issuing* (vgl. ebd. S.52). Für diesen Geschäftszweig, dessen Inhalt es ist, die Rolle eines Intermediärs bei Kreditkartenzahlungen zwischen Kreditkartenunternehmen und Kunden (*Issuing*) bzw. Händler (*Acquiring*) einzunehmen und dafür eine prozentuale Vergütung am Transaktionsvolumen zu erhalten, ist es nötig, eine Banklizenz zu besitzen (vgl. Straßberger, 2021, S.15f.). Vor allem war Wirecard innerhalb dieses Geschäftsfeldes im *Acquiring* aktiv, da das *Issuing* typischerweise durch die Hausbanken der Kunden abgewickelt wird (vgl. ebd., S.16). In der EU übernahm die Wirecard Bank AG das *Acquiring*, da sie diese Banklizenz besaß (vgl. Wirecard, 2017). Ebenso erlangte sie Lizenzen von Visa und Mastercard zum Betreiben des *Acquirings* (vgl. Wirecard Untersuchungsausschuss, 2021, S.179f.). Außerhalb der EU sollen vor allem im asiatischen Raum sog. Drittparteien bzw. Drittpartner zur Abwicklung dieser Geschäfte genutzt worden sein (vgl. Straßberger, 2021, S.16). Wirecard wickelte Geschäfte laut der Anlageschrift aus dem Prozess gegen Braun, Bellenhaus und den ehemaligen Chefbuchhalter „aufgrund fehlender eigener Lizenzen oder aufgrund der Zugehörigkeit eines Händlers zu einem besonders profitablen Hochrisikogeschäft wie z.B. Pornographie oder Glücksspiel“ (Staatsanwaltschaft München I, 2022) über diese Drittparteien ab.

Dieser von Marsalek geleitete und für den Betrug Wirecards genutzte Geschäftszweig funktionierte so, dass diese Drittpartner bei den *Acquiring* Geschäften an die Stelle von Wirecard traten und dafür Provisionen auf Treuhandkonten von Wirecard zahlten. Diese vermeintlichen Geschäfte waren entscheidend für Wirecards Außendarstellung und dessen immenses und stetiges Wachstum (vgl. Karami, 2022). Laut dem Financial Times (FT) Journalisten Dan McCrum, der sich lange Zeit mit Wirecard und dessen Betrug beschäftigte und vor dem zur Aufklärung eingerichteten Wirecard-Untersuchungsausschuss aussagte, sollen speziell drei dieser Partner für die Hälfte des Umsatzes und einen großen Teil der Konzerngewinne verantwortlich sein (vgl. Wirecard Untersuchungsausschuss, 2021, S.127). Diese drei Partnerunternehmen, Al Alam Solutions aus Dubai, das von Oliver Bellenhaus geleitet wurde, die Senjo Group aus Singapur und PayEasy Solutions, das seinen Sitz auf den Philippinen hatte, hatten die Kontrolle über die angeblichen Transaktionen, während Wirecard diese Vorfälle buchte als seien es eigene

(vgl. ebd., S.129). Dadurch, dass es sich um Provisionen von anderen Unternehmen handelte, die auf Treuhandkonten geflossen sein sollten, habe Wirecard lediglich diese ausweisen müssen. Dies erleichterte es, diese Geschäfte letztendlich zu erfinden, da so keine Umsätze gefälscht werden mussten (vgl. ebd.).

Dies taten die für den Betrug Verantwortlichen auch. Laut eigener Aussage im laufenden Gerichtsprozess hat unter anderem Oliver Bellenhaus auf Wunsch die Bilanz auf diese Weise um „100 Millionen mehr Umsatz und 50 Millionen mehr Gewinn“ verändern können (vgl. RND, 2023). Als Wirecards Jahresabschlussprüfer EY die Geschäftsräume eines dieser Drittpartner besuchen wollte, wurde laut McCrum zur Täuschung der Prüfer ein Büro mit Mitarbeitern und Computern eingerichtet, welches nach deren Besuch wieder abgebaut wurde (vgl. Wirecard Untersuchungsausschuss, 2021, S.136). Neben dem Drittpartnergeschäft, welches aus Accountingperspektive das relevanteste ist, da es das Bilanzergebnis am stärksten beschönigend betrifft, stehen die Beteiligten ebenfalls im Verdacht, sich durch überhöhte Preise bei Käufen von Tochterunternehmen oder Kreditvergaben an Partnerunternehmen, die unrechtmäßig waren, bereichert zu haben (vgl. Lenz, 2020, S.547).

Im Wesentlichen waren durch die Scheingeschäfte im Drittpartnergeschäft in Wirecards letzter testierter Konzernbilanz aus dem Jahr 2018 die Forderungen aus dem *Acquiring*bereich, Zahlungsmittel und Zahlungsmitteläquivalente sowie die Posten Umsatzerlöse und Materialaufwand in der Gewinn- und Verlustrechnung von falschen Angaben betroffen (vgl. Lenz, 2020, S.549 i.V.m. Wirecard, 2019, S.118–120). Außerdem wird vermutet, dass die Posten immaterielle Vermögenswerte und Finanzanlagen, durch Firmenübernahmen zu überhöhten Preisen und die übernommenen, zu wertvoll bewerteten immateriellen Vermögensgegenstände, als zu hoch ausgewiesen wurden (vgl. Peemöller, 2021, S. 90f.).

Wirecard erhielt die Gebühren aus den angeblichen Drittpartnergeschäften direkt und konnte sie als Umsatzerlöse buchen. Der Anteil der Drittpartner, der an diese gehen sollte, wurde als Materialaufwand gebucht und mit den Forderungen an die Drittpartner saldiert, wodurch die Posten Materialaufwand und Forderungen aus dem *Acquiring*bereich tangiert worden sind (vgl. Lenz, 2020, S.548).

Unter dem Posten Zahlungsmittel und Zahlungsmitteläquivalente, der im Jahresabschluss 2018 mit ca. 2,72 Mrd. Euro beziffert wurde (vgl. Wirecard, 2019, S. 118), wurde unter anderem das Geld ausgewiesen, das aus dem Drittpartnergeschäft auf Treuhandkonten transferiert worden sein soll. Wirecard gab an, dass diese Mittel dort lagen, um Ausfallrisiken und folgenden Zahlungsrückabwicklungen vorzubeugen (vgl. KPMG, 2020, S. 31). Allerdings erscheint die Höhe dieses Betrages als merkwürdig, da sich der Posten der langfristigen verzinslichen Verbindlichkeiten im gleichen Jahr trotz dieser erheblichen Summe massiv erhöht hatte (vgl. Peemöller, 2021, S. 92 i.V.m. Wirecard, 2019, S. 119).

Der Bilanzbetrug soll zum einen den Zweck des Erlangens von Krediten gehabt haben, da das vorhandene opera-

tive Geschäft nicht profitabel gewesen sei. So wurden insgesamt 3,1 Milliarden Euro von geschädigten Banken an Wirecard gezahlt (vgl. Staatsanwaltschaft München I, 2022). Zum anderen soll sich mindestens Jan Marsalek durch die Betrugsmasche bereichert haben. Es wird vermutet, dass dies unter anderem durch Geld, das Wirecard für Unternehmensübernahmen zahlte, geschah (vgl. SZ, 2020b). Jan Marsaleks Drittpartner- und Asiengeschäft, in welchem sich der Betrug abspielte, soll im Unternehmen fernab der Kenntnis anderer Vorstandsmitglieder eine Art Parallelorganisation gewesen sein, die durch das Drittpartnergeschäft für einen erheblichen Anteil des ausgewiesenen Gewinns verantwortlich war (vgl. Bayer und Hoffmann, 2022, S. 373). Er soll aus dem Unternehmen einen dreistelligen Millionenbetrag entnommen haben (vgl. SZ, 2020b), der auf seiner Flucht und in seinem Leben nach der Bekanntmachung des Betrugs hilfreich sein könnte.

Der im Jahr 1980 in Wien geborene Marsalek stieß bereits im Alter von 19 Jahren zum erst ein Jahr alten Unternehmen Wirecard (vgl. Trend.at, 2020), nachdem der computer- und programmierungsaffine Österreicher (vgl. Karami, 2022, S.23) kurz vor seinem bevorstehenden Schulabschluss die Schule verließ. Seinen Schulabbruch und die Tatsache, dass er keinen Führerschein besaß, begründete er damit, Besseres zu tun gehabt zu haben (vgl. McCrum, 2022, S.38). Allerdings hatte er weder eine berufliche Ausbildung genossen, noch in einem anderen Unternehmen gearbeitet (vgl. McCrum, 2022, S.83). Er wurde bereits 2010 mit 29 Jahren zum Chief Operating Officer des Unternehmens (vgl. FT, 2020b).

Er war ledig, hatte aber eine langjährige Freundin (vgl. SZ, 2020b), zudem wird er als Fan der Kampfsportart Jiu-Jitsu beschrieben (vgl. McCrum, 2022, S.38). Ansonsten sei sein Privatleben extravagant gewesen (vgl. Karami, 2022, S.24), er soll viel gefeiert und gerne ins Luxushotel Mandarin Oriental in München zu Champagner eingeladen haben (vgl. SZ, 2020b).

Bereits zur Zeit seiner Tätigkeit bei Wirecard habe er umfangreiche Kontakte zu Geheimdienstmitarbeitern verschiedener Länder gehabt (vgl. SZ, 2020b). Bekannte Marsaleks beschreiben, dass er eine Faszination für dieses Metier habe (vgl. ebd.). Dazu passend ist die Beschreibung, dass er für Geschäftstreffen Privathäuser als Treffpunkt präferierte und seine Vorliebe der Nutzung von Bargeld, welche dem Wirecard Geschäftsmodell entgegenstand (vgl. ebd.). Besonders intensiv sollen seine Beziehungen zum österreichischen Innengeheimdienst, einem früheren hochrangigen libyschen Geheimdienstler und möglichen russischen Agenten gewesen sein (vgl. SZ, 2020a). Für Marsaleks Flucht sind mutmaßlich vor allem Letztere von Interesse. Demnach soll er sich nach seiner Ausreise über Österreich und Minsk in Russland befinden (vgl. SZ, 2022a). Seit 2011 sponserte Wirecard die Österreich-Russische Freundschaftsgesellschaft, in der Marsalek, wie auch Geschäftsführer Braun Ehrensenatoren gewesen waren (vgl. Trend.at, 2020). Außerdem finanzierte er zum Teil die Messenger-App Telegram aus Russland (vgl. Karami, 2022, S.24).

Zehn Jahre nach Wirecards Börsengang im Jahr 2005 wurden zum ersten Mal kritische Stimmen gegen das Unternehmen laut. Zu dieser Zeit startete die FT und insbesondere deren Journalist Dan McCrum die Serie *The House of Wirecard* im FT-Blog *Alphaville*, die sich mit Ungereimtheiten in der Wirecard-Bilanz auseinandersetzte (vgl. FT, 2015). Hierbei standen zunächst hohe Vorauszahlungen und Preise bei Unternehmenskäufen im asiatischen Raum, hohe immaterielle Vermögenswerte wie Kundenlisten bei solchen Übernahmen, weiterhin die Tatsache, dass einige der übernommenen Unternehmen unprofitabel oder in Schieflage waren und verschiedene Posten der Bilanzen der verschiedenen Gesellschaften des Konzerns im Vordergrund (vgl. ebd.). Bis zur Eröffnung des Insolvenzverfahrens von Wirecard arbeitete McCrum weiterhin daran, die Unregelmäßigkeiten aufzuklären, was nicht nur ihm Aufmerksamkeit brachte, sondern auch Wirecard immer stärker in die Kritik geraten lies.

Die Aktie des Konzerns hatte unter anderem darunter gelitten, dass die FT über Unregelmäßigkeiten bei einer Tochtergesellschaft in Singapur ermittelte, da Wirecard dort gefälschte Transaktionen vorgeworfen worden waren (vgl. FT, 2019a). Das Zahlungsdienstleistungsunternehmen versuchte, sich selbst gegen die kritische Berichterstattung zu schützen und warnte die Münchener Staatsanwaltschaft davor, dass das Unternehmen von Shortsellern angegriffen werde und sorgte so dafür, dass die Staatsanwaltschaft gegen Dan McCrum wegen Vergehens gegen das Wertpapiergesetz ermittelte (vgl. FAZ, 2019). Wirecard gab an, bedroht worden zu sein, außerdem seien Personen bestochen worden, damit sie Wirecard gegenüber kritisch berichten sollten. Diese vermeintlichen Vorfälle gab die Staatsanwaltschaft an die Bundesanstalt für Finanzdienstleistungsaufsicht (Bafin) weiter (vgl. SZ, 2019). Dies und die Tatsache, dass Wirecard zuvor bereits Opfer von angeblichen Angriffen durch Leerverkäufe war, veranlasste die Bafin dazu, am 18.02.2019 ein Leerverkaufsverbot für die Wirecard-Aktie zu erteilen (vgl. Bafin, 2019a). Ein Leerverkauf (*Short Sale*) ist eine Wertpapiertransaktion, bei der daraus Profit generiert werden soll, dass der Kurs der betroffenen Position über einen Zeitraum sinkt. Dies funktioniert so, dass eine Anzahl an Wertpapieren zum aktuellen Kurs ausgeliehen, diese dann zum selben Kurs verkauft und zu einem späteren Zeitpunkt zum Kurs dieses Zeitpunktes wieder eingekauft werden und die Leihe durch Rückgabe der Wertpapiere beendet wird (vgl. Hornberg, 2006, S.43). Der Gewinn bei diesen Geschäften entspricht der Stückzahl multipliziert mit dem Kursverlust dieses Zeitraums. Daher stimmt es, dass Shortseller eher durch negative Berichterstattung über Wirecard profitiert hätten und tatsächlich haben. Solche Transaktionen hatte beispielsweise die Hedgefondsgründerin Fahmi Quadir aus New York bereits 2018 mit der Wirecard-Aktie getätigt, da Sie mit ihrem Hedgefonds nur Leerverkäufe bei Aktien von Unternehmen durchführt, bei denen sie Betrug oder Rücksichtslosigkeit vermutet (vgl. Handelsblatt, 2021). Hierzu gab sie Hinweise über den Betrug an die Bafin, die jedoch ein Treffen mit ihr ablehnte, nachdem die Finanzaufsichtsbehörde das besagte Verbot der Leerverkäufe durchgesetzt hatte (vgl. ebd.). Eine

Frage vor der die Bafin stand, war die, ob die Leerverkäufe ein Resultat der kritischen Berichte waren oder die Berichte den Zweck hatten, die Leerverkäufe zu unterstützen.

Dan McCrum äußert sich aufgrund dieser Vorfälle in seinem Buch *House of Wirecard – Wie ich den größten Wirtschaftsbetrug Deutschlands aufdeckte und einen DAX-Konzern zu Fall brachte* so: „Wirecard schaffte es, ausländische Spekulanten, insbesondere die anonymen zu dämonisieren, um das Establishment hinter sich zu scharen“ (McCrum, 2022, S.12). Dieses Vorgehen gegen Wirecard-Kritiker und Shortseller sorgte dafür, dass Kritik vor dem Zusammenbruch des Konzerns nur vorsichtig geäußert wurde (vgl. Rinker, 2022, S.140).

Wirecard selber reagierte laut der Aussage McCrums auf verschiedene Arten auf die geäußerte Kritik. Zuerst habe es wütende Briefe und den Vorwurf der Kooperation mit Shortsellern gegeben, anschließend Bestechungsversuche, Hackerangriffe auf die FT und seine Quellen und schließlich eine Überwachung durch Privatdetektive (vgl. Wirecard Untersuchungsausschuss, 2021, S.131 - 133).

Weitere Recherchen der FT bezogen sich auf den Drittpartner Al Alam Solutions. Die Journalisten fanden heraus, dass dieser Drittpartner für 34 der lukrativsten Wirecard-Kunden zuständig sein sollte. Aus Wirecard-Dokumenten sei hervorgegangen, dass über Al Alam monatlich 350 Mio. Euro für Wirecard transferiert würden. Allerdings ergaben die Recherchen der FT, dass Al Alam lediglich sechs oder sieben Mitarbeiter habe und 15 der 34 angegebenen Kunden noch nie von diesem Unternehmen gehört hätten. Acht weitere Kunden existierten zu dem Zeitpunkt der angegebenen Transaktionen nicht einmal mehr (vgl. FT, 2019b). Diese Berichte hatten zur Folge, dass Wirecard unter Druck geriet und der Aufsichtsrat eine unabhängige Sonderprüfung der Wirtschaftsprüfungsgesellschaft KPMG einberief, um die Vorwürfe zu entkräften (vgl. Rinker, 2022, S.140).

Im Sonderprüfungsbericht konnte KPMG die Vorwürfe nicht ausräumen, da ihnen Informationen der Drittparteien und Bankbestätigungen für die Treuhandkonten, auf denen die 1,9 Mrd. Euro vermutet wurden, fehlten (vgl. KPMG, 2020, S.12 f.). Die Jahresabschlussprüfer von EY, die zuvor jeden Jahresabschluss von Wirecard testiert hatten, konnten ebenso keine Nachweise dafür finden, weswegen sie das Testat für den Jahresabschluss 2019 verweigerten, was Wirecard am 18.06.2020 mitteilte (vgl. Wirecard AG, 2020c). Vier Tage später wurde vermeldet, dass „aufgrund weiterer Prüfungen [...] die bisher zugunsten von Wirecard ausgewiesenen Bankguthaben auf Treuhandkonten in Höhe von insg. 1,9 Mrd. Euro mit überwiegender Wahrscheinlichkeit nicht bestehen.“ (Wirecard AG, 2020b). Am 25.06.2020 beantragte die Wirecard AG die Eröffnung eines Insolvenzverfahrens (vgl. Wirecard AG, 2020a). Jan Marsalek war zu diesem Zeitpunkt bereits seit ca. einer Woche außer Landes (vgl. Spiegel, 2020).

### 3. Untersuchung der Betrugsfälle im Kontext des Fraud Diamonds

#### 3.1. Relevanz des Faktor Mensch im Modell

Um die Wichtigkeit des Faktors Mensch im Fraud Diamond zu beurteilen, ist es notwendig, diese Frage auf die einzelnen Elemente des Modells anzuwenden und mögliche personenbezogene Aspekte in ihnen zu finden.

*Motivation* zur Begehung von Betrug kann z.B. eine finanzielle Schieflage persönlicher Art oder Probleme mit Vorgesetzten sein (vgl. Europäische Kommission, 2016, S. 33f.). Doch nach dem Grundmodell klassischer Motiv-Theorien besteht der Zustand der *Motivation* aus Situationsfaktoren und Motiven, die in der Person liegende Strukturen sind (vgl. Rothmund und Eder, 2011, S. 92f.), was zeigt, dass der Faktor Mensch durch diese psychologischen Faktoren in dieser Voraussetzung des Schemas enthalten ist.

Eine mögliche *Rechtfertigung* des Betrugs kann Verärgerung gegenüber dem Arbeitgeber sein, ebenso könnte man eine Tat damit rechtfertigen, dass Wettbewerber auf die gleiche Art betrügen (vgl. Europäische Kommission, 2016, S.34). Diese *Rechtfertigungen* dienen im Fraud Diamond primär der Selbstüberzeugung, dass der Betrug die damit einhergehenden Risiken wert sei (vgl. Wolfe und Hermanson, 2004, S.39). Diese Überzeugung seiner selbst ist ein Vorgang, der intrinsisch passiert, weswegen der Faktor Mensch auch hier auffindbar ist.

*Fähigkeiten*, die einem Menschen in der Umsetzung eines Betrugs helfen, können zum Beispiel Intelligenz, Selbstvertrauen, Stressresistenz oder wirksames Lügen sein (vgl. Europäische Kommission S.34). Dies sind charakterliche Eigenschaften, die ebenfalls dem Faktor Mensch zuordenbar sind. Ebenfalls werden in den Leitlinien der nationalen Betrugsbekämpfungsstrategien der Europäischen Kommission aus dem Jahr 2016 das Wissen oder die Position bzw. Funktion als Beispiele für *Fähigkeiten* in diesem Kontext aufgeführt (vgl. ebd.). Allerdings sind diese nicht personenbezogenen Umstände eher Resultate aus *Fähigkeiten* und sind daher nicht nur von der psychischen Disposition eines Individuums abhängig, sondern beispielsweise auch von dessen sozialer Rolle.

Zuletzt ist die *Gelegenheit* als Voraussetzung für Betrug in den Modellen angeführt. Als Beispiel hierfür könnten etwa die richtige Position oder Umstände genannt werden, die Betrug ermöglichen (vgl. Europäische Kommission, 2016, S. 33). Dies können interne oder externe Mechanismen, wie die juristischen Rahmenbedingungen sein. Bei dieser Betrachtung ist der Faktor Mensch beim Täter zu vernachlässigen. Allerdings können interpersonelle Aspekte und der Faktor Mensch bei den Opfern des Betrugs oder den Wirtschaftsprüfern der betroffenen Bilanz bei der *Gelegenheit* eine Rolle spielen.

Neben den Voraussetzungen, die den Faktor Mensch beinhalten, sind demzufolge die *Gelegenheit* und die Situationsfaktoren, die sich zusammen mit dem Motiv zu einer *Motivation* summieren, zu nennen. Zusammenfassend: Die Quantifizierung des Faktors Mensch ist bei einer wirtschaftswissen-



schaftlichen Fragestellung nicht exakt möglich. Was jedoch betrachtet werden kann, ist die Umgebung, also Gelegenheiten und Situationsfaktoren wie Gesetzgebung, Kontrollinstanzen oder Personalpolitik, in der dieser Mensch steht. Sie stellen einen Teil der Rahmenbedingungen eines möglichen Betrugs dar, weshalb bei ihnen angesetzt werden kann, wie in Kapitel 4, ebenso wie die Rolle des Faktors Mensch dabei zu untersuchen sein wird. Zuvor sollen im Folgenden die vorgelegten Fälle mit Hilfe des Fraud Diamonds im Einzelnen analysiert werden.

### 3.2. Analyse der Voraussetzungen der Betrugsfälle

Um Adele Spitzeders *Motivation*, so zu handeln, wie sie es letztendlich tat, zu ergründen, ist es notwendig, die *Motivation* in ein mögliches Motiv und die Situationsfaktoren zu unterscheiden. So ist sie, laut ihrer eigenen Darstellung, in ihrer verschuldeten Lage im Hotel lebend dazu gezwungen, selbst zu kochen, „obwohl sie früher nie auch nur eine Kartoffel abgesotten habe“ (Spitzeder, 1878, S.35). Außerdem zeigt sich bei ihr ein ungewöhnliches Verständnis von Sparsamkeit. So stellt sie das Wohnen im Hotel, das Rauchen von Zigarren und tägliche Restaurantbesuche, wenngleich sie die Speisen dort als „frugal [...]“ (ebd., S. 35) beschreibt, als Zeichen ebensolcher Sparsamkeit dar. Dieser luxuriöse Lebensstil im Vergleich zu ihrer damaligen monetären Situation, der Wille diesen Lebensstil weiterzuführen als Motiv und ihre offensichtliche Geldnot (vgl. ebd.) als Situationsfaktor stellen eine mögliches *Motivation* Spitzeders dar.

Aus ihren Memoiren geht hervor, dass ihr trotz ihrer Taten die Wahrung ihres Selbstbildes gelungen ist. Diese fertigte sie, wie in Kapitel 2.1 beschrieben, aus dem Grund ihrer *Rechtfertigung* an. So führt sie dort an, dass sie stets transparent mit der Tatsache umgegangen sei, dass sie keine Sicherheiten oder Deckung für die Einlagen besaß (vgl. ebd., S. 40). Ebenso scheint sie das Fehlen einer angemessenen Buchführung dadurch zu begründen, dass sie sich als keine Kauffrau sah, was ihr auch durch ein Handelsgericht bestätigt worden sei (vgl. ebd. S.228). Zu ihrer *Rechtfertigung* grenzt sie sich außerdem stark von den Geldverleihern ab, bei denen sie sich verschuldet hatte und über deren hohen Zinssatz sie klagte. Sie betont, dass sie ihren Einlegern geringere Zinsen bot, als sie zuvor selber habe zahlen müssen (vgl. ebd. S.40). Spitzeder schien sich außerdem in der Rolle als Wohltäterin zu gefallen. So trägt ein Kapitel ihrer Memoiren den Titel „Meine Humanitätswerke“ (ebd. S.193-199). In diesem beschreibt sie sich als „generöse Natur“ (ebd. S.193) und stellt dar, in welchem Umfang sie einer Vielzahl von verschiedenen Menschen durch finanzielle Unterstützung geholfen habe (ebd. S. 194-199). Zu dieser Darstellung passt ebenfalls, dass der Zinssatz, mit dem sie Geld verlieh, je nach Stand und Beruf des Kreditors variiert haben sollte (ebd. S.42).

Adele Spitzeders Umgang mit der Presse und ihr Bewusstsein für ihren Ruf und ihre Position sind *Fähigkeiten*, die ihr bei Aufbau und Aufrechterhaltung ihres Systems halfen. Ausdruck dessen sind die Bezahlung eines Journalisten, der sie über den Gegenstand der Gespräche in der Stadt bezüglich ihrer Person aufklärte. Ihr Bewusstsein darüber, dass sie nicht

verreisen konnte, damit der Anschein einer Flucht mit dem Geld der Anleger nicht erweckt werden würde (vgl. ebd. S. 66), ist zwar kein Hinweis auf ein mögliches Unrechtsbewusstsein, jedoch darauf, dass ihr ein Fluchtmotiv unterstellt werden konnte. Aus diesen Umständen lässt sich zudem ihre *Fähigkeit* ableiten, Vertrauenswürdigkeit aufzubauen und zu wahren. Sie selbst spricht sich die *Fähigkeit* zu, einen richtigen Tonfall, der sich durch Grobheit ausgezeichnet haben soll, in der Ansprache ihrer Kunden gewählt zu haben, der diese angezogen haben sollte (vgl. ebd. S. 51).

Das Vertrauen, das ihr entgegengebracht wurde, stellte eine *Gelegenheit* zum Aufbau ihres Geschäfts für sie dar. Ebenfalls war es für das ca. dreijährige Bestehen von Vorteil, dass noch kein Kreditwesengesetz und keine Bankenaufsicht existierten, die erst 1931 durch die Bankenkrise in der Weimarer Republik eingeführt wurden (vgl. Bafin, 2019b). Damit ein Ponzi-System aufrecht erhalten bleibt, sind eine wachsende Menge von Anlegern nötig. Diese Gelegenheit bot sich Adele Spitzeder offenbar, da diese Zahl bei ihr tatsächlich sehr hoch war. So schildert sie, dass sie insgesamt 30.000 Gläubiger gehabt haben sollte (vgl. Spitzeder, 1878, S. 260). Diese Menge an Kunden mag sich einerseits durch die hohen gebotenen Renditen erklären, andererseits war das Wissen um die Funktionalität einer Bank in der eher ländlichen Landschaft vermutlich kaum ausgeprägt, da das deutsche Bankwesen erst in der Gründerzeit eine größere Bedeutung durch den wirtschaftlichen Aufschwung bekam und sich viele Neugründungen von Banken, wie beispielsweise der Deutschen Bank oder der Commerzbank, ereigneten (vgl. Wandel, 1998, S.10 f.).

Manfred Schmider hatte, der Aussage des in die Flowtex-Aufarbeitung involvierten Mannheimer Oberstaatsanwalts Dr. Reinhard Hofmann zufolge in seiner Jugend schon die Erfahrung gemacht, dass er durch materiellen Besitz wie ein Moped Menschen um sich scharen konnte (vgl. SWR, 2019, 02:45). Dies und der Wille, mit Flowtex Erfolg zu haben, können Motive Manfred Schmiders zum Beginn des Betrugs gewesen sein. Gepaart mit dem äußeren Umstand des anfänglichen Misserfolgs von Flowtex (vgl. Heck, 2006, S.35) ist es naheliegend, dass dies die *Motivation* zum Betrug ergeben hat. Er beschreibt, dass er den mit Flowtex suggerierten Luxus zur Verschleierung des Systems auch privat ausgelebt habe, um Neid zu erzeugen (vgl. SWR, 2019, 24:00). Der Aufbau und Erhalt eines solchen Lebensstils und persönliche Bereicherung könnten angesichts des Umfangs und der Bestehensdauer des Systems ebenso eine Rolle gespielt haben, wie das Prestige, das mit dem Führen eines erfolgreichen Unternehmens und dem Besitz eines Flughafens einhergeht. Außerdem wurde im Zuge der Ermittlungen innerhalb eines psychiatrischen Gutachtens festgestellt, dass Manfred Schmider an Größenwahn leide, was aber keine seelische Krankheit sei, weswegen er als vollkommen schuldfähig eingestuft wurde (vgl. Peemöller et al., 2020, S.94).

Dass Flowtex in seiner Bilanz zunächst nur Zahlen darstellen wollte, die es noch nicht gab und dass er an eine Geschichte glaubte, ist eine *Rechtfertigung*, die Schmider retrospektiv anführt (vgl. ebd., 08:00). Er habe nicht gemerkt,

wann er „falsch abgebogen“ (ebd., 02:00) sei. Ebenso, argumentiert er, seien die Banken begeistert gewesen (vgl. ebd., 08:20). Er betont außerdem, dass die Geschädigten ausschließlich Banken gewesen seien und er vor allem ein schlechtes Gewissen seiner Familie gegenüber habe (ebd., 28:50). Allerdings ist diese Aussage vor dem Hintergrund fragwürdig, dass Schmiders Verhaftung am Freitag, den 04. Februar 2000 nur einen Werktag vor den geplanten Zahlungen von Investoren für eine Flowtex-Anleihe stattfand (vgl. Heck, 2006, S.7). Flowtex plante also an die Börse zu gehen, was dazu geführt hätte, dass nicht nur Banken geschädigt worden wären.

Seine *Fähigkeit*, Geldgeber durch seinen „Charme, der beeindruckend ist“ (SWR, 2019, 08:50), für sich einzunehmen, half ihm dabei, neue Kredite zu erhalten. Außerdem besaß Manfred Schmider das Verständnis dafür, seinen Betrug auf verschiedenen Ebenen zu vertuschen. Er verstand es, die Wirtschaftsprüfer durch das Tauschen der Typenschilder zu täuschen und das Bild von Flowtex durch seine Fähigkeit der (Selbst-)Inszenierung zu kreieren und aufrechtzuerhalten. Zudem war es ihm möglich durch die Darstellung seines Reichtums vom tatsächlichen Betrug abzulenken und ein Bild zu kreieren, in dem ein Misserfolg von Flowtex undenkbar sei. So wurde bei Geschäftstreffen zur Vorführung der Maschinen der Bewirtung und gelegentlichen Hubschrauberflügen mehr Zeit eingeräumt als dem Grund des Besuchs der Geschäftspartner (vgl. Heck, 2006, S.112). Zudem war es Schmider möglich, ein Firmengeflecht aufzubauen und die tatsächlichen Besitzverhältnisse zu verheimlichen, sodass die Scheingeschäfte nicht auffielen. Außerdem schaffte er es, durch das Knüpfen verschiedener Kontakte zu Behörden oder zur Politik, Schaden abzuwenden.

Die *Gelegenheit* zum Start der Betrugsmasche, war die Möglichkeit, eine genehmigte Finanzierung zu erhalten, ohne einen hinreichenden Nachweis über die Existenz der zu finanzierenden Maschine vorweisen zu müssen. Dabei half es Schmider sowohl in der Position zu sein, ein Unternehmen mit dem Geschäftsmodell von Flowtex zu besitzen und zu führen, als auch der Umstand, dass dieses Geschäftsmodell unzählige Verwendungsmöglichkeiten mit sich brachte und es somit das Interesse zahlreicher Geldgeber geweckt hatte. Ebenfalls war es von Vorteil, dass Manfred Schmider kurz zuvor durch die Versicherungssummen aus dem zweifelhaften Raubüberfall an Startkapital für Flowtex gekommen war. Beim Aufrechterhalten des Scheins eines florierenden Unternehmens waren seine Kontakte in die Politik und die Gelegenheit, den Baden Airport zu erwerben, nützlich, sodass der Ruf von Flowtex als etablierte, erfolgreiche Firma verbreitet wurde. Zudem half ihm der Umstand, dass der Betrug von Behörden und Wirtschaftsprüfern trotz einiger Anzeichen und Gelegenheiten nicht früher aufgedeckt wurde.

Die naheliegende Antwort auf die Frage, was die *Motivation* Jan Marsaleks und der anderen Beteiligten war, den Bilanzbetrug zu begehen, ist die finanzieller Bereicherung. Im Falle Marsaleks könnte diese Bereicherung allerdings den Zweck der Finanzierung seiner Aktivitäten betreffen, die nicht seiner Position bei Wirecard zuzuordnen sind. So war

Jan Marsalek seit 2015 in Libyen tätig und hatte laut einem Teilnehmer eines Meetings in Marsaleks Villa in der Nähe des russischen Konsulats in München die Vorstellung, die südliche Grenze des nordafrikanischen, vom Bürgerkrieg betroffenen Landes unter dem Deckmantel einer humanitären Hilfsaktion mit 15.000 Soldaten zu schließen und so die Migration zu kontrollieren (vgl. FT, 2020a). Dieses Vorhaben wurde nicht umgesetzt, dennoch zeigt es die Interessen Jan Marsaleks auf, die zu seiner Vorliebe für Geheimdienste und seinen Verbindungen zu diesen passen. Solche Vorhaben und sein Interesse an derartigen Tätigkeiten könnten Marsaleks Motiv sein. Dafür spricht auch, dass er nur einen sehr geringen Anteil seines Vermögens in Wirecard-Aktien investiert hatte (vgl. Trend.at, 2020).

Da es von dem flüchtigen Marsalek und dem ehemaligen Geschäftsführer Markus Braun keine Aussagen zu einer möglichen *Rechtfertigung* gibt, ist die reumütige Darstellung von Oliver Bellenhaus aus dem Gerichtsprozess, dass aus kleinen Lügen große Lügen entstanden seien (vgl. SZ, 2022b), die einzige Aussage eines Beteiligten, die in eine solche Richtung geht.

Eine *Fähigkeit*, die Jan Marsalek zugesprochen wird, ist sein Charme, den er ausgestrahlt habe, wenngleich er im jungen Alter ein wenig leichtsinnig wirkte (vgl. McCrum, 2022, S.38). Außerdem soll laut einem Wirecard Manager das halbe Unternehmen Angst vor ihm gehabt haben (vgl. Karami, 2022, S.23f.), was dabei hilfreich gewesen sein könnte, die Betrugsmasche separiert vom Unternehmen aufzubauen und mögliche Kritiker einzuschüchtern. Bei seinen vielfältigen internationalen Geschäftsbeziehungen und Firmengeflechten könnte die ihm zugesprochene Weltgewandtheit von Vorteil gewesen sein (vgl. McCrum, 2022, S.46).

Die *Gelegenheit*, die sich für den Betrug im Drittpartnergeschäft bot, war die, dass Wirecard die Einnahmen aus dem Drittpartnergeschäft lediglich als Umsatzerlöse buchete, sodass die Fälschung von nötigen Unterlagen nicht zahlreich erfolgen musste. Außerdem war es von Vorteil, dass Jan Marsaleks Asien- und Drittpartnergeschäft separiert vom restlichen Geschäftsbetrieb operierten. Zudem waren die jährlichen Testate der Jahresabschlüsse von Wirecard durch EY für die Aufrechterhaltung des Betrugssystems entscheidend, da sich Banken und Aktionäre auf dieses Urteil verließen. Des Weiteren half dem Unternehmen, dass die Bafin im Jahr 2019 das Shortsellingverbot verhängte und das System so schützte.

Die *Motivation* zum Betrug ist bei diesen drei Fällen primär die persönliche Bereicherung für den eigenen Lebensstil, zur Herstellung gesellschaftlicher Relevanz oder der Finanzierung anderer Interessen. Eine weitere Beurteilung und Analyse dieses Aspektes erfordert allerdings eine umfassendere soziologische oder psychologische Auswertung und ist daher für die folgenden Aspekte der Betrugsprävention, Erkennung und Aufarbeitung ebenso nachrangig zu betrachten, wie der Aspekt der *Rechtfertigung*. Bei diesem ist, neben dem Sonderfall der Adele Spitzeder, die sich keiner Schuld bewusst zu sein scheint, auffällig, dass der Glaube an den Unternehmenserfolg zum späteren Betrug führte. Eine detail-

liertere Analyse hierzu ist allerdings ebenfalls von geringem Interesse für die weitere Arbeit, da dort ebenfalls andere Fachrichtungen passender sind als die wirtschaftswissenschaftliche Forschung und insbesondere die im Controlling und Accounting.

Es lässt sich also festhalten, dass bei einer solchen Betrachtung des Faktors Mensch primär die *Fähigkeiten* der Täter von Interesse sind. In den vorliegenden Fällen ist dort vor allem eine besondere Wirkung derer auf andere auffällig, sei es durch eine besondere Ansprache, Charme oder Protz, was dem Gelingen des Betrugs in allen drei Fällen zuträglich war. Speziell in den Betrugsfällen von Flowtex und Wirecard boten Fehler oder Unterlassungen von Institutionen, die Betrug erkennen und verhindern sollten, einen Teil der *Gelegenheit* des Erfolgs.

#### 4. Ansatzpunkte und Anregungen für Betrogene und Wirtschaftsprüfung

##### 4.1. Kritische Aufarbeitung des Handelns in diesen Fällen

Die Frage, welche Fehler und Unterlassungen im Detail vorlagen, wird im Folgenden ebenso beantwortet, wie die, welche Rolle der Faktor Mensch dabei über die Täterperspektive hinaus innehaben könnte.

Im Fall von Flowtex sind vor allem die Vorgänge der Finanzierungsbewilligung auf der Seite der Banken und Leasinggeber, die Art der Prüfungshandlungen von KPMG zur Überprüfung der ausgewiesenen Horizontalbohrmaschinen und das Verhalten der staatlichen Behörden von Interesse.

Denjenigen Banken und Leasinggesellschaften, die Opfer von Schmiders Betrug waren, ist vorzuwerfen, in welchem Umfang sie proaktiv auf Manfred Schmider zur Abgabe neuer Finanzierungsangebote zugegangen sein sollen (vgl. Heck, 2006, S. 113). Im Rahmen einer Sonderprüfung der Kreditgeschäfte mit Flowtex bei der Commerzbank und Dresdner Bank hat die dafür engagierte Wirtschaftsprüfungsgesellschaft BDO festgestellt, dass die Prüfung der Bonität und der Kreditsicherheiten der Commerzbank Frankfurt nicht pflichtgemäß erfüllt worden war (vgl. ebd., S. 120f.). Die Dresdner Bank stellte in einem internen Revisionsbericht vom März des Jahres 2000 fest, dass Verdachtsmomente nicht verfolgt worden seien (ebd., S.121). Des Weiteren seien ihnen bereits im Jahr 1995 Diskrepanzen zwischen der Flowtex-Bilanz und einem Artikel der Frankfurter Allgemeinen Zeitung (FAZ) aufgefallen, der beschreibt, dass sowohl die in Deutschland existierende Anzahl von Horizontalbohrmaschinen, als auch deren Stückpreis wesentlich geringer sei, als es Flowtex allein in seiner Bilanz angab (vgl. ebd., S.121 f. i.V.m. FAZ, 1995). Dennoch wurde die Entscheidung getroffen, aufgrund der Profitabilität an der Geschäftsbeziehung zu Flowtex festzuhalten, obwohl diesbezüglich Bedenken im Raum standen, nachdem Schmider bei der Forderung weiterer Nachweise drohte, ebenjene Geschäftsbeziehung zu beenden (vgl. Heck, 2006, S.122). Den Banken fiel nicht auf, dass das in einer Werbebroschüre in einer Luftaufnahme gezeigte Werksgelände der nach außen von Flowtex unabhängigen Firma KSK in Wirklichkeit die Zentrale von Flowtex

zeigte, auf der lediglich der Unternehmensschriftzug grafisch ausgetauscht wurde (vgl. ebd., S.123).

Bei Betrachtung von KPMG als prüfendes Unternehmen der Bilanzen der Jahre 1997, 1998 und einer von Schmider in Auftrag gegebenen Sonderprüfung aus dem Jahr 1999 (vgl. Handelsblatt, 2001) gilt es zu beachten, dass diese Testate Grundlage für das gute Rating (BBB) von Standard&Poor's für Flowtex waren (vgl. Heck, 2006, S.124 i.V.m. Lenz, 2012, S.195). Dabei wurde KPMG vor allem vorgeworfen, keine Kontrollen der Bohrmaschinen bei den Servicegesellschaften oder unangekündigte Prüfungshandlungen vorgenommen zu haben und so einen Zeitraum für Täuschungen geschaffen zu haben. So wurden sämtliche Maschinen, die stichprobenartig ausgewählt worden waren, an einem Ort überprüft (vgl. Handelsblatt, 2001). An diesem hat der beschriebene Etikettenschwindel stattgefunden, sodass am Ende des Jahres 1998 das Vorhandensein von 2139 Systemen bestätigt wurde (vgl. Heck, 2006, S.124). Zudem wurde deutlich, dass KPMG bei Flowtex ebenfalls in beratender Funktion tätig war, wobei die Möglichkeit besteht, dass bei diesen beiden Tätigkeiten die gleichen Personen mit Flowtex arbeiteten (vgl. ebd., S.125). Letztendlich zahlte die Wirtschaftsprüfungsgesellschaft nach einem Vergleich den Gläubigern von Flowtex 100 Millionen Mark, was die bis dahin höchste gezahlte Schadenersatzsumme einer solchen Gesellschaft in Deutschland darstellt (vgl. FAZ, 2001).

Die Frage nach der Rolle und dem Mitverschulden der Finanzbeamten des Landes Baden-Württemberg wurde im Prozess einer Klage auf Schadenersatz der Gläubiger von Flowtex gegen das Land Baden-Württemberg mit einem Streitwert in der Höhe von ca. 1,1 Milliarden Euro behandelt (vgl. FAZ, 2005b). Diese wurde zwar abgewiesen (vgl. FAZ, 2005a), nachdem man sich die laut dem Vorsitzenden Richter des Prozesses entscheidende Frage, ob die Informierung von Ermittlungsbehörden durch die Finanzbeamten aufgrund der Kenntnis eines Betriebsprüfers seit 1996 über den Verdacht möglicher Scheingeschäfte bei Flowtex aufgrund von „Desinteresse, Betriebsblindheit und Inkompetenz“ (Manager Magazin, 2005) nicht erfolgte oder ob dies zum Zweck der Unterstützung von Schmider und Kleiser unterlassen wurde (vgl. ebd.). Letzteres hätte Grund für einen Schadenersatzanspruch gegen das Land Baden-Württemberg darstellen können (vgl. ebd.). Aus der detaillierten und kritischen Darstellung der Rolle der Behörden von Heck (2006) geht hervor, dass Schmider und Kleiser Kenntnis davon hatten, dass einigen Beamten seit 1996 klar war, dass ein Teil der Verträge fingiert war. Entsprechende Notizen und Unterlagen wurden sowohl bei Steuerfahndung, als auch bei einem Finanzbeamten gefunden (vgl. Heck, 2006, S. 142-148). Letzterer ist insofern von Interesse, als dass er mit Schmider auf dessen Grundstück Tennis gespielt und einen VW-Golf bei Schmiders Autohändler vergünstigt gekauft haben soll (vgl. ebd. S. 148).

Die Bafin und EY sind die zu Betrachtenden, wenn im Falle Wirecards nach Fehlern und Unterlassungen zu suchen ist, die den Betrug begünstigten.

Bei der Bafin ist dort neben der Entscheidung zum Shortsellingverbot die Zuständigkeitsfrage bei der Aufsicht Wirecards interessant zu betrachten. So hat die Bafin als Aufsichtsorgan von Finanzdienstleistern lediglich die Wirecard Bank AG geprüft, während die Aufsicht des Gesamtkonzerns in die Zuständigkeit der Bezirksregierung Niederbayern gefallen sein soll, da die Wirecard AG als Technologieunternehmen und nicht als Finanzholding kategorisiert wurde (vgl. Karami, 2022, S. 45 i.V.m. Wirecard Untersuchungsausschuss, 2021, S.1624-1627). Die Bezirksregierung Niederbayerns sei mit jener Aufsicht überfordert und war sich darüber unklar gewesen, wie die Zuständigkeitsverhältnisse aussahen (vgl. Wirecard Untersuchungsausschuss, 2021, S. 1626f.). Zudem stellte die Bafin nur die zweite Stufe im Verfahren der Bilanzkontrolle dar, während die Deutsche Prüfstelle für Rechnungslegung (DPR) in erster Instanz dafür verantwortlich war (vgl. Karami, 2022, S.18). Diese ist dafür zuständig, die Rechnungslegung kapitalmarktorientierter Unternehmen zu kontrollieren, während es im Aufgabenbereich der Bafin lag, die Finanzberichterstattung zu prüfen und finanzindustrie- und kapitalmarktbezogene Themen zu behandeln (vgl. ebd., S. 46). Die DPR konnte allerdings nach eigener Aussage aus rechtlichen und kapazitätsbezogenen Gründen keine forensischen Untersuchungen durchführen (vgl. ebd., S.47).

Bei der nachträglichen Betrachtung des Shortsellingverbots stellt sich die Frage, inwiefern diese Maßnahme ihrem Zweck laut Art. 2 VO (EU) Nr.236/2012 („Leerverkaufs-VO“), der Sicherstellung des „[...] ordnungsmäßigen Funktionieren des Binnenmarktes [...]“ in „[...] Ausnahmesituationen [...]“ nachkam. Eine solche Ausnahmesituation sahen sowohl die Bafin, als auch die zuständige europäische Behörde, die European Securities and Markets Authority (ESMA) als gegeben (vgl. ESMA, 2019). Dennoch steht der Zweifel im Raum, ob die Grundlage für die bestehenden Leerverkaufpositionen: die Artikelveröffentlichungen der „renommierten und international anerkannten“ (Karami, 2022, S. 32) FT, eine solche Ausnahmesituation darstellt (vgl. ebd.). Trotz der Maßnahme blieb der Aktienkurs im Verbotszeitraum, in dem die Effizienz bei der Bildung des Aktienpreises eingeschränkt war (vgl. ebd., S.32), ungewöhnlich volatil (vgl. ebd., S.33).

Der Umstand, dass Bafin-Mitarbeiter, ebenso wie der Leiter der Aufsicht der Abschlussprüfer (APAS), noch nach der Veröffentlichung des KPMG Sonderprüfungsberichts mit Wirecard-Aktien handelten, ist der Außendarstellung dieser Behörden bei der Betrachtung des Falles nicht zuträglich (vgl. Rinker, 2022, S.142).

Die APAS verhängte am 03. April 2023, während der Erstellung dieser Arbeit, Sanktionen gegen EY und fünf seiner Wirtschaftsprüfer, aufgrund von als erwiesen angesehenen Verletzungen der Berufspflicht (vgl. APAS, 2023). Neben Geldstrafen für die Wirtschaftsprüfer, muss EY eine Strafe von 500.000 Euro zahlen und darf zwei Jahre lang keine neuen Mandate bei Unternehmen von öffentlichem Interesse erlangen (vgl. ebd.). Zudem stehen noch Gerichtsverfahren gegen EY nach Sammelklagen bevor (vgl. Tagesschau, 2023). Welche Pflichten die Wirtschaftsprüfer verletzt haben, erläu-

tert der sog. „Wambach Bericht“ der Wirtschaftsprüfungsgesellschaft Rödl & Partner aus dem Jahr 2021, der den Wirecard Untersuchungsausschuss bei der Frage nach der Verantwortung von EY unterstützen sollte (vgl. Rödl&Partner, 2021, S.5). So wird moniert, dass beim Abschluss des Geschäftsjahres 2016 nach Betrugsvorwürfen eines Whistleblowers und darauf basierenden Fragen der Wirtschaftsprüfer, mündliche und schriftliche Erklärungen des Vorstands ausgereicht haben sollen, um ohne weitere Prüfung ein uneingeschränktes Testat zu erteilen (vgl. ebd., S.36). Zudem werden unter anderem die Qualität der Prüfungsnachweise aus Saldenbestätigungen und das Fehlen von Drittbestätigungen beim Jahres- und Konzernabschluss des Jahres 2014 (vgl. ebd., S.45f.), die fehlende Einbindung wesentlicher Fraud-Indikatoren nach IDW PS 210 (2012) Tz. 35 (vgl. ebd., S.57), das Ausreichen schwacher Prüfungsnachweise bei der Abbildung des Drittpartnergeschäfts in den Bilanzen 2015 und 2016 (vgl. ebd. S.60), das Fehlen von Nachweisen über die Existenz der sich als fiktiv herausstellenden Treuhandkonten im Jahr 2015 (vgl. ebd., S.62), das Fehlen einer Beurteilung, ob eine Prüfung des internen Kontrollsystems der Drittpartner zwischen 2014 und 2016 nötig gewesen wäre (vgl. ebd. S. 64) und das alleinige Sich-Verlassen auf Saldenbestätigungen der Drittpartner bei der Prüfung der Umsatzerlöse ohne einzelne Transaktionen nachzuvollziehen (vgl. ebd., S. 78) bemängelt. Zudem gibt der KPMG Sonderprüfungsbericht darüber Aufschluss, dass Wirecards internes Kontrollsystem erhebliche Mängel aufwies, was EY in den Jahresabschlussprüfungen ebenfalls hätte auffallen sollen (vgl. Lenz, 2020, S.550 i.V.m. KPMG, 2020, S.19ff.).

Sowohl Wirecard als auch Flowtex weisen Elemente in ihrem Unternehmen auf, die Warnzeichen zum Bilanzbetrug entsprechen, so lag bei Flowtex aufgrund des innovativen Geschäftsmodells Erfolgsdruck (vgl. Rinker und Müller, 2022, S.103f.), der wie in Kapitel 3.2 dargelegt, mit dem ausbleibenden Erfolg eine Motivation Schmidts darstellen könnte und bei Wirecard das Problem eines schwachen Aufsichtsrats (vgl. ebd. S.105 i.V.m. Bayer und Hoffmann, 2022, S.373) ebenso wie die Problematik rückwirkender Buchungen (vgl. Rinker und Müller, 2022, S.109f.), da Wirecard mit seinen Drittpartnern nur vierteljährlich abrechnet (vgl. Lenz, 2020, S. 548) vor. Zudem ist ein unausgewogenes Portfolio der Geschäftspartner, wie es bei Wirecard aufgrund der großen Abhängigkeit des Umsatzes in der Bilanz von letztendlich fiktigen Drittpartnergeschäften vorliegt, ein mögliches Indiz für Bilanzbetrug (vgl. Rinker und Müller, 2022, S.116).

#### 4.2. Gezogene und zu ziehende Konsequenzen aus der Aufarbeitung

Aufgrund der großen Tragweite des Wirecard-Skandals wurde in dessen Folge am 10. Juni 2021 das Finanzmarktintegritätsstärkungsgesetz (FISG) zur Reformierung der Bilanzkontrollverfahren, zur Vertrauensstärkung der Anleger in den deutschen Kapitalmarkt und dessen Integrität und Stabilität, verkündet (vgl. Bundesfinanzministerium, 2021).

Dessen Inhalt sind Veränderungen im Bereich der Bilanzkontrolle, der Abschlussprüfung und Vorgaben für bi-



lanzierende Unternehmen. Deren Vorstände sind seitdem gemäß §91 Abs. 3 AktG-E, soweit es sich bei den Unternehmen um börsennotierte Aktiengesellschaften handelt, dazu verpflichtet, ein internes Kontrollsystem (IKS) und ein Risikomanagementsystem (RMS) einzurichten. Des Weiteren beschreibt §100 Abs. 5 AktG, dass je mindestens ein Mitglied des Aufsichtsrats im Bereich der Rechnungslegung und eines im Bereich der Abschlussprüfung über Sachverstand verfügen muss, wobei es sich dabei um mindestens zwei verschiedene Personen handeln muss (vgl. Hennrichs, 2021, S. 276 f.). Die Bafin erhielt bei der Frage der Bilanzkontrolle zusätzliche Kompetenzen und das zweistufige System wurde abgeschafft (vgl. Bach und Lauer, 2022, S. 73), um Unklarheiten bei der Zuständigkeit zu vermeiden. Zur Erhöhung der Sorgfalt, Prüfungsgenauigkeit und Unbefangenheit der Abschlussprüfer, sind seitdem ein gesetzlicher Wechsel des Jahresabschlussprüfers nach 10 Jahren bei der Prüfung von Unternehmen von öffentlichem Interesse und die Trennung von Beratung und Prüfung bei diesen vorgeschrieben (vgl. Deloitte, 2021, S.4).

Bei der zuvor erfolgten Betrachtung der dargestellten Verhaltensweisen der beteiligten Banken, Wirtschaftsprüfungsgesellschaften und Behörden, die sich durch die Betrüger haben täuschen lassen, ist es nicht verwunderlich, dass sowohl im Falle Wirecards durch Dan McCrum, als auch bei Flowtex durch Geldwäschermittler aus Spanien und Portugal, die aufgrund eines Geldwäscheverdachts einer portugiesischen Bank auf Schmider stießen (vgl. Heck, 2006, S.12), die entscheidenden Impulse zur Aufdeckung der Betrugsfälle von Externen kamen, die aufgrund dessen, dass sie sich den Fällen ohne persönlichen Einfluss der Verantwortlichen, also einer Ausprägung des Faktor Mensch, näherten, den Betrug erkannten.

Dies zeigt einen weiteren interessanten Aspekt des Faktors Mensch in Bilanzbetrugsfällen auf. Denn dieser Variable unterliegen auch diejenigen, die sich haben blenden lassen. Im Falle der Wirtschaftsprüfer sind sogar Elemente des Faktors Mensch gesetzlich verankert. So gilt es laut §43 Abs. 4 der Wirtschaftsprüferordnung (WPO), „[...] während der gesamten Prüfung eine kritische Grundhaltung zu wahren [...]“. Zudem ist es ein Teil dieser Pflicht, „ungeachtet ihrer bisherigen Erfahrung mit der Aufrichtigkeit und Integrität des Führungspersonals des geprüften Unternehmens und der mit der Unternehmensüberwachung betrauten Personen die Möglichkeit in Betracht zu ziehen, dass es auf Grund von [...] Verhaltensweisen, die auf Unregelmäßigkeiten wie Betrug oder Unrichtigkeiten hindeuten, zu einer wesentlichen falschen Darstellung gekommen sein könnte“ (§43 Abs. 4 Nr.2 WPO). Diese Verordnung zeigt die Schnittstelle zweier Aspekte des Fraud Diamonds auf, deren Gestaltung für die Betrugsbekämpfung entscheidend ist. Der *Fähigkeit* des möglichen Betrügers sein Umfeld durch seine Ausstrahlung und Wirkung zu beeinflussen, sollen die Wirtschaftsprüfer aufgrund der kritischen Grundhaltung keine *Gelegenheit* zum Betrug bieten.

Die Wichtigkeit dieser Grundhaltung in der Zukunft haben Weißenberger und Lösse (2022) vor dem Hintergrund der Einbindung künstlicher Intelligenz in den Prozess der

Erkennung von Bilanzbetrug festgestellt (vgl. Weißenberger und Lösse, 2022). So könnte der Faktor Mensch eine erhebliche Rolle im Zusammenspiel mit ebendieser künstlichen Intelligenz einnehmen, indem er sie ergänzt und durch interpersonelle Ereignisse im Faktor Mensch des Gegenüber das wahrnehmen kann, was die künstliche Intelligenz durch die Analyse von Bilanzen nicht erkennt.

## 5. Fazit und Zusammenfassung

Zusammenfassend lässt sich feststellen, dass der Faktor Mensch bei der Betrachtung von Bilanzskandalen eine erhebliche Rolle spielt. So wurde deutlich, dass nicht nur die Entwicklung eines Bilanzbetrugs zum Bilanzskandal durch den Faktor Mensch erfolgt, sondern, dass er ebenfalls in den Betrugsfällen selbst bedeutsam ist. Im Rahmen des auf Cresseys Fraud Triangle basierenden Fraud Diamond wurde herausgearbeitet, dass der Faktor Mensch im Hinblick auf den Täter primär in den Betrugsvoraussetzungen *Fähigkeit*, *Motivation* und *Rechtfertigung* enthalten ist. Die Fälle der Dachauer Bank, von Flowtex und der Wirecard AG wurden dargestellt und hinsichtlich der Rolle des Faktors Mensch analysiert. Hierbei wurde mithilfe des Fraud-Diamond-Modells festgestellt, dass die Wirkung der Täter auf die Betroffenen, die Behörden und die Wirtschaftsprüfer insbesondere beim Fall von Flowtex entscheidend war. Das Modell ist zur Einordnung dieser Fälle deshalb gut geeignet, weil es im Element der *Gelegenheit* die Analyse nicht nur auf den Täter beschränkt. An diesen Stellen muss auch eine gewisse Empfänglichkeit vorgelegen haben, sich beispielsweise vom Charme und der Überzeugungskraft der Täter beeindrucken lassen. Da diejenigen, die den Betrug nicht erkannten in ihrer Arbeit ebenfalls dem Faktor Mensch unterliegen, kann er folglich auch bei der *Gelegenheit* gegeben sein. Schließlich wurden anhand der Fälle von Flowtex und Wirecard mögliche Ansätze und tatsächliche Konsequenzen aus den Betrugsumständen aufgezeigt und erarbeitet, wo die interpersonelle Schnittstelle zwischen Wirtschaftsprüfer und Verantwortlichem im Fraud Diamond zu verorten ist und, welche wichtige Rolle sie bei der Prävention und Erkennung von Bilanzbetrug spielt.

Aus der Erforschung dieses Themas ergeben sich viele interessante Ansatzpunkte zur weiteren Forschung. So besteht beim Fall der Dachauer Bank die Notwendigkeit einer wirtschaftshistorischen Analyse, die eine fundierte und objektivere Perspektive mitbringt als die Adele Spitzeders aus ihren Memoiren. Außerdem wäre zur weiteren Feststellung der Eignung des Modells des Fraud Diamonds zur Einordnung der Rolle des Faktors Mensch in Betrugsfällen, eine Analyse solcher Fälle interessant, in denen interpersonelle Motive innerhalb eines Unternehmens beispielsweise aufgrund von Hierarchien vorliegen. Zuletzt wird die Frage aufgeworfen, ob sich der Faktor Mensch in Bilanzbetrugsfällen mithilfe soziologischer Modelle für Wirtschaftsprüfer, analog des Fraud Diamonds für die Täterperspektive, systematisch und kriterienorientiert analysieren lässt und welche Ergebnisse aus einer solchen Analyse hervorgehen könnten.

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# The Impact of Prospectus Language on IPO Underpricing: A Textual Analysis of European IPOs

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## Abstract

This study explores the impact of IPO prospectus language on the prevalent underpricing in European IPOs, using natural language processing techniques. Specifically, it investigates whether a relationship exists between litigious, negative, positive, and uncertain language, as well as the degree of document similarity and IPO underpricing. For this purpose, qualitative text data is converted into quantifiable metrics using modern analysis techniques. The study presents new methodological approaches to textual analysis. The results establish a clear relationship between underpricing and multiple dimensions of prospectus language and highlights unique features of European markets. These include specific disclosure obligations of various market segments and the different listing types available to issuing firms. The results of the variables related to sentiment analysis all reveal significant relationships. However, no robust evidence emerges for variables related to document similarity. Overall, the introduced methodological approaches offer enhanced explanatory power over traditional methods, effectively contributing to the explanation of the underpricing phenomenon in European markets.

**Keywords:** IPO; NLP; prospectus language; textual analysis; underpricing

## 1. Introduction

The initial public offering (IPO) landscape has experienced a significant shift over the past two decades, with a major decline in activity both in Europe and the United States. In Europe, the number of annual IPOs dropped from 380 per year between 1997 and 2007 to 220 per year between 2008 and 2018 (European IPO Task Force, 2020, p. 11). A similar picture is obtained from the U.S. market, where IPO activity has decreased by 50% since 1997 (Huang et al., 2023, p. 1). The reasons for this decline are manifold. The observations can be attributed to the lower profitability of firms in the current business environment, leading to more consolidation (Gao et al., 2013). Another explanation lies in the exceptional rise of private markets, which allow companies to stay private by raising late-stage capital. This has the benefit of avoiding the scrutiny and governance regulations imposed on public companies (Ewens & Farre-Mensa, 2020). However, a consistent factor behind many explanations for this declining trend is the underpricing phenomenon, which describes

one of the most controversial aspects of IPO research. Underpricing is related to the fact that, on average, companies have very high first-day returns, which can cost them multiple years of operating profits (Loughran & Ritter, 2002).

Numerous studies have attempted to explain this effect. Among the most prominent explanations is the uncertainty theory of Beatty and Ritter (1986), which links underpricing to the high degree of uncertainty surrounding the issuing firm and the valuation of the IPO due to the lack of reliable historical data. Another important theory is that of Benveniste and Spindt (1989), which links the phenomenon to the compensation investors demand for revealing private information about the offering to the issuing firm. The third important theory of underpricing addressed in this thesis is the legal liability theory by Lowry and Shu (2002), which claims that underpricing is used as a protection against lawsuits the firm and its underwriters might face in the aftermarket. Previous research has tended to focus on exploring different explanations for the phenomenon. However, more recently the research community has shifted to finding significant predic-

tors of underpricing and attributing their findings to prevalent theories. An important research area that has emerged with enhanced analytical capabilities, is the area of textual analysis. In this context, studies have established a link between underpricing and the language in the IPO prospectus. The prospectus is a document containing information required to evaluate the offering, such as a business plan, risk factors and comprehensive financial data. Initial studies were conducted using U.S. samples. Hanley and Hoberg (2010) explored the impact of information revelation on underpricing finding that more unique information disclosure leads to reduced levels of underpricing, while higher document similarity has the opposite effect. In a related study, Hanley and Hoberg (2012) assess document similarity in the context of prospectus revisions during the bookbuilding period and how this affects underpricing. Loughran and McDonald (2013), applied a dictionary-based sentiment analysis, which established a link between underpricing and uncertain sentiment within the prospectus. A similar study of the Chinese market was conducted by Guo et al. (2022), confirming the results for an international market. Ferris et al. (2013) examine the impact of conservative language in a prospectus. Their findings indicate a positive significant relationship between underpricing and document conservatism. These existing studies are based on simple word count methods. However, recent advancements in natural language processing (NLP) have augmented the possibilities of researchers to develop text-based quantitative measures of economic variables. A prominent technology is word embeddings, which are geometric representations of word meanings, that are used to translate textual data into numerical format (Seegmiller et al., 2023, p. 1). The first generation of word embedding models, word2vec, GloVe, fastText, are based on the works of Mikolov et al. (2013), Pennington et al. (2014), and Mikolov et al. (2017), respectively. They represent each word as a fixed vector representation. Recent advancements in model architecture enable context-dependent word and sentence representations, as in the models, BERT of Devlin et al. (2018) and Sentence-BERT (SBERT) of Reimers and Gurevych (2019).

While the relationship between prospectus language and underpricing has been studied previously, the application of modern NLP techniques to this problem remains relatively underexplored. This study addresses this limitation by developing methodologies for sentiment and similarity analysis using novel word embedding techniques. The primary research question is whether the textual analysis of IPO prospectuses can explain the underpricing of European IPOs. Specifically, it is investigated if a relationship can be found between litigious, negative, positive, and uncertain sentiments, as well as the degree of document similarity and underpricing, using both the fastText and SBERT models. The study also evaluates the potential of novel NLP models in analyzing these documents. For robustness, results are benchmarked with traditional word count methods. The idea of the methodology used is to leverage the capabilities of embedding models to better understand text semantics. Therefore, the pro-

posed methodology in this research should provide an improvement over traditional word count methods. In addition, the proposed methodology is easy to implement, unlike many other approaches to sentiment analysis, which typically require large amounts of labeled data. This data is difficult to obtain as it requires expert judgment, which especially for complex financial contexts is rarely available. The suggested approach for sentiment analysis uses the same word lists as Loughran and McDonald (2013), and modifies them for optimized use in combination with word embedding models. The updated methodology for similarity analysis follows the concept presented in Breitung and Müller (2022), which suggests to measure document similarity by comparing pairwise sentence similarities. The obtained results suggest that the methodologies provide valid and coherent insights. Furthermore, this study contributes significantly to the existing body of academic literature in the field of textual analysis and IPO underpricing by corroborating the documented phenomenon using a European dataset. To this end, the dataset initially introduced by Kaserer and Trefsel (2023) is utilized. This dataset encompasses the listing documents and important firm and offering characteristics for 745 European listings, including both IPOs and private placements over the period from 2016 to 2022. It is important to note that, in the ensuing paper, the term 'IPO' is frequently employed as an umbrella term for listings, like the term 'prospectus', which is used as a generic term for listing documents.

The findings of this study can be summarized as follows. First, a significant positive relationship between underpricing and the use of uncertain language is evident in the European sample, confirming the findings from previous studies for different markets. Second, through the application of the refined methodology, a significant relationship is observed between litigious sentiment in IPO prospectuses and underpricing. This observation aligns with the legal liability hypothesis. Third, drawing inspiration from the concept of prospectus conservatism, it is found that neutral prospectuses - those that avoid both positive and negative language - are significantly associated with lower levels of underpricing. This finding resulted again from the use of the embedding-based approaches. Fourth, in the similarity analysis, no statistically significant evidence is discovered to suggest that prospectuses, which disclose less new information, affect underpricing. Finally, the analysis demonstrates that the methodologies developed in this study yield superior results in terms of both the number of significant coefficients and the ratio of explained variance. Overall, this study enriches the existing literature by providing new insights into the relationship between textual variables in IPO prospectuses and underpricing, specifically within the European context. The advanced methodologies deployed contribute to a more thorough understanding of these dynamics.

The structure of the paper is organized as follows. Section 2 contains a thorough literature review, delving into the IPO process, theories of underpricing, and relevant research in the area of textual analysis, along with a presentation of the hypotheses derived therefrom. Subsequently, Section 3

describes the dataset and illustrates the development of the methodologies for sentiment and similarity analyses. This is succeeded by Section 4, which presents detailed descriptive statistics. In Section 5, the outcomes of the regression analyses are disclosed and interpreted. Lastly, Section 6 encapsulates a conclusion that recapitulates the findings, highlights the limitations, and outlines the future areas of research.

## 2. Literature Overview

### 2.1. IPO Process and Characteristics

#### 2.1.1. The Dynamics of IPOs

IPOs are highly complex financial transactions. The process requires the collaboration of numerous parties, which prepare the issuing firm for its stock market debut and conduct crucial pre-market due diligence. The high complexity and the costs associated with a stock market listing, which usually involve fees of around 7% of gross proceeds charged by investment banks, require careful evaluation of managers (Lowry et al., 2017, p. 193). However, despite the declining trend in IPO activity and the mentioned caveats, going public remains a vital component in the financial strategy of most emerging firms. The primary motivators behind pursuing an IPO include gaining access to capital for investment activities, exploiting attractive valuations and even market inefficiencies (i.e., overvaluation), adjusting more flexibly the firm's capital structure, and providing existing shareholders with an opportunity to sell shares in a liquid secondary market (Lowry et al., 2017, p. 8-10). As a first step after deciding to pursue an IPO, the issuing company typically engages a group of investment banks known as underwriters, who oversee the structuring of the offering. Once the underwriters have been selected and their roles within the syndicate are established, subsequent steps involve determining the types of shares to be issued, the offer size, and the mechanism for selling those shares. The offering might consist of primary shares (i.e., newly issued stock sold for the first time) or secondary shares (i.e., existing shares sold by current investors), but commonly as a combination of both. The total volume of sold stocks is decided based on the company's future investment plans and the liquidation requirements of existing shareholders. In most cases, the issuance is conducted as a firm commitment IPO, where the underwriter guarantees the sale of all the stock at the offer price. The underwriters then purchase the shares from the company at a small discount prior to the offering and subsequently sell them at the offer price on the market. For smaller transactions, IPOs can also be executed on a best-effort basis, in which the underwriters do not guarantee the stock's sale (Berk & DeMarzo, 2019, p. 879). For determining the offer price, underwriters have several options, but the predominant method in international markets is the book building approach. In this approach, underwriters organize meetings with pre-selected institutional investors to engage them in price discovery by submitting bids for IPO shares within a predefined price range. A unique aspect of book building is that underwriters possess the authority to

both set the price and determine the allocation of IPO shares (Huibers, 2020, p. 117). Auctions and fixed-price offerings are the remaining pricing mechanisms. Both give underwriters no discretion in determining the allocation of shares, but while auctions provide also no room to determine the offer price, in fixed-price issues the offer price is directly set by the underwriters (Torbira & Oki, 2017, p. 33). The IPO process further necessitates that companies register with their respective national listing authorities. In accordance with market-specific regulations and exemptions, companies are generally required to produce a prospectus containing comprehensive information pertinent to investors interested in the offering, thereby enabling them to conduct an informed assessment prior to participation. These requirements differ greatly depending on the setting of the IPO. The following chapter will explain the different considerations for companies when choosing the best-suited exchange and listing type.

#### 2.1.2. IPO Considerations - Exchange and Listing Types

##### *Exchange Types*

Most European stock exchanges consist of a main market and one or more second-tier markets catering to specific firm classes. Historically, these secondary markets included seasoning markets - common before the year 2000. They provided smaller firms with a venue to go public before potentially transitioning to the main market if successful. The "New Markets", which experienced a swift rise and subsequent decline around the year 2000, constituted another market segment. This segment fostered the IPO boom of high-tech firms during the dot-com bubble (Vismara et al., 2012, p. 354). Presently, markets are primarily classified into regulated main markets and exchange-regulated, or in other words "unregulated" secondary markets, which are known under the term multilateral trading facility (MTF). Regulated markets are fully governed by EU law and the respective national legislation and managed by a designated market operator. MTFs can be maintained by market operators, but also investment firms. After recent regulatory changes, MTFs now include a newly created subtype called SME growth market (SME GM), which require a majority of admitted issuers to be classified as SMEs. The intention of regulators behind the introduction of SME GMs is to increase investor appeal and further reduce administrative burdens for SMEs seeking access to capital markets (Kaserer & Treßel, 2023, pp. 5-6). The significance of secondary markets becomes apparent when examining historical transaction volumes. Vismara et al. (2012, p. 353) report that, during the period from 1995 to 2009, approximately 77.5% of IPOs occurred on second-tier markets. For their sample of listings on European exchanges with a registered SME GM market segment, Kaserer and Treßel (2023, p. 6) report a successful start for SME GMs. After the first market was established in 2018, already in 2021 80% of all listings took place on an SME GM. These high transaction volumes can be attributed to the less stringent regulatory requirements imposed on issuers. This be-

comes evident as more than 70% of second-market issuers do not fulfil all the requirements of the respective main market, as found by Vismara et al. (2012, p. 366). In a study focused on the UK Alternative Investment Market (AIM), one of the most notable exchange-regulated markets, Doukas and Hoque (2016, p. 387) investigated the reasons behind firms opting for unregulated markets. Employing a more recent dataset, they demonstrated that only 50.5% of firms listed on AIM failed to satisfy the criteria of the main market, a figure much lower than the 67.2% reported for the identical markets by Vismara et al. (2012, p. 366). Doukas and Hoque (2016, pp. 402-403) further contend that firms primarily select a market platform that aligns with their investment and financing objectives. Companies opting for listings on main markets often exhibit heightened merger and acquisition activity, necessitating liquid share trading and consequently accepting increased regulatory oversight and scrutiny. In contrast, firms selecting secondary markets, such as AIM, often are loss-making, resulting in a greater dependence on seasoned equity offerings for financing. Notably, secondary markets attract smaller and younger companies due to their lower listing and ongoing flotation costs. The mentioned differences between exchanges require prospective issuers to analyze firm characteristics and their needs thoroughly to make the best choice on which exchange type to list. Another important consideration of this evaluation is the right choice of listing type, which will be further explained in the next chapter.

### *Listing Types*

In Europe, the dominant listing types available to issuing companies are IPOs and private placements. The IPO process has already been described in chapter 2.1.1. Private placements differ from IPOs in that they only involve the sale of shares to a select group of qualified investors, which in the case of a secondary market listing can avoid the requirements for extensive regulatory filings. In this context, only an offering memorandum is required, which includes company information and offer details to be distributed to the targeted group of investors. The details of the offer are negotiated on an individual basis with each investor and are finalized with the signing of a purchase agreement. In contrast, IPOs are open to an unlimited number of both institutional and retail investors and consequently require a higher level of regulatory oversight (Geddes, 2003, pp. 129-132). During the negotiation phase of a private placement, the maximum number of qualified investors that can potentially be contacted is capped at 150, as defined in Article 1, Paragraph 4e of the new prospectus regulation.<sup>1</sup> This number may vary depending on member state regulations. Companies often limit the addressees of their offerings in the primary market for several reasons. For the company, the main advantage of this

approach is that offerings on MTFs are not regulated according to EU legislation if they do not include a public offering. On secondary markets, the national listing authorities (e.g. BaFin) are not required to approve a prospectus when the listing is without a public offer (Vismara et al., 2012, p. 354). In contrast, in regulated markets, for the admission of securities a registration document has to be provided by the issuers, irrespective of whether the transaction involves an IPO or a private placement (Kaserer & Treßel, 2023, p. 7). By limiting the addressees of their offerings, companies can avoid the extensive regulatory requirements, reduce costs associated with producing and publishing a prospectus, and accelerate the process of raising capital. Additionally, private placements allow for more flexibility in negotiating terms and conditions, catering to the specific needs of both issuers and qualified investors. There are also several motives for initial investors to push against an IPO. According to Torbira and Oki (2017, p. 34) initial investors can better exercise control of the firm thanks to the discrete nature of private placements, but also for the sale of larger quantities of secondary shares during the offering this type of listing is preferred among investors. A pivotal aspect of the decision for the right listing type is the prospectus exemption rule. Thus, the subsequent chapter will elaborate on this critical aspect of the IPO process, discussing the rationale of preparing a prospectus, the requisite contents, and the evolving regulatory landscape surrounding these documents.

### 2.1.3. Required Disclosure – Listing Documents

An important part of the IPO process is drafting the prospectus, which is a legal document providing information about the offering. A full prospectus is required when securities are offered to the public or when securities are listed on a regulated market, provided that no exemption rules are applicable to the specific offering. The prospectus should provide enough information, allowing investors to make informed decisions regarding their participation in the offering (BaFin, 2023). Omissions of material information or inaccurate statements within the prospectus can lead to shareholder litigation. Such scenarios are particularly prevalent in the United States, where they are governed by the Securities Act of 1933 (Geddes, 2003, p. 140). The European prospectus regulation also sets high information standards for issuers. Yet, the explicit contents of a prospectus are susceptible to the regulation of the respective jurisdictions. However, the International Organization of Securities Commissions has established some guidelines for international harmonization of prospectus content, aiming to enhance comparability across markets. Essential elements of a prospectus are, as described by Geddes (2003, pp. 97-99):

1. A summary of the offering: Presenting business, details of shares being offered, use of proceeds, listing information, and key financial data.
2. A management discussion and analysis: Assessing the company's revenues, expenses, and capital expenditures by comparing the latest year with two prior years.

<sup>1</sup> Regulation (EU) 2017/1129 of the European Parliament and of the Council of 14 June 2017



3. The company's financial statements: Typically featuring three years of audited historical records.
4. A risk factors section: Disclosing potential risks to protect the issuer from investor lawsuits and inform investors about the possible hazards associated with purchasing shares.

In an effort to revive the IPO markets and make them more appealing, particularly for smaller firms, regulators have introduced new reforms in response to the declining IPO activity. In the United States, the Jumpstart Our Business Startups (JOBS) Act was enacted in 2012, while the European Union responded in 2017 with the above-mentioned prospectus regulation (Kaserer & Treßel, 2023, p. 13). The new EU law features several key elements, including adjustments to the exemption rule and the introduction of the EU Growth Prospectus. Consequently, the regulation raises the total proceeds threshold, below which a prospectus is not required, to €1 million. Furthermore, it provides member states with the option to increase this threshold up to €8 million (Kaserer & Treßel, 2023, p. 8). The new EU growth prospectus is a simplified version of the full prospectus, applicable for SMEs conducting initial offerings on an unregulated market with planned proceeds above the exemption threshold. Kaserer and Treßel (2023, pp. 11-13) compare content requirements for the EU growth prospectus with those of full prospectuses, and admission documents. The latter are listing documents governed by the discretion of their respective MTF without the influence of EU legislation. The EU growth prospectus requires less content disclosure than the full prospectus, which is consistent with its primary objective of reducing financial burdens and bureaucratic obstacles for companies. However, when compared to admission documents, it imposes more comprehensive content requirements. In summary, prospectus regulation significantly influences a company's decision on which market to go public due to the high associated costs. This is why recent reforms were aimed at balancing reduced financial and bureaucratic burdens with investor protection and global harmonization.

## 2.2. Underpricing of IPOs

### 2.2.1. Empirical Evidence and Consequences of Underpricing

Underpricing is one of the most controversial aspects of IPOs. It describes the phenomenon that most IPOs have high positive returns on their first day after floating on the market. This characteristic and its underlying causes have been vastly studied in academic research since the 1970s (Ljungqvist, 2007; Ritter & Welch, 2002). Empirical evidence has been provided for most markets. For the U.S. for example, Hanley (2017) presents an analysis of the IPO market from 1980 to 2015, demonstrating consistent positive underpricing during this period, albeit with extreme fluctuations. The most pronounced underpricing occurred during the dot-com bubble in the years 1999 and 2000, with average first-day returns reaching 71.1% and 56.3%, respectively Hanley (2017,

p. 8). Table 1 provides numbers for European markets presented in Ritter (2023), which all show positive average first day returns. The highest underpricing value was observed in Greece, where the average underpricing exceeded 50% between 1976 and 2013. Conversely, the lowest value of 6.2% was recorded in Austria during the period from 1971 to 2018. In recent years, alternative methods of going public have emerged with the aim of circumventing the high costs associated with traditional stock market listings. A remarkable surge in the popularity of special purpose acquisition companies (SPACs) was observed in 2020 and 2021, with nearly 75% (i.e. 861 out of 1157) of all such transactions between 2010 and 2022 occurring within these two years (Huang et al., 2023). A SPAC is a shell-company established by a financial sponsor, which raises funds through an IPO and commits to utilizing the proceeds to acquire a private company, thereby taking it public (Huang et al., 2023, pp. 14-15). As reported by Klausner and Ohlrogge (2023, pp. 112-113) the popularity of SPACs is already fading. Reasons are the substantial costs involved, on average 36% of gross proceeds, which in this case investors are required to bear, and low post-merger performance (on average -62% as of December 2022).

Another alternative to traditional IPOs that emerged as an imminent result to high underpricing, are direct listings. First promoted in the U.S. in 2018 by software company Spotify Technology, direct listings are also an option on European exchanges. A direct listing differs from an IPO in the regard, that no underwriters are involved in the offering process, and that the company directly lists its existing shares without an offer price on an exchange. Direct listings have not yet gained widespread adoption, with a limited number of transactions to date. One potential explanation for this phenomenon is the restricted suitability of direct listings, which primarily cater to companies with strong brand recognition and solid financials with no direct need for raising primary proceeds. Nonetheless, the ongoing public discourse surrounding this form of listing has drawn attention to the role of underwriters in the underpricing of IPOs (Huang et al., 2023). The following chapter will explore established theories, explaining the persistent occurrence of underpricing in IPOs, which has been a subject of extensive research and debate in the field of finance. Several theories have been proposed to explain this phenomenon, with varying degrees of emphasis on information asymmetry, institutional aspects, and behavioral factors. The following chapter will focus on three prominent theories of underpricing, namely the winner's curse, the information revelation, and the lawsuit avoidance hypothesis. It should be noted that other theories, such as the signaling theory and behavioral theories like the principal-agent theory, might also provide additional insights into the underpricing phenomenon.

**Table 1:** Average IPO underpricing in European countries. Taken from Ritter (2023)

| Country               | Sample Size | Time Period | Avg. Initial Return |
|-----------------------|-------------|-------------|---------------------|
| Austria               | 106         | 1971-2018   | 6.2%                |
| Belgium               | 154         | 1984-2017   | 11.0%               |
| Bulgaria              | 9           | 2004-2007   | 36.5%               |
| Cyprus                | 73          | 1997-2012   | 20.3%               |
| Denmark               | 190         | 1984-2021   | 7.6%                |
| Finland               | 244         | 1971-2021   | 14.5%               |
| France                | 904         | 1983-2021   | 9.4%                |
| Germany               | 840         | 1978-2020   | 21.8%               |
| Greece                | 373         | 1976-2013   | 50.8%               |
| Ireland               | 38          | 1991-2013   | 21.6%               |
| Italy                 | 413         | 1985-2018   | 13.1%               |
| Netherlands           | 245         | 1983-2021   | 12.0%               |
| Norway                | 368         | 1984-2021   | 10.3%               |
| Poland                | 359         | 1991-2022   | 12.4%               |
| Portugal              | 33          | 1992-2017   | 11.5%               |
| Spain                 | 204         | 1986-2021   | 9.5%                |
| Sweden                | 442         | 1980-2021   | 28.2%               |
| Switzerland           | 173         | 1983-2021   | 24.6%               |
| United Kingdom        | 5,309       | 1959-2020   | 15.7%               |
| <b>Average Europe</b> |             |             | <b>16.9%</b>        |

### 2.2.2. Theories of Underpricing

#### *Information Asymmetry and Uncertainty*

Fundamental research on information asymmetries as a reason for underpricing was conducted by Rock (1986, pp. 188-189). He assumes the existence of two types of investors: informed and uninformed. Uninformed investors participate in an issue without any private information, whereas informed investors possess perfect information and solely subscribe to underpriced issues. This means that underpriced issues get rationed more often than overpriced issues. Therefore, the probability of receiving an allocation of underpriced shares is inversely related to the degree of underpricing. This implies that for issues with substantial underpricing uninformed investors are crowded out by informed demand, whereas for overpriced issues, uninformed investors obtain a full allocation. However, in general, the demand from uninformed investors is essential, as otherwise, total demand would be insufficient to fill many offerings. Thus, to attract uninformed investors, who are requiring a positive conditional return from their investment, “the issuer must price the shares at a discount, which can be interpreted as compensation for receiving a disproportionate number of overpriced stocks” (Rock, 1986, p. 193). On the other hand, informed investors require returns that equal the costs of becoming informed in the first place (Ljungqvist, 2007, p. 389). Therefore the central aspect of underpricing in Rock’s (1986) model is the heterogeneity of investors participating in the offering. Michaely and Shaw (1994, pp. 289-290) investigate this theory by examining a unique type of IPOs,

namely master limited partnerships (MLPs). MLPs are of particular interest because institutional investors tend to avoid this market due to unfavorable tax implications. Thus, creating a homogeneous market comprised predominantly of uninformed retail investors. In their study, the researchers discover marginally negative levels of average underpricing for MLP issues, while disclosing positive first day returns for regular IPOs. A finding that supports the winner’s curse theory of Rock (1986). Beatty and Ritter (1986, pp. 215-217) argue that the winner’s curse problem is at least partially caused by ex-ante uncertainty, which makes the expected payout for informed investors less predictable and thus requires higher underpricing to attract them. The researchers further argue that it is an important role of investment banks to enforce an underpricing equilibrium. Beatty and Ritter (1986, p. 229) compare the decision to invest in information production by investors to investing in a call option on the issuing firm that would be exercised if the estimated price is higher than the quoted offer price. The price of a call option increases with implied volatility, i.e. ex-ante uncertainty. Consequently, they argue that as uncertainty increases, more investors choose to become informed and thus the underpricing must be higher. They use the number of uses of proceeds (regulation-specific indicator) and the inverse of gross proceeds (firm size indicator) as proxies for ex-ante uncertainty. A positive relationship between both variables and underpricing confirms the theory of ex-ante uncertainty (Beatty & Ritter, 1986, p. 223). According to Loughran and McDonald (2013, p. 13), the ex-ante uncertainty proxies are due to regulatory changes and different investor sentiment no longer relevant indicators. The content of IPO prospec-

tuses can help to derive new proxies for this purpose. In the next chapter, underpricing will be discussed in the context of price discovery and costs of information production.

### *Information Revelation and Disclosure*

Another central theory of underpricing was developed by Benveniste and Spindt (1989). Similarly, to the winner's curse model, the information revelation theory assumes that information asymmetries exist. However, in this case, asymmetries exist between the informed investors and the uninformed issuer. Investors have private information about the offering, which they without additional incentives would keep to themselves to profit from in the post-IPO period. As a consequence, underwriters, who conduct the bookbuilding process, use underpricing to incentivize investors to disclose this information truthfully. The discretion to allocate shares to those investors regularly participating in the underwriters' transactions is used to effectively minimize the required underpricing, through preferred allocation to those investors (Benveniste & Spindt, 1989, pp. 344-345). Another study focusing on the process of information revelation during bookbuilding comes from Sherman and Titman (2002). The researchers argue that issuers with a great need for pricing accuracy, which often are riskier, smaller firms with a great need for subsequent seasonal offerings, are paying for price discovery with higher underpricing. In this regard, firms must weigh the costs of engaging investors in information production or choosing to disclose more information by themselves. Depending on the degree of outsourcing of information production, the required level of underpricing to compensate investors will vary (Hanley, 2017; Hanley & Hoberg, 2010). The default option to disclose information to investors is through listing documents. Depending on the type of offering this is the prospectus or the respective admission document. The issuing firm and its underwriters have the chance to engage in premarket due diligence and disclose this information in the prospectus, thereby reducing the levels of underpricing. Hanley and Hoberg (2010) examine the consequences of informative disclosures within prospectuses. Their findings indicate an inverse relationship between underpricing and unique prospectus contents. This underscores the trade-off between the expensive production of information during due diligence and the revelation of information by investors during the bookbuilding process. In a recent study, Jenkinson et al. (2018, pp. 2305-2309) provided empirical support for the information revelation hypothesis by investigating underwriter practices using typically undisclosed data. The researchers analyzed private bookbuilding data for 410 IPOs managed by UK-based banks from January 2010 to May 2015. Their research examined investor behavior and its influence on allocations, focusing on three bid characteristics – price limitations, early submission, and revisions during bookbuilding – along with investor participation in pre-bookbuilding meetings and any potential investor-bank relationships. The findings suggest that price-sensitive bids generally received higher allocations. Further-

more, investors who participated in bookbuilding meetings often received greater allocations of underpriced shares. This supports the notion that investors, who choose to disclose information are rewarded with underpriced shares. This process, however, also has faced criticism due to persistent allegations of reciprocal arrangements between bankers and investors, which are based on a lack of transparency inherent in the bookbuilding process. Nevertheless, it can be acknowledged that using underpricing might serve as a useful tool for companies with high costs of information production. Hence, a viable proxy for underpricing could be the quantity of new information presented in the prospectuses, as it mirrors the balance between self-produced information and information sourced from investors. So far theories of underpricing dealt primarily with information asymmetries. This might not fully explain the pervasive underpricing phenomenon observed in the market. Thus, the next chapter will introduce a notable theory – the lawsuit avoidance theory. This theory explores the concept of using underpricing as a form of insurance against potential legal risks.

### *Lawsuit Avoidance*

A fundamental component in theories explaining underpricing beyond the view of information asymmetry is the lawsuit avoidance hypothesis, which goes back to a study by Tinic (1988). It states that underpricing is used by underwriters to protect themselves from lawsuits in the post-IPO period. This litigation risk stems from the fact that investors can bring legal claims against the issuers for wrongful statements or omissions in IPO prospectuses. Underpricing is an effective tool to reduce the expected value of potential legal liabilities thanks to two aspects. First by decreasing the likelihood that investors will lose money on their investment, it helps to reduce the probability of investors engaging in legal action against the issuers (i.e., lawsuit deterrence). Second, underpricing affects the maximum recoverable damages (i.e., lawsuit insurance), as possible claims for reparations are usually limited to the IPO offer price (Tinik, 1988, pp. 797-800). Drake and Vetsuypens (1993, pp. 68-70) analyze data from 93 IPOs between 1969 and 1990, for which issuers were sued for inadequate prospectus disclosure. To create an artificial experiment setting, they compare these IPOs with a sample of 1,114 IPOs from 1983 to 1987 used in Muscarella and Vetsuypens (1990). After combining both data sets, they group the total sample into three categories – overpriced, underpriced and more than 10% underpriced. In contrast to the lawsuit avoidance theory, no discernible differences were identified within the subsets related to lawsuit probability. The researchers further argue that it is rather medium to long-term share price declines that affect the probability of a lawsuit. Referring to the fact that investors who buy the stock in the secondary market also have the possibility to invoke legal actions, Drake and Vetsuypens (1993, p. 72) conclude that initial underpricing plays no decisive role for the litigation risk and thus revoke the lawsuit avoidance hypothesis. Concerns about the endogeneity of the study were

raised by the authors themselves. The true relationship between underpricing and litigation might not be adequately addressed because the ex-ante risk of a company being sued is neglected by the sample selection design. Addressing these concerns, Lowry and Shu (2002, pp. 322-326) examine the relationship between underpricing and litigation risk. The measurement of litigation risk is complex, as it is influenced by two interrelated factors: the level of insurance and the firm's intrinsic litigation risk. Specifically, underpricing the offering can lead to a decreased likelihood of lawsuits, while higher intrinsic risk tends to correlate with stronger underpricing. This dual relationship can distort results when analyzed through standard Ordinary Least Squares (OLS) methods. To address this issue, the researchers have proposed a two-stage estimation technique. In the first stage, initial return and litigation risk are regressed on exogenous predictors. In the second stage, the predicted values from the initial stage are used as explanatory variables to predict the other respective variable. They find that firms with higher litigation risk underprice their IPOs by greater amounts, providing support for the insurance effect component of the litigation-risk hypothesis. They also find that firms that engage in more underpricing significantly lower their litigation risks, especially for lawsuits occurring closer to the IPO dates, providing support for the deterrence effect of underpricing. Their results emphasize the importance of controlling for endogeneity in studying the relationship between underpricing and litigation risk.

Geographically, studies of litigation risk and underpricing are largely focused on the U.S. There, investors can bring legal action in the form of class action lawsuits against underwriters in relation to Section 11 of the Securities Act of 1933, which requires issuers to reveal only accurate information without material omissions (Drake & Vetsuypens, 1993, p. 65). In Europe, shareholder litigation through class action lawsuits is less common, despite many countries having laws that allow for collective shareholder action. In practice, only a few such lawsuits have been brought to court (Allianz Global Corporate & Specialty SE, 2020). However, recent regulatory initiatives indicate a shift towards a more progressive direction. Article 11 of the prospectus regulation mandates comparable standards for information disclosure to be implemented by national regulators, and a new directive on representative actions has been introduced.<sup>2</sup> Lin et al. (2013) conducted a comprehensive cross-country study to investigate the relationship between litigation risk and IPO underpricing, and how it is influenced by a country's legal environment. By using a 40-country sample, they adopted legal classifications from La Porta et al. (2008) and considered various country-level variables to measure litigation risk. Their findings supported the lawsuit avoidance hypothesis in a cross-country setting, revealing that IPOs in countries with higher litigation risk experience higher underpricing levels. The study further indicated that IPOs in common

law countries, which are representative of the Anglo-Saxon regions and show more litigation risk, exhibit significantly greater underpricing compared to those in civil law countries, which are representative of the law systems of Continental European countries (Lin et al., 2013, pp. 66-69). In conclusion, the lawsuit avoidance hypothesis provides a compelling explanation for underpricing in IPOs across various legal environments. A notable critique against the lawsuit avoidance theory comes from Abrahamson et al. (2011, p. 2073), who argue that litigation costs account for only a minor fraction of 0.58% of gross proceeds in a large sample of IPOs. This limited magnitude of legal risk, they contend, cannot fully explain the underpricing phenomenon. However, this argument overlooks the endogeneity concern of actual litigation costs if underpricing were not employed and fails to consider potential reputational and organizational damages resulting from a lawsuit. The underpricing phenomenon remains a dominant topic in IPO literature. Its widespread occurrence across various settings complicates the attribution of a full explanation to a single theory. The subsequent chapters will discuss a set of methodologies, grouped under the term textual analysis, which can be utilized to extract information from IPO prospectuses for predicting underpricing.

### 2.3. Textual Analysis of Financial Documents

#### 2.3.1. Sentiment Analysis

Traditionally, financial research has focused predominantly on numerical data. However, with the emergence of NLP and related analytical methods, the scope of studies has expanded to include more qualitative information. This field of research is labelled as textual analysis and encompasses methods, which are used to transform qualitative data into quantifiable metrics. Efficient tools for this purpose are domain-specific word lists. For the financial domain, the most important examples are the Loughran and McDonald (2011) word lists (LM word lists). The LM word lists include negative, positive, uncertainty, litigious, strong modal, and weak modal sentiment word lists. This method allows comparing word counts or percentage-of-words (POW) of different documents to gauge document tone. In a subsequent study Loughran and McDonald (2013), use these word lists to study the relationship between first day returns and language in S1 filings (i.e., the first SEC filing in the IPO process, also containing the initial version of the prospectus). Loughran and McDonald (2013, p. 2) further argue that IPOs characterized by a higher frequency of uncertain words are more challenging for investors to value. Consequently, the ratio of words with uncertain sentiment should act as a direct proxy for ex-ante uncertainty, which is linked to higher underpricing according to the theory of Beatty and Ritter (1986). In a sample of 1,887 U.S. IPOs that occurred between 1997-2010, the researchers find evidence supporting their initial conjecture, demonstrating a significant positive relationship between underpricing and document tone. Significant relationships are also discovered for uncertain, weak modal and negative word frequencies (Loughran & McDonald, 2013,

<sup>2</sup> Directive (EU) 2020/1828 of the European Parliament and of the Council of 25 November 2020



pp. 4-8). A related study by Ferris et al. (2013) examines the impact of conservative language in a prospectus. They hypothesize that a prospectus filled with conservative language may appear more credible and reduces the risk of litigation from dissatisfied investors. On the other hand, excessive use of conservative language reduces the interest of investors in the offering and thus requires more underpricing as an incentive. To research this conjecture, they apply different negative sentiment word lists, including the respective LM word list. The findings indicate a positive significant relationship between underpricing and document conservatism, which is more pronounced for technology firms (Ferris et al., 2013, p. 995). For a similar study of the Chinese market, Guo et al. (2022, p. 2) compiled Chinese versions of the LM word lists to test the relationship between underpricing and prospectus sentiment. In addition to the ex-ante uncertainty proxy, the researchers establish litigious words as an ex-ante litigation risk proxy. Based on a dataset with 1917 IPOs from 2009 to 2018, their findings are similar to those of Loughran and McDonald (2013) - negative and uncertain sentiments show a positive and statistically significant relationship with underpricing (Guo et al., 2022, pp. 6-7). Brau et al. (2016, pp. 3-5) analyze the relative frequency of positive and negative strategic words in prospectuses. To compile these two word lists, they first collected a set of strategy-related words. Then, they conducted a survey among MBA students to rate the words as positive or negative in terms of business strategy. By employing these word lists, they discovered that a higher frequency of positive words (and a lower frequency of negative words) was associated with a larger first-day return. Since the process of manually generating word lists can be quite cumbersome, new technologies can be utilized. Das et al. (2022) demonstrate how pre-trained fastText word embeddings, can be employed to create financial lexicons for sentiment analysis tasks. The suggested approach extends the possibilities for researchers, which are bound to a limited set of sentiments defined by published conventional word lists. They find that the generated word lists consist of words that are notably relevant for the respective financial concepts and show similar performance to the manually selected word lists, such as the LM word lists. Sehrawat (2019) suggests using word embedding vectors to compute the similarity between financial documents and the LM word list sentiment categories. In the following chapter, another important component of textual analysis will be examined: the analysis of similarities between documents, which is used to describe the amount of new information that is contained in the document.

### 2.3.2. Similarity Analysis

Extracting document similarities may serve many functions in the financial context. It can be utilized to convey crucial information, such as document sentiment but also the degree of novel information contained within the text. While humans can easily discern whether two texts are similar, this task is more complex for machines. It involves the translation of textual data into numerical representation for auto-

matic processing (Breitung & Müller, 2022, p. 1). Numerical representation can be obtained through established methods like bag-of-words (BOW), or through the use of word embeddings (e.g., fastText and BERT), which are more recent technological advancements in the field of NLP.

Hanley and Hoberg (2010) conducted an important study in the context of IPO underpricing and document similarity. Aligning with the information revelation theory proposed by Benveniste and Spindt (1989), they argue that higher levels of information production and pre-market due diligence by underwriters contribute to reduced underpricing. Issuers investing more resources in information production will thus produce a prospectus with more distinct and informative content. The degree of underpricing is linked to the ratio between informative content (passages containing new information) and standard content (passages mirroring peer prospectuses). To decompose a document into informative and standard content, the researchers developed a novel methodology. The process begins with the creation of a BOW representation for each prospectus. Comparable IPOs are then identified, comprised of two groups: Those that took place within the previous 90 days (recent IPOs), and those within the same industry occurring between 90 to 365 days prior to the issue date (same-industry IPOs). Lastly, an OLS regression without intercept is run. The reference document's BOW vector is used as the dependent variable. Two independent variables – the average BOW vector of recent IPOs and the average BOW vector of same-industry IPOs – are used. Finally, standard content is defined as the sum of both regression coefficients, while informative content is equal to the absolute value of the residuals, representing the content not explained by the two predictors (Hanley & Hoberg, 2010, pp. 2837-2839). The results show a significant positive (negative) relationship between standard content (informative content) and underpricing. In a subsequent study, Hanley and Hoberg (2012, pp. 236-239) apply BOW analysis to a set of IPO prospectuses to analyze the relationship between litigation risk, underpricing and strategic disclosure. The researchers hypothesize that firms may choose between disclosing additional information or using higher levels of underpricing to protect against potential lawsuits. For each given IPO, they compare the similarity of BOW vectors between the initial version of the prospectus and later revised versions. A high degree of similarity leads the researchers to anticipate an increased likelihood of omitting value-relevant information, that was disclosed during book-building. This hypothesis is conversely related to the ex-ante litigation risk proxy mentioned in Guo et al. (2022), which links more legal disclosure to higher underpricing. In a sample of 1,623 US IPOs between 1997 and 2005, they find robust support for the idea that firms may choose underpricing over disclosure as a strategy to hedge against litigation risk. They further argue that the deterrence effect of underpricing is mainly to reduce the likelihood of a Section 11 lawsuit, which would include the names of the underwriters, and the resulting reputational damage to the investment banks. This explains why underwriters continue to opt for underpricing

even when positive information is revealed at investor meetings. A methodologically analogous approach is employed in a study by Hoberg and Phillips (2010, p. 1425), who research asset complementarities as a success factor for mergers and acquisition deals. Therefore, they utilize the BOW technique to evaluate the similarity of product descriptions in 10-K reports of acquirer and target. A recent study making use of advancements in NLP was conducted by Breitung and Müller (2022, pp. 2-3). They propose a new methodology to assess document similarity, using context-dependent sentence embeddings to develop a new metric indicating how similar the current annual report of a firm is to the one from the past year. Therefore, they calculate pairwise cosine similarities between sentence embeddings to identify for each sentence the most similar sentence in the compared document. The final similarity score, labeled as simBERT, is the average of the maximum cosine similarities. High simBERT scores indicate that the company did not disclose much new information. The advantage of this approach compared to conventional BOW methods is that they capture the full semantic meaning of sentences, which means that no exact word overlap is required to show that sentences are similar and negated sentences have dissimilar meanings. This approach is also supported by the findings of Meden (2022, p. 4), showing that sentence embeddings demonstrate high accuracy for semantic similarity tasks. The author further argues that fastText embeddings are also a valid tool for the exploration of similarities, although these output embeddings are not context dependent. The evolution of technologies in sentiment and similarity analysis has greatly expanded the potential for researchers to enhance the accuracy and efficiency of their results. In the following chapter, the development of the hypotheses for this study will be described, which will then be followed by a new section including a detailed description of the methodological approach.

#### 2.4. Hypothesis Development

In order to investigate the research question – if textual analysis of IPO prospectuses can contribute to explaining underpricing in European IPOs – two propositions and a set of hypotheses are developed in accordance with the cited literature. These hypotheses address the probability that a certain amount and type of information in a prospectus will affect the underpricing level and evaluate the performance of different NLP methodologies in conducting textual analysis.

**Proposition 1: Textual information contained in IPO prospectuses explains the level of underpricing.**

Ex-ante uncertainty hypothesis (H1): Uncertain sentiment within a prospectus is indicative of higher levels of ex-ante risk for investors (Beatty & Ritter, 1986; Loughran & McDonald, 2013; Rock, 1986).

*H1: Uncertain sentiment is positively related to underpricing.*

Legal liability hypothesis (H2): The presence of legal sentiment in a prospectus is indicative of a firm's higher ex-ante risk of litigation (Guo et al., 2022; Hanley & Hoberg, 2012; Lowry & Shu, 2002)

*H2: Litigious sentiment is positively related to underpricing.*

Neutral language hypothesis (H3): Neutrality (i.e., neither positive nor negative sentiment) in prospectus language should improve the trust in the firm's disclosure. This hypothesis is inspired by the idea in Ferris et al. (2013), that conservative language increases credibility among investors. Expanding on the notion of greater credibility, this study hypothesizes that language with more negative, but also positive sentiment increases skepticism and results in greater underpricing.

*H3: Positive and negative sentiments are positively related to underpricing.*

Information revelation hypothesis (H4): Firms can invest in price discovery or engage investors in information production. Investors require compensation for information revelation (Benveniste & Spindt, 1989; Hanley & Hoberg, 2010).

*H4: Prospectus similarity is positively related to underpricing.*

**Proposition 2: Performance of textual analysis influenced by selected NLP tool.**

Methodological approach hypothesis (H5): The efficiency of semantic content analysis in prospectus documents can be enhanced through state-of-the art NLP techniques.

Neural network hypothesis (H5.1): The use of neural network-based word embeddings in textual analysis will yield superior results compared to traditional word count methods, due to their ability to interpret meaning without relying on exact word overlap (Mikolov et al., 2013, 2017; Seegmiller et al., 2023).

*H5.1: FastText variables explain more variance than word count methods.*

Transformer model hypothesis (H5.2): Transformer-based word embeddings are expected to yield the highest performance in textual analysis, given their inherent capacity to understand the contextual relationship of words (Breitung & Müller, 2022; Devlin et al., 2018).

*H5.2: BERT-based variables explain more variance than fastText variables.*

### 3. Data and Methodology

#### 3.1. Data and Sample

The dataset employed in this study is derived from a subset of the sample originally utilized by Kaserer and Treßel

(2023, pp. 3-4). It includes listings from Denmark, Finland, France, Norway, and Sweden, with issue date between January 2016 and September 2022. Only exchanges with a registered SME growth market are included. This applies to Euronext, NASDAQ Nordic, Nordic Growth Market (NGM) and Spotlight Stock Market (SSM). The original study considers only operating companies and therefore, excludes listings from SPACs, REITs and closed-end funds. Further, it excludes market transfers, relistings, and secondary listings to limit the scope of the study to initial listings. Merger-based transactions (mergers, demergers, reverse takeovers) are neither considered. Furthermore, the listing must include the sale of either primary or secondary shares, which does not apply to direct listings. Since the goal of this study is to research the effect of textual variables on IPO underpricing, only reliable underpricing data should be considered. Thus, listings with underpricing above 200% are excluded to reduce the impact of noise in the data. After applying these filters, a final sample of 745 offerings are included. As shown in Table 2, of the 745 listings 632 are classified as IPOs, while only 113 are classified as private placements. The majority of listings in the sample are from Sweden, followed by Norway, France, Finland and Denmark having the fewest.

The dataset contains the listing documents in a machine-readable format for each transaction. In the original study, these documents were translated into English using Google Translate (Kaserer & Treßel, 2023, pp. 17-18). To ensure that only English vocabulary words are retained, in this study the listing documents are filtered using the vocabularies from the Python packages NLTK corpus and Pyspellchecker. Words not found in at least one of these dictionaries were discarded. The original dataset contains variables for firm and offering characteristics, including many hand-collected variables from prospectuses, which are further augmented in this study with selected variables from Refinitiv Eikon.

### 3.2. Techniques for Textual Analysis

The proposed methodologies use different NLP approaches for textual analysis, with the objective to link underpricing with prospectus sentiment and prospectus similarity. The primary tool to extract semantic meanings from unstructured textual data is the implementation of word or sentence embeddings. The chosen methodologies are adopted according to Seegmiller et al. (2023) and Breitung and Müller (2022). Word embeddings are a novel technology, employing algorithms to map words into vector space. Their technological advantage, compared to traditional methods, is that they allow for words to be similar, without requiring exact overlap. This makes them a more suitable choice for extracting meaning from a document than traditional word count, such as POW and BOW methods. Introduced by Mikolov et al. (2013, pp. 1-5), word2vec was the first widely available embedding model based on neural networks. To train the model, Continuous Bag-of-Words (CBOW) and Continuous Skip-gram algorithms are used. CBOW predicts a target word based on its surrounding context and Skip-gram does

the opposite, predicting the context words from a given target word. More recent models of this type include GloVe, which learns efficient word representations by training on word-word co-occurrence statistics (Pennington et al., 2014, p. 1532) and fastText (Mikolov et al., 2017, p. 2), which is trained on n-grams and has the ability to handle out-of-vocabulary words. The introduction of transformer architecture (Vaswani et al., 2017) has spurred considerable advancements in the NLP domain. In contrast to earlier models, current methods can generate contextualized word embeddings that effectively capture the semantics of words within their unique contexts. A prominent model is BERT, short for Bidirectional Encoder Representations from Transformers (Devlin et al., 2018, pp. 1-3). BERT, structured as a stack of multiple Transformer encoder layers, incorporates several self-attention heads in each layer. These self-attention mechanisms facilitate the computation of context-aware embeddings for any given sequence of input tokens. A shortcoming, is that no independent sentence or document embedding is computed and thus cosine similarity measures are not well suited for document comparisons. Reimers and Gurevych (2019) address this issue and suggest SBERT, which is a modification of the conventional BERT model fine-tuned for such semantic textual similarity tasks.

FastText word embeddings can be synthesized to document vector representation by aggregating the set of word vectors using their term-frequency-inverse-document-frequency (tf-idf) weights. Tf-idf weighting is a statistical measure that quantifies the importance of a word to a specific document relative to the entire corpus. It emphasizes terms that are frequent within a particular document but not common across all documents (Seegmiller et al., 2023, p. 6). This resulting document embedding can be used for tasks such as sentiment and similarity analysis. However, when it comes to SBERT embeddings, as per the approach by Reimers and Gurevych (2019) and Breitung and Müller (2022), such weighting is not required. Unlike fastText, where a single document vector is obtained, SBERT characterizes a document through a list of sentence embeddings. Cosine similarity, which is derived by comparing the cosine of the angle between two vectors, is used in both cases to obtain sentiment and similarity scores. This technique interprets the similarity in terms of semantic meaning of two embedding vectors. Specifically, the measure is computed as the normalized dot product of the two vectors, which provides a robust measure of their relative orientation. Cosine similarity scores range between [-1,1]. A value of -1 signifies oppositely directed vectors, a value of 0 denotes orthogonal vectors, and a value of 1 represents identically orientated vectors. These values analogously express the semantic associations between words or documents. Equation 1 describes the formula for cosine similarity of two vectors A and B (Seegmiller et al., 2023, p. 2):

$$\text{similarity} = \cos(\Theta) = \frac{A \cdot B}{\|A\| \|B\|} \quad (1)$$

**Table 2:** Initial offerings by exchange country and type

| Country        | Exchange Name | Exchange Type     | IPOs       | Private placements | Total      |
|----------------|---------------|-------------------|------------|--------------------|------------|
| <b>Denmark</b> | NASDAQ        | Regulated market  | 9          | 0                  | 9          |
|                | Nordic        | MTF               | 13         | 0                  | 13         |
|                |               | SME growth market | 31         | 2                  | 33         |
|                | <b>Total</b>  |                   | <b>53</b>  | <b>2</b>           | <b>55</b>  |
| <b>Finland</b> | NASDAQ        | Regulated market  | 17         | 0                  | 17         |
|                | Nordic        | MTF               | 19         | 1                  | 20         |
|                |               | SME growth market | 27         | 1                  | 28         |
|                | <b>Total</b>  |                   | <b>63</b>  | <b>2</b>           | <b>65</b>  |
| <b>France</b>  | Euronext      | Regulated market  | 38         | 0                  | 38         |
|                |               | MTF               | 6          | 7                  | 13         |
|                |               | SME growth market | 39         | 2                  | 41         |
|                | <b>Total</b>  |                   | <b>83</b>  | <b>9</b>           | <b>92</b>  |
| <b>Norway</b>  | Euronext      | Regulated market  | 19         | 3                  | 22         |
|                |               | MTF               | 1          | 86                 | 87         |
|                | <b>Total</b>  |                   | <b>20</b>  | <b>89</b>          | <b>109</b> |
| <b>Sweden</b>  | NASDAQ        | Regulated market  | 65         | 0                  | 65         |
|                | Nordic        | MTF               | 108        | 5                  | 113        |
|                |               | SME growth market | 124        | 3                  | 127        |
|                |               | NGM               | MTF        | 30                 | 1          |
|                | SSM           | SME growth market | 11         | 0                  | 11         |
|                |               | MTF               | 46         | 2                  | 48         |
|                | <b>Total</b>  | SME growth market | 29         | 0                  | 29         |
| <b>Total</b>   |               |                   | <b>413</b> | <b>11</b>          | <b>424</b> |
| <b>Total</b>   |               |                   | <b>632</b> | <b>113</b>         | <b>745</b> |

This table shows the number of transactions split by country, exchange name, exchange type and listing type for the period between 2016 to 2022.

Cosine similarity is employed to generate similarity and sentiment variables. In the following chapter, a detailed explanation of the derivation process for these textual variables is provided.

### 3.3. Sentiment Analysis of IPO Prospectuses

#### 3.3.1. Percentage-of-Words Sentiment Analysis

The POW approach is based on the study by Loughran and McDonald (2013). It is a straightforward method, of determining document sentiment through word list frequencies within a document. Critical for the success of this approach is the use of a word list that is specific to the applicable domain. Particularly in the field of accounting and finance, words often have different meanings than in general language. Thus, using a “discipline-specific word list can reduce measurement error” (Loughran & McDonald, 2011, p. 44). Similar to the study by Loughran and McDonald (2013), the LM word lists are used to determine the POW variables. A Python module to download the word lists can be found at the Notre Dame Software Repository for Accounting and Finance, which is maintained by Bill McDonald, who co-authored the refer-

enced study<sup>3</sup>. Following the developed set of hypotheses, this study makes use of the litigious, negative, positive, and uncertainty word lists. Loughran and McDonald (2011, pp. 44-45) provide a detailed description of the word lists, which is summarized in the following paragraph.

The litigious sentiment list consists of 731 words that are not necessarily directly related to lawsuits but are common in a litigious environment and often are related to legislation and regulation. These words include terms like ‘allegation’, ‘claimant’, ‘deposition’ and ‘hereupon’. The negative sentiment list, which consists of 2,337 words, describes undesirable financial situations for a firm. Examples of these words include ‘bankruptcy’, ‘decline’, ‘difficult’ and ‘loss’. These words are often associated with negative implications and are reflective of adverse conditions or outcomes. The positive sentiment list is significantly more compact, containing 353 words that are usually linked with favorable circumstances in finance. This list encompasses terms like ‘achieve’, ‘efficient’, ‘improve’ and ‘profitable’, all of which convey a sense of success, strength, or beneficial attributes. The authors highlight

<sup>3</sup> Notre Dame Software Repository for Accounting and Finance: <https://sraf.nd.edu/loughranmcdonald-master-dictionary/>



that underwriters who write the prospectus are conscious of investors' use of textual analysis to evaluate the document. As a result, they try to avoid negative words and instead use negated positive words. Consequently, the researchers emphasized selecting terms with unilateral meanings that, when used, clearly express the intended sentiment. Lastly, the uncertainty list focuses on the sentiment of ambiguity, doubt, and imprecision, containing a total of 285 words. Words such as 'approximate', 'contingency', 'uncertain' and 'sometimes' are included. Some words may appear in multiple lists. The overlaps exist mainly between litigious, negative and uncertainty lists (Loughran & McDonald, 2011, p. 45). Each list contains several topics that are related to the specific sentiment and describe it holistically. In the process of obtaining the POW variables, no pre-processing operations such as stop-word removal or lemmatization are applied to word lists and documents. As a result, the lists often include multiple words from the same word group. For example, the negative word list contains words such as 'defend', 'defendant', 'defendants', 'defended', 'defending', and 'defends'. Additionally, words that may lack standalone semantic meaning but intend to create specific sentiments in certain contexts are also included in the list. Examples from the litigious list are 'herefor', 'herefrom', 'insofar', 'moreover', 'therefrom'. This shows that the selection of words is very approach-specific. In the next chapter, which will discuss the creation of a set of embedding-based variables, a new method addressing these characteristics will be suggested.

### 3.3.2. FastText Sentiment Analysis

Similar to the POW approach, fastText variables are calculated for the same categories, using LM word lists as the foundation for sentiment scoring. The extraction of sentiment through word embeddings is a multi-stage process inspired by the study of Seegmiller et al. (2023). The process consists of data preprocessing, document vectorization, and finally, document sentiment scoring for each category. The first step involves selecting the most suitable embedding model, and in this study, fastText has been chosen. Developed by Mikolov et al. (2017), fastText is the latest model in conventional word embeddings. It utilizes n-grams to handle out-of-vocabulary words and thereby to optimize the amount of information captured. The default version of fastText represents embeddings in a 300-dimensional vector space. Pre-trained word vectors are available for download in multiple languages, having been trained on Wikipedia and other web data sources.<sup>4</sup> Before computing the word embeddings, the documents must be preprocessed, to facilitate accurate sentiment analysis. The pre-processing steps are adopted from the BOW approach described in Kaserer and Treßel (2023, p. 19). The prospectuses are subjected to several pre-processing steps. First, they are tokenized, and stop words, named entities, and punctuation marks are removed. Subsequently, the resulting tokens are filtered based on their parts of speech

tag, with pronouns, proper nouns, conjunctions, determiners, adpositions, interjections, symbols, and other text parts being discarded. The remaining tokens undergo lemmatization, simplifying them to their base or root form. This normalization allows for simplified comparisons within word groups by establishing a standard form for the words. In addition, non-ASCII characters are removed and tokens with less than three and more than 45 characters are removed to minimize noise. These pre-processing steps are executed using the Python packages Spacy, NLTK and Unidecode.

The next phase involves computing a tf-idf weighted embedding vector for each document. This includes first applying the tf-idf vectorization to each document, a method that is similar to the BOW approach. It creates a vector, representing all unique words in the corpus of documents. Using the tf-idf vectorizer from the Python package Scikit-learn, for the given dataset, a vector of length 25,684 is obtained. Each of the 745 documents is then characterized by a vector of the same length, storing the individual tf-idf weights for each word. The formula for calculating the tf-idf weight for word  $t$  in document  $d$  is outlined in equations 2 to 4. Equation 2 describes the synthesized tf-idf formula. Equation 3 describes the calculation for the first component of the full formula, the term frequency (tf), and equation 4 describes the second component, the inverse document frequency (idf). The representation is based on Seegmiller et al. (2023, pp. 6-7) and Mandal et al. (2021, p. 435):

$$tf - idf(t, d) = tf(t, d) \cdot idf(t) \quad (2)$$

$$tf(t, d) = \frac{\text{frequency of term } t \text{ in document } d}{\text{total number of terms in document } d} \quad (3)$$

$$idf(t) = \log \left( \frac{\text{total number of documents}}{\text{total number of documents with term } t + 1} \right) \quad (4)$$

The computations yield a  $745 \times 25,684$  matrix representing the tf-idf weights of the documents. Subsequently, the vector containing all words is passed into the fastText model, generating a  $25,684 \times 300$  matrix that includes the embedding representations of each word. To obtain a single vector for each document, the dot product between a document's tf-idf weights and the word embedding matrix is computed, effectively combining the importance of individual words with their semantic representations. Especially for prospectuses that contain large amounts of standardized words, which are present across all documents, this weighting technique optimizes the information content of the document embedding. The resulting outputs are 300-dimensional document arrays characterizing the prospectuses. Compared to the traditional BOW methodology, this approach provides a significantly reduced dimensionality, which makes computation more efficient (Seegmiller et al., 2023, pp. 7-8). To further refine the analysis, several modifications are applied to the LM word lists. These adjustments address limitations arising from the narrow application scope (limited to POW). Unaltered LM

<sup>4</sup> fastText library: <https://fasttext.cc/docs/en/crawl-vectors.html>

word lists may introduce measurement errors due to varying word group lengths and the inclusion of words without standalone meanings. A subset of the LM word lists is created by applying similar part-of-speech filters as for the prospectus pre-processing. Additional filters are added for auxiliary words and existential adverbs (e.g., there, therefrom, etc.) because these word types often do not express a real sentiment. Subsequently, the remaining words are lemmatized, and resulting duplicates are discarded. FastText embeddings are then calculated for each word in the reduced word lists. For optimized mapping, these vectors are further reduced to two dimensions using principal component analysis. Subsequently, for each word list, the two-dimensional word vectors are clustered into five groups using the k-means algorithm. These operations are executed utilizing the Scikit-learn package. From each cluster, two words are randomly drawn to form a robust new word list, yielding a total of 10 different words. This results in four lists of identical length with a robust exposure to distinct topics within each sentiment list. The reduced word lists are included in Table 11, in the appendix. Finally, sentiment scores for each document are calculated using the different word lists. This is achieved by computing the cosine similarities between the document embedding vector and each of word list item's embedding vectors. The document's score for a given category is represented as the average of these cosine similarities. This measure quantifies the relationship between the sentiment in the prospectus and the sentiment embodied by the wordlist. Consequently, each prospectus is associated with multiple sentiment scores. Each score is corresponding to how close the semantic meanings between prospectus and respective wordlists are. A shortcoming of this approach is that it neglects the contexts of words, resulting in a word with different meanings for a given context being wrongfully represented by the same embedding vector. Additionally, the order of words and the semantic meaning of negated expressions is not captured effectively. To address these limitations, the next chapter presents a method based on state-of-the-art transformer models, which enables the computation of contextualized sentence embeddings.

### 3.3.3. Sentence-BERT Sentiment Analysis

The introduction of the transformer architecture, which is the basis for BERT, has revolutionized the field of NLP and many connected domains, as it has established a new benchmark for numerous language-specific tasks with state-of-the-art results. (Devlin et al., 2018, p. 2). The inspiration for the SBERT sentiment variables comes from Seegmiller et al. (2023, p. 9), who propose to extend the methodology described in the previous chapter with contextualized word embeddings. For this purpose, numerous models, pre-trained on extensive corpora and fine-tuned for various downstream tasks, can be readily accessed through the Hugging Face

Transformers<sup>5</sup> and Sentence Transformers<sup>6</sup> libraries. The broad availability of these resources has significantly catalyzed the adoption of transformer-based models amongst the research community (Wolf et al., 2020). Previous studies have demonstrated the superior performance of contextualized embeddings in terms of word similarity tasks compared to traditional models (Rogers et al., 2021, p. 845).

In this study, the SBERT model by Reimers and Gurevych (2019) is used. As shown in Figure 1, the basis for the sentence embeddings is the classical BERT model introduced by Devlin et al. (2018, p. 3). The BERT base model is equipped with 12 layers, and 12 attention heads and contains 110M parameters. The model has a hidden size of 768, which represents the dimensions of the embedding vectors. SBERT is an extension of BERT, trained on classified sentence pairs, it produces a fixed-sized average vector representation for a given input sentence. The fine-tuning process optimizes the model to combine individual word vectors in a way that the resulting sentence embedding is semantically meaningful. For each sentence an embedding with a hidden size of 768 is produced (Reimers & Gurevych, 2019, pp. 3-4). SBERT requires fewer preprocessing steps than the fastText method. The only requirement is to split the documents into lists of sentences. For this purpose, the Sentencizer method from the Spacy package is used, which employs grammar-based sentence-boundary detection. Next, the list of sentences from each of the 745 documents is passed into the SBERT model. The resulting output is a list of the same length, with each entry being a 768-dimensional sentence embedding vector. Although SBERT can handle single-word inputs, as found in the sentiment word lists, the model is fine-tuned for sentence inputs. Therefore, it is suggested to modify the word lists to optimize the sentiment scores for this approach. The previously introduced reduced word lists are expanded by incorporating each word into a short, exemplary sentence that conveys its potential meaning within a prospectus document, consistent with the given sentiment category. The framed sentences are intentionally unspecific so as not to limit the semantic meaning of the original word list. The sentence dictionaries are listed in Table 11 in the Appendix. Except for the fact that the sentiment lists now contain sentences instead of words, the remaining process to compute sentiment scores is analogous to the process presented in the previous chapter. The sentences from the sentiment list are encoded using the SBERT model. Next, by calculating the average pairwise cosine similarity between the document's and the dictionary's sentence embeddings, the final sentiment scores for each category are computed. To demonstrate the validity of the newly designed sentiment scoring method, two exemplary documents are provided:

<sup>5</sup> Hugging Face Transformers library:  
<https://huggingface.co/docs/transformers/index>

<sup>6</sup> Hugging Face Sentence Transformers library:  
<https://huggingface.co/sentence-transformers>

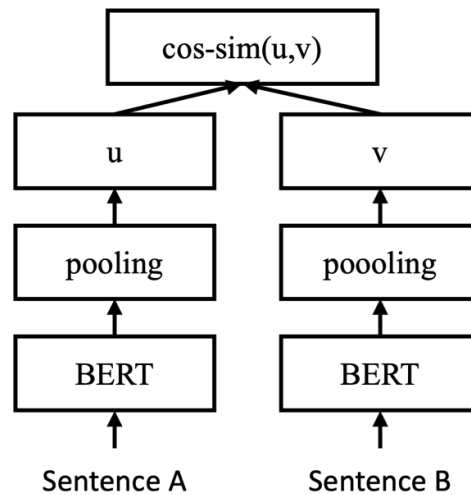


Figure 1: SBERT architecture to compute similarity scores. Taken from Reimers and Gurevych (2019, p. 3)

**Document 1:** [“We are not able to limit losses related to tax penalties.”; “Economic conditions might be worse than expected.”; “Competitive disadvantages could be result of criminal proceedings.”]

**Document 2:** [“We managed to exceed quoted profit guidance thanks to strong demand.”; “The annual targets for the company will be exceeded.” “We have successfully averted any legal problems.”]

The sentiment scores logically align with the anticipated direction: Document 1 contains negative, litigious, and uncertain language, while Document 2 expresses positive, certain, and non-litigious language. The scores for these categories are notably distinct. Because prospectuses are long documents with thousands of sentences, the differences between sentiment scores for full documents will be more nuanced, and the scores will generally be lower due to the different sentence structure (i.e., prospectuses contain more complex sentences than sample documents). In addition to sentiment analysis, this study explores the degree of information revelation in a prospectus document. To achieve this, a similarity analysis of comparable documents is conducted. The methodology for this will be detailed in the subsequent chapter.

### 3.4. Similarity Analysis of IPO Prospectuses

#### 3.4.1. Bag-of-Words Similarity Analysis

In order to study the impact of information disclosure on underpricing, the BOW methodology is adopted according to the studies by Hanley and Hoberg (2010) and Hanley and Hoberg (2012). The objective is to establish a measure for the information revelation present in an IPO prospectus. Information revelation refers to the level of information generation during pre-market due diligence, carried out by the

issuing company and its underwriters. Since the process of generating information involves substantial costs, underwriters might choose to outsource these activities to investors. If a larger portion of the price discovery process is outsourced, it may result in the prospectus containing less information specific to the given offering. Consequently, the prospectus might resemble those from prior related offerings. Therefore, prospectus similarity should describe the degree of information revelation with an inverse relationship. Based on the BOW approaches referenced in the above-mentioned studies, a new measure for similarity of a given prospectus compared to those of its peer group is introduced to test this assumption.

The process consists of document pre-processing, vectorization, and similarity analysis. For preprocessing, the identical steps, as described in Chapter 3.3.2 are utilized. Subsequently, to convert the prospectuses into a numerical format, the CountVectorizer function from the Scikit-learn package is employed. To refine the content and eliminate unwanted elements not removed during preprocessing, only words that appear in a minimum of 2.5% of the documents are included. This step is necessary with regard to similarity analysis since higher dimensional vectors might lead to biased results (Breitung & Müller, 2022, p. 8). The output of the vectorization is a BOW vector containing 6505 elements, which is notably smaller than the tf-idf vector associated with the fastText approach. For each of the 745 documents the vector stores the word count of the respective item. Normalization is applied, so that vectors store relative word frequencies which sum up to 1 for every document, independent of its length (Hanley & Hoberg, 2010; Kaserer & Treßel, 2023). In the next step, the reference documents are identified from recent IPOs and same-industry IPOs, as outlined by Hanley and Hoberg (2010). Recent IPOs occurred in the previous 90-day period and same-industry IPOs are identified by their Fama-French 12 industry code (FF12) and are limited to offerings that occurred between 90 days to 1 year before the respective issue

**Table 3:** Document sentiment scores with SBERT

|            | Litigious-SBERT | Negative-SBERT | Positive-SBERT | Uncertainty-SBERT |
|------------|-----------------|----------------|----------------|-------------------|
| Document 1 | 0.408           | 0.520          | 0.325          | 0.503             |
| Document 2 | 0.318           | 0.318          | 0.507          | 0.292             |

This table presents the SBERT scores for Document 1 and Document 2 for sentiment categories litigious, negative, positive, and uncertainty.

date. The similarity of a given prospectus to the comparable documents is then determined using cosine similarity, as recommended by Hanley and Hoberg (2012, p. 253). For each of the two reference document groups, the average cosine similarity is computed between the BOW vector of the given prospectus and the BOW vector of the documents in the respective group. Subsequently, the similarity score is expressed as the average of the cosine similarities of both groups (in case one of the groups has no elements, the similarity score defaults to the value of the other group). The approach detailed in Hanley and Hoberg (2010), which determines standard and informative content using regression coefficients and residuals respectively, was also explored. The findings mirrored those in the original study. Yet, due to concerns over interpretability and consistency, the cosine similarity method was favored. For clarity, this specific approach is labelled as BOW (cosine similarity). The next chapter will present a novel similarity measure utilizing contextualized sentence embeddings.

### 3.4.2. SimBERT Similarity Analysis

The simBERT document similarity measure addresses a significant limitation of the BOW method. Namely, BOW approaches cannot capture the semantic meaning of texts, which largely depends on structure and use of words. Moreover, different words often express identical concepts, for which simple word count techniques fail to capture the similarities. Depending on the author's writing style, two documents can be characterized by very different vector representations, even when the message conveyed is similar. SimBERT, a novel method for extracting semantic similarity, that addresses these concerns, is proposed by Breitung and Müller (2022). The proposed document similarity measure makes use of SBERT sentence embeddings, which are obtained identically as in Chapter 3.3.3, for the sentiment scoring method. SimBERT assesses the similarity between two documents on the sentence level. For every sentence in a particular document, its closest counterpart in the second document is determined by computing pairwise cosine similarities between the sentence embeddings from both documents. The similarity score between documents is derived by averaging the maximum cosine similarities across all sentence pairs (Breitung & Müller, 2022, p. 2). Finally, to determine the degree of information revelation, each prospectus is assessed in comparison to documents from similar offerings. A high degree of similarity indicates a low level of information revelation, which is anticipated to relate to more pronounced underpricing. To identify the relevant offerings for comparison, the

methodology outlined in the preceding chapter is used. For each category – recent IPOs and same-industry IPOs – the average similarity scores are calculated between the prospectus and every document within the respective group. The final simBERT score is derived by averaging the similarity scores obtained from each of the two document categories. Again, if one group contains no documents, the value from the other group is adopted as the final simBERT score. To illustrate this methodology, the example from the SBERT chapter is augmented with a third document, with a similar meaning as Document 1, but different use of vocabulary (Document 1 and Document 2 remain identical as in the previous example with opposing meanings):

**Document 3:** [“We cannot mitigate losses from tax-related fines.”, “The economic climate may deteriorate beyond our predictions.”, “Legal issues could lead to competitive setbacks.”]

The outcomes validate the efficacy of the simBERT approach. They distinctly differentiate between semantically divergent documents (Document 1 - Document 2 and Document 2 - Document 3) while demonstrating a high similarity score for related documents (Document 1 - Document 3). A traditional BOW method would have failed to identify the similarity, since word overlaps were intentionally avoided. Consequently, simBERT can be used as a robust measure of textual similarity. This concludes the present chapter and the section detailing methodology. The subsequent chapter will provide summary statistics encompassing the most critical document, firm- and offering-specific, and textual variables.

## 4. Descriptive Statistics

### 4.1. Listing Documents

This study explores the relationship between textual information and underpricing, therefore using IPO prospectuses as the main source of information for the study. Given the different content requirements of the prospectus types outlined in previous chapters, it is important to illustrate the effect of this regulatory aspect on the actual listing document. For this purpose, Table 11, in the Appendix, provides detailed information on the word count, sentence count, average sentence length, and number of unique words for each of the document types. It shows that the average length of documents varies substantially among the groups. The full prospectus stands out with the highest average length, containing 58,331.384 words distributed over 2,216.858



**Table 4:** Document similarity scores with simBERT

|            | Document 1 | Document 2 | Document 3 |
|------------|------------|------------|------------|
| Document 1 | 1          | 0.388      | 0.837      |
| Document 2 | 0.388      | 1          | 0.468      |
| Document 3 | 0.837      | 0.468      | 1          |

This table presents pairwise simBERT scores between Document 1, Document 2 and Document 3.

sentences. Following that, the growth prospectus averages 33,506.486 words, divided into 1,252.171 sentences. Admission documents have the shortest content, with an average of 19,950.344 words and 827.466 sentences. These disparities in content volume align with the stricter regulatory requirements imposed on growth prospectuses and full prospectuses. Figure 2 visually represents this relationship, highlighting the sentence count associated with the different listing documents.

In terms of sentence length, full prospectuses and growth prospectuses are quite similar, averaging 25.669 and 25.697 words per sentence, respectively. Admission documents present a noticeably shorter average sentence length, with 24.203 words. Sentence length is a commonly utilized metric to gauge complexity and readability (Loughran & McDonald, 2016). Longer sentences often denote lower readability. This suggests that the stringent content prerequisites for full and growth prospectuses while indicating more information disclosure, might simultaneously heighten complexity for investors. The number of unique words is distributed analogously to the document length. The influence of different listing types on underpricing is further examined in the following chapter.

#### 4.2. Transaction Volume and Underpricing

The underpricing phenomenon proves to be consistent within the analyzed sample. Figure 3 presents the yearly average underpricing across the different exchange types during the sample period. The values are mostly positive throughout the years. Listings on regulated markets consistently display an underpricing of around 10%. Listings on MTFs, in contrast, displayed greater variation. While they showed average underpricing of over 20% in 2019 and 2020, in 2018 the average underpricing was negative. The newly introduced SME growth markets, which recorded the first transactions in 2019, demonstrated positive underpricing for the years 2019 through 2021, but shift to negative underpricing in 2022.

Figures 6 and 7 in the Appendix provide a more comprehensive view of transaction volume and mean underpricing across different category breakdowns. As shown in subfigure 6(a), the periods with the highest market activity, are spanning from Q3 2020 to Q4 2021. Subfigure 7(a) reveals notably elevated levels of underpricing during Q2 and Q3 2020, coinciding with the onset of the Covid-19 pandemic in Europe. According to the theory of Beatty and Ritter (1986),

an explanation for this observation might be that the pandemic has raised underlying risk and risk perception, which caused the higher levels of underpricing.

The data in subfigure 7(b) underscores the disparities between listing types. Private placements, with a sample size of 113, show an average underpricing of 14,336%, nearly twice the average underpricing of the 632 IPOs, which stands at 7,380%. Further breakdowns by exchange and prospectus type can be found in subfigures 6(c), 6(d), 7(c), and 7(d). Surprisingly, the listings on a regulated market display the highest underpricing average at 10,265%, followed by MTFs at 8,431% and SME GMs at 7,431%. Contrary to expectations that listings without a prospectus requirement would experience higher underpricing, the data shows listings with a full prospectus average of 9.118% underpricing almost identical to admission documents, which have a slightly higher value of 9.749%. Only growth prospectuses deviate notably with a mean underpricing of 2.766%. The levels of underpricing vary significantly throughout the sample period. The irregular behavior observed in certain categories may be partly due to regulatory changes and external shocks, such as the Covid-19 pandemic, which affected European markets during the sample period. Given the limited timeframe of the sample, potential biases in the data cannot be ruled out. To obtain reliable results from the study, it is crucial to select a robust set of control variables for subsequent regressions. The following chapter will provide summary statistics for these variables.

#### 4.3. Control Variables

In this chapter, the set of variables, later used for regression analysis is introduced. The selection of these variables is based on related studies on IPO underpricing and textual analysis by Guo et al. (2022), Hanley and Hoberg (2010), and Loughran and McDonald (2013). The subsequent analysis is based on Table 12 in the Appendix, which contains the descriptive statistics.

The primary variable of interest in this study is underpricing. This is defined as the change between the offer price and the first day closing price, indicated in decimal format. As highlighted in the preceding chapter, differences exist between IPOs and private placements, with the latter displaying substantially greater underpricing. The average underpricing across the entire sample is 0.085, which, when compared with the European averages shown in Table 1, appears relatively low. The values reported by Loughran and McDonald

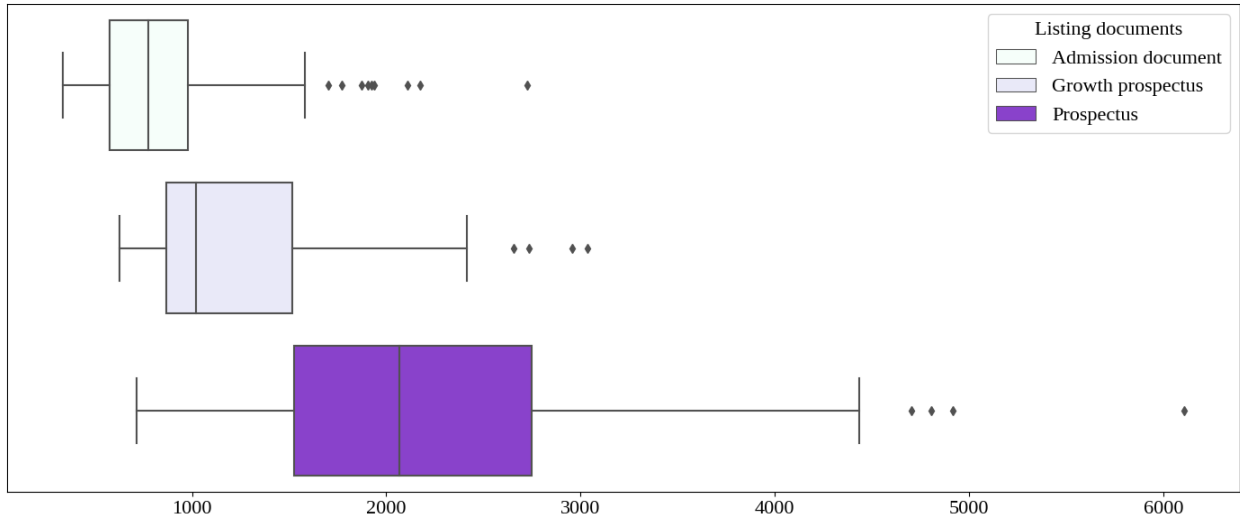


Figure 2: Boxplot of sentence counts in listing documents.

The figure presents boxplots of document lengths proxied by number of sentences for different listing types: full prospectus, growth prospectus, and admission document.

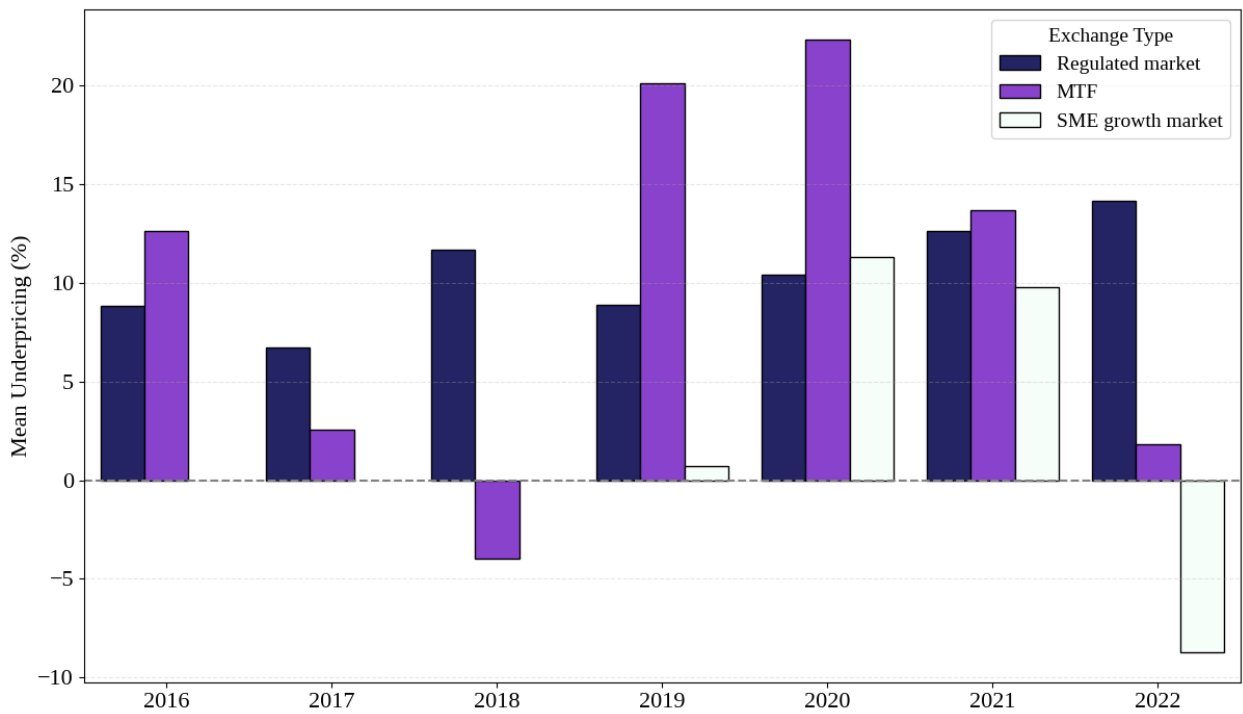


Figure 3: Time-series bar charts of yearly average underpricing

For the period from 2016 to 2022 yearly values for mean underpricing are represented across the different exchange types: Regulated Market, MTF, and SME GM. Each bar represents the mean underpricing for a specific year and exchange type.

(2013, p. 6) and Guo et al. (2022, p. 5) also show much higher average values for underpricing of 0.348 and 0.404, respectively. Table 12 further includes summary statistics for offering and company characteristics used as control variables in the regression models. The sales variable is represented by the issuing firm’s sales figure for the year preced-

ing the listing. While sales data is an important indicator of a firm’s size and economic performance, used as a control variable in Loughran and McDonald (2013), it was not included in the regression models. This exclusion was due to the multicollinearity issues it posed in combination with textual variables. Instead of sales, the study employs the num-

ber of employees as an indicator of firm size (similarly embodied by the value from the year preceding the IPO). As depicted in Table 12, a parallel trend is observable between sales and the number of employees. Typically, firms opting for IPOs show higher sales and a larger workforce, than those choosing private placements to go public. Yet, it is notable that both metrics are significantly skewed by outliers. This skewness becomes apparent when comparing the mean and the median: while firms, on average, have more than 319 employees, the median is just 24. The stark contrast is evident when examining the maximum value for employees, which stands at 40,131. Thus, to limit the impact of outliers, log transformation is used for this variable for regression analyses. The next control variable to be used is the pre-file NASDAQ return, which serves as a market sentiment proxy, similarly as adopted by Hanley and Hoberg (2010). The variable is determined by the 30-day return preceding the issue date for the specific listing. The average pre-file NASDAQ return stood at 0.016 and is notably higher for private placements than for IPOs. This difference can be attributed to the relaxed regulatory requirements on private placements, allowing underwriters to move more swiftly and react to periods of heightened market sentiment. Compared to the sample used in Hanley and Hoberg (2010, p. 2833) from 1996 to 2005, which shows prior NASDAQ returns of 0.049, it seems that either the market sentiment was generally less favorable over the sample period of this study or the variable became a less important factor for the timing of listings. Market sentiment is also included as a control variable in the study by Guo et al. (2022), however there it is defined as the return between offering date and listing date, which is usually a much shorter period. The remaining control variables are dummy variables. The tech dummy variable, similar to the one found in Hanley and Hoberg (2010), is based on the identified SIC code classification by Loughran and Ritter (2004, p. 35). Nearly one-third of the entire dataset is classified as a technology firm, with a more significant proportion being observed among IPOs. In Hanley and Hoberg (2010, p. 2833) almost 50% of issuances come from tech firms. The subsequent two variables, the regulated market, and the IPO dummy, serve to control for the specific characteristics of European markets and to account for differences between listing types. The regulated market variable shows, that only 2.7% of private placements are listed on regulated markets, a notably smaller fraction compared to the 23.4% of IPOs. This can be explained by considering a main motivator for companies to opt for private placements, which is the prospectus exemption rule. However, prospectus exemption applies only to exchange-regulated markets. As a result, companies choosing private placements rarely decide to list on regulated markets (Kaserer & Treßel, 2023, p. 6).

Table 5 presents the pairwise correlation of the mentioned variables. The pronounced and statistically significant correlation between the number of employees and sales supports the decision to substitute the sales variable in the regression analysis. The only variables that demonstrate a significant correlation with underpricing are the pre-file

NASDAQ return and the IPO dummy. Overall, the observed correlations are relatively low, mitigating the risk of multicollinearity in the subsequent regression analyses. In the next chapter summary statistics for the textual variables, which constitute the second component of the regression analyses will be presented.

#### 4.4. Textual Variables

##### 4.4.1. Sentiment Analysis

This chapter explores the sentiment variables highlighted in Section 3.3. Table 13, in the Appendix, offers a comprehensive set of summary statistics for these variables, with a dedicated breakdown by listing type and will be used as a reference throughout this section. First, POW variables are analyzed, which are also considered in the studies by Guo et al. (2022) and Loughran and McDonald (2013). For the POW variables, the mean values marginally exceed the median values across all word lists, though the discrepancies are not substantial. The recorded mean values for litigious, negative, positive, and uncertainty sentiments are 0.648%, 1.147%, 0.816%, and 1.325%, respectively. As such, listing documents display a stronger negative and uncertain sentiment compared to litigious and positive sentiments. These findings align closely with those of Loughran and McDonald (2013, p. 6), who documented values of 0.72%, 1.41%, 0.94%, and 1.28% for the same categories in the final prospectus. However, the values obtained for the Chinese IPO market by Guo et al. (2022, p. 5) differ markedly, indicating 7.06%, 3.60%, 5.22%, and 1.51% for litigious, negative, positive, and uncertainty sentiments respectively. One potential explanation for this variance is that Guo et al. (2022, p. 3) expanded the translated LM wordlists by adding 207 positive words, 53 negative words, 28 uncertainty words, and 51 litigious words, which might appear with high frequency in their sample of prospectuses. Another consideration could be fundamental differences between Chinese listing documents and those from Europe or the U.S. For the sample documents analyzed in this study the standard deviation ranges between 0.202 for positive-POW and 0.341 for uncertainty-POW variable. Comparing IPOs to private placements, the data suggests that private placement documents have a higher frequency of litigious, positive, and uncertain words. In contrast, IPO prospectuses contain more positive terms. For example, the occurrence of litigious words in private placements is nearly double that in IPOs. The differences between litigious and negative sentiments are also substantial, whereas the values for positive words show only a marginal variation. The heightened litigious, negative, and uncertain sentiments observed in IPOs align logically with the company characteristics discussed in the preceding chapter. Typically, private placements are favored by smaller firms with lower sales figures and a smaller workforce. As such, smaller firms often have an inherently higher risk profile. This relationship offers one plausible connection between textual information and the anticipated ex-ante risk.

The subsequent variables were derived using the fastText word embeddings. Higher values signify a more pronounced

**Table 5:** Pairwise correlations of the control variables

|                       | Underpricing | Sales    | Employees | Pre-file<br>NASDAQ<br>return | Tech<br>company<br>(D) | Regulated<br>market<br>(D) | IPO<br>(D) |
|-----------------------|--------------|----------|-----------|------------------------------|------------------------|----------------------------|------------|
| Underpricing          | 1            |          |           |                              |                        |                            |            |
| Sales                 | 0.01         | 1        |           |                              |                        |                            |            |
| Employees             | 0.017        | 0.878*** | 1         |                              |                        |                            |            |
| Pre-fileNASDAQ return | 0.094**      | 0.023    | 0.024     | 1                            |                        |                            |            |
| Tech company (D)      | -0.01        | -0.059   | -0.075**  | 0.002                        | 1                      |                            |            |
| Regulated market (D)  | 0.034        | 0.189*** | 0.270***  | -0.004                       | -0.145***              | 1                          |            |
| IPO (D)               | -0.077**     | 0.021    | 0.032     | -0.042                       | 0.096***               | 0.188***                   | 1          |

This table presents pairwise correlations of control variables. In the table, (D) is used to indicate that the respective variable is a dummy variable. Statistical significance at the 1%, 5%, and 10% levels is denoted by \*\*\*, \*\*, and \*, respectively.

similarity between the document and the corresponding sentiment word list. Surprisingly, when compared with the POW variables, the highest mean value emerged for the positive sentiment at 0.333, paired with a standard deviation of 0.014. It is followed by the uncertainty variable, with a mean value of 0.300 and a standard deviation of 0.013. The next highest score is attributed to negative sentiment with a mean of 0.264 and the least standard deviation of 0.011. The litigious sentiment records the lowest score with a mean value of 0.245 and a standard deviation of 0.014. Similar to the POW set, the differences between mean and median are neglectable. When looking at the standard deviations for the fastText variables, it becomes evident that the standard deviations are considerably smaller than those of the POW variables. One plausible explanation for this might lie in the computation methods of the variables. Whereas the POW methodology considers solely the words in the LM lists, the embedding method considers all words. Since the maximum similarity score between any two words is set at 1, differences between entire documents containing a vast array of unique words will be denoted by more subtle variations. The SBERT scores are similar to those obtained from fastText in terms of interpretation. Both groups are based on cosine similarities, where a maximum value of 1 signifies two identical sentences. The findings present another unique relative ranking of sentiment detected in the prospectuses when compared to POW and fastText methodologies. Among the SBERT variables, the litigious sentiment shows the highest mean value (0.308) followed by negative (0.299), positive (0.287) and uncertainty (0.282). The respective standard deviations for the variables are 0.012; 0.016; 0.018 and 0.015. Although standard deviations are still small it appears that SBERT variables express more variation within documents. Noteworthy, uncertainty which was most pronounced for the previous variable categories records in this case the lowest mean. The evident differences between variable groups might be attributed to the better processing power of newer NLP techniques. The POW metrics are limited to the terms included in the LM word lists, thus offering a narrower perspective. In contrast, fastText has the capabil-

ity to discover similarities between related words, which are not considered in the predefined word lists. SBERT marks a further enhancement by including context in its computations, a feature especially useful for negated expressions. While there are pronounced differences in sentiment scores across the various methods, the relationship between IPOs and private placements remains consistent for each sentiment. Across all three methodologies, private placements consistently exhibit higher values for litigious, negative, and uncertain sentiments. Conversely, IPOs consistently display a greater prevalence of positive language.

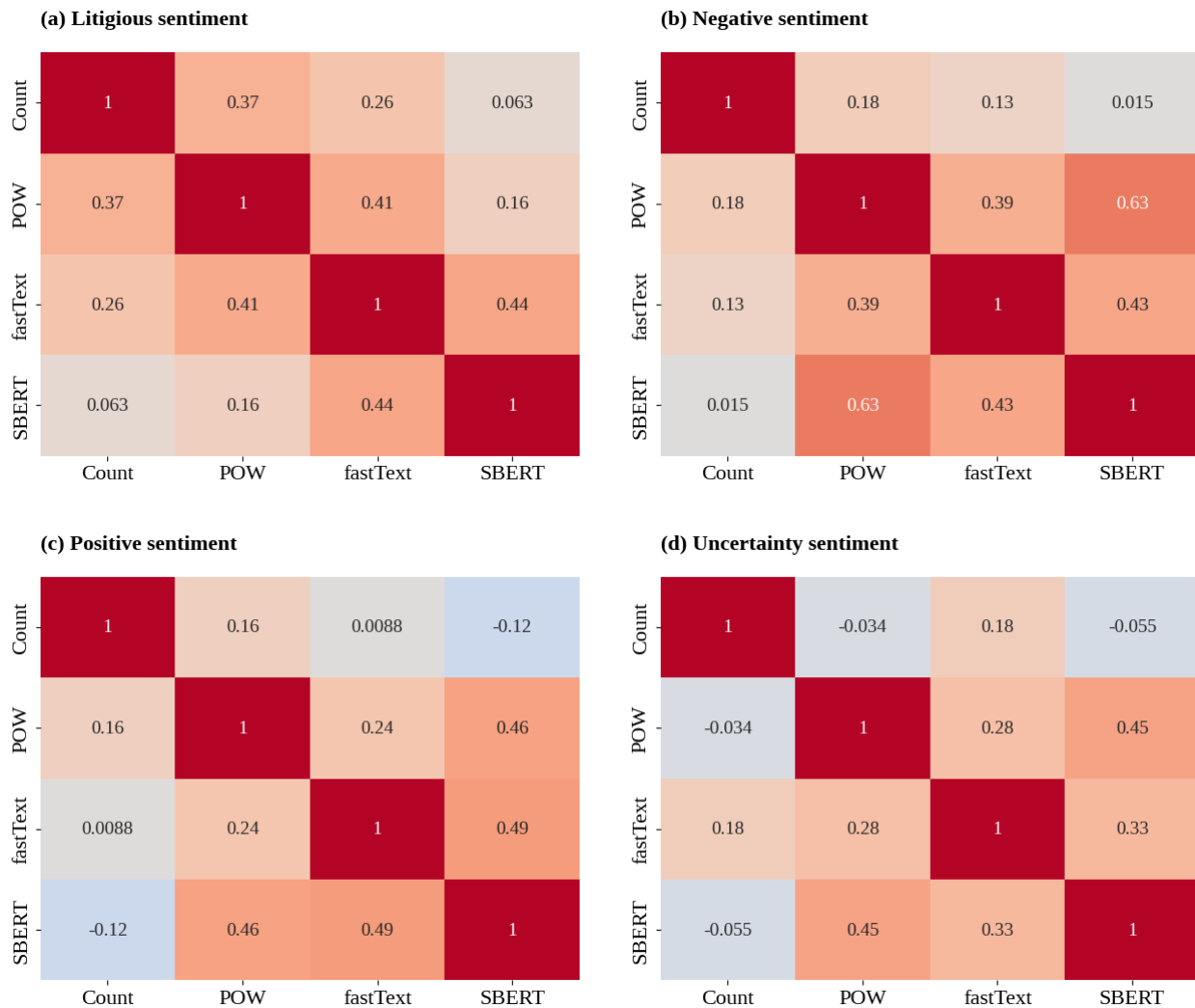
Furthermore, Figure 4 reveals strict positive correlations when examining pairwise relationships between variables representing each sentiment. The elevated correlation of fastText and BERT with POW acts as a validation of the chosen methodological approach, suggesting that all three techniques capture the same underlying construct. Given that not only NLP techniques but also utilized dictionaries varied for the different approaches, it is anticipated that correlations will still leave some room for variations. This explains why most correlation values are below 0.500. The distributions and relationships between underpricing and the collection of sentiment variables for each of the described methods are depicted in Figures 8 through 10 in the appendix. An important observation is the high, positive correlation among negative, litigious, and uncertain sentiments, which is strongest for SBERT variables. For the POW methodology, a distinctive clustering can be observed between IPOs and private placements. However, this clustering becomes less apparent in the subsequent methods.

In summary, the descriptive statistics presented offer consistent values across the various sets of variables, laying the groundwork for further analysis in the regression models. The following chapter will provide a parallel analysis of the similarity scores.

#### 4.4.2. Similarity Analysis

In addition to sentiment analysis, this study explores the information content of listing documents. High information content is characterized by a low degree of document simi-





**Figure 4:** Correlation heatmaps for the sentiment variable grouped by sentiment

This figure presents the pairwise correlation of the different variables for a given sentiment. The heatmap shows the correlations between the different types of variables used to extract this sentiment. “Count” represents the word count of the LM word list of the respective sentiment.

larity, as explained in Section 3.4. To measure document similarity, two methodologies are employed: BOW (cosine similarity) and simBERT. Both metrics are based on cosine similarities, comparing document vectors and sentence vectors respectively. Consequently, the maximum similarity value is capped at 1, indicative of two identical entities. As both metrics depend on a reference set of documents from a specific period preceding the listing for comparison, not every document in the sample was assigned a similarity value. Therefore, the total sample size is reduced to 695 observations, as shown in Table 14 in the Appendix, which is used as a reference in this chapter.

The BOW variable is characterized by a mean value of 0.697 a median of 0.706 and a standard deviation of 0.055. Differences between mean and median are caused by outliers, with the minimum as low as 0.392 and the maximum as high as 0.815. IPOs show higher similarity scores, with mean and median values at 0.700 and 0.707, respectively. In

contrast, private placements register values of 0.685 (mean) and 0.697 (median). The second metric, simBERT records a mean of 0.773, a median of 0.774, and a notably smaller standard deviation of 0.015 compared to BOW (cosine similarity). When analyzing the relationship between IPOs and private placements for simBERT, it can be observed that IPOs demonstrate slightly lower similarities. This is reflected in the mean and median, both with values of 0.773 for IPOs, as opposed to 0.777 and 0.779 for private placements, respectively. Based on the different ranking of both listing types, it can be concluded that BOW (cosine similarity) and simBERT show differing effectiveness in measuring document similarity. A possible explanation is the higher accuracy of contextualized embedding techniques in determining the semantic meaning of text, which is more important predictor than usage of words. Breitung and Müller (2022, p. 28) provide statistics for both variables in their research. The simBERT score they report is in a close range, averaging at 0.79. How-

ever, the BOW measure yields a substantially higher average document similarity, registering a mean of 0.93. Since Breitung and Müller (2022, p. 11), compare two consecutive annual reports from the same company, it is probable that the report was authored by the same accounting firm or even by the same individuals. This would account for the recurrence of similar words across the documents, which explains high BOW similarities. In general, in their analysis, similarities are expected to be higher as numerous items are expected to remain constant across two reports from the same firm.

Figure 5 shows the correlations between document size and discussed similarity variables. While not a feature in the regression models, document size is used as a proxy for information content, as noted by Loughran and McDonald (2016, p. 1223) and Guo et al. (2022, p. 2). The findings align logically, showcasing inverse correlations between document size and both similarity metrics. BOW and simBERT exhibit a positive correlation of 0.354.

As noted in Hanley and Hoberg (2010, p. 2849) documents with richer information content correlate with significantly higher listing expenses, highlighting the costs of information production. Figure 11 in the Appendix visually supports this trend, plotting log-transformed listing expenses against similarity measures, BOW and simBERT. The observed relationship is coherent, indicating that higher similarity scores are negatively related to listing expenses. These similarity variables, thus, offer valid insights for exploring the relationship between underpricing and information revelation. The subsequent chapter will present the regression models including a discussion of the results.

## 5. Empirical results

### 5.1. Model Design

The structure of the regression models used in this study is derived from related research in the field of textual analysis and IPO underpricing. For the sentiment analysis, the empirical models of Loughran and McDonald (2013) as well as Guo et al. (2022) serve as the most relevant benchmarks. Both studies explore the relationship between sentiment word lists and underpricing. For the similarity analysis, the outlined model for the study of information revelation and underpricing by Hanley and Hoberg (2010) is used as a reference.

The OLS regression models presented in the subsequent chapters all follow a consistent structure. The dependent variable in each model is underpricing. Each model incorporates an intercept, a single textual variable, a consistent set of base predictors, fixed effects (FE), and employs clustered standard errors. The regression tables include below the coefficients in parentheses the t-statistics for the respective variable. The set of base predictors remains constant across all models and encompasses the following control variables: Log(Employees), Pre-file NASDAQ return, Tech company dummy, Regulated market dummy, and IPO offering dummy. These variables are defined in detail in Chapter 4.3. Other predictors used in Loughran and McDonald (2013, p.

7) are not included in this study because of limited data availability. Examples are share overhang and upward revision of the pricing range, which are defined as the number of retained shares divided by the number of issued shares and the percentage upward revision from the mid-point of the filing range, respectively. Particularly, upward revisions account for a large part of the explained variance in the models of the reference study. However, in contrast to the U.S., in Europe offer price revisions are much less common (Jenkinson et al., 2006). Thus, in this study, it is anticipated that the impact of upward revisions would be less pronounced. To ensure that the estimates are not biased due to trends in specific variables, FE are included for the IPO year, FF12, and the financial market authority (FMA). FMA introduces country-specific fixed effects based on the country of origin of the FMA responsible for regulating the issuing company. Furthermore, to account for phenomena like hot- or cold-issue periods or sector-specific market dynamics, the displayed standard errors are clustered by IPO year and FF12. The same fixed effects and robust standard errors are applied in all the conducted regression models. The following section will describe the results of the regression models for POW, fastText, SBERT and similarity variables.

### 5.2. Regression Results

#### 5.2.1. Percentage-of-Word Variables

This chapter examines the relationship between the POW sentiment variables and IPO underpricing. Table 6 displays the results of the multivariate regressions for each sentiment word list. The observed values for  $R^2$  are lowest for litigious and negative sentiments, in columns (1) and (2), both with values of 0.076. Positive-POW in column (3) has a value for  $R^2$  of 0.077. The highest level of explained variance can be attributed to column (4), which includes the uncertainty word list variable and shows a value of 0.080. These values are considerably lower than those reported in the studies by Loughran and McDonald (2013, p. 7) and Guo et al. (2022, p. 7). The lower  $R^2$  values can be attributed to predictors that were used in the referenced studies but were omitted in this study. Among the base predictors, only the tech company and the regulated market dummy variables consistently display significant coefficients across the columns. Both variables are significant at the 1% level in each regression. The tech company dummy variable has significant positive coefficients, ranging from 0.118 in column (3) to 0.126 in column (4). Similarly, the regulated market dummy variable has positive coefficients, with values ranging from 0.065 in column (1) to 0.069 in column (4). The firm size proxy represented by Log(employees), the market sentiment indicated by the Pre-file NASDAQ return, and the IPO dummy variable all show insignificant coefficients. This aligns partly with Loughran and McDonald (2013, p. 7) findings, where size proxy, expressed as Log(sales), does not consistently display significant values. In contrast, the market sentiment variables are consistently significant in their study and in that of Guo et al. (2022, p. 6). This underscores the conjecture

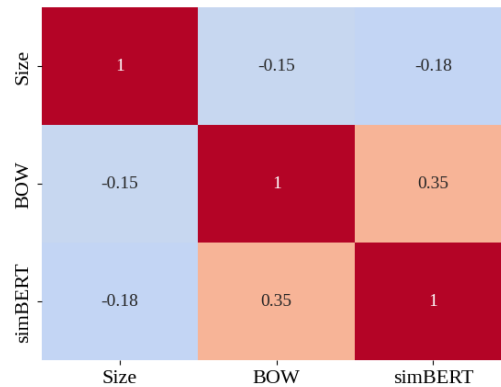


Figure 5: Correlation heatmaps for the similarity variables

Size is the document size measured as number of words within a listing document. The heatmap shows pairwise correlations between the set of variables.

of the limited importance of this variable for European IPOs or the current business environment. The last finding is surprising, as the average underpricing for IPOs is considerably lower for private placements, the impact of the IPO dummy variable remains insignificant. This could potentially be attributed to the mediating influence of one or more other control variables.

Regarding the POW variables, columns (1) through (3) yield insignificant results for litigious, negative, and positive sentiments. It is only in column (4) that the uncertainty sentiment variable becomes statistically significant with a t-statistic of 1.820. A one-standard deviation increase in the uncertainty variable is associated with an economically significant increase in underpricing by 0.031 (derived from multiplying the standard deviation of 0.341 with a coefficient of 0.091). This effect is nearly equivalent to the value presented by Loughran and McDonald (2013, p. 8), which is documented at 0.033. In contrast, Guo et al. (2022, p. 7) report a one-standard deviation increase in the percentage of uncertain words leads only to an increase of 0.012 in underpricing. Moreover, the findings of Loughran and McDonald exhibit statistically significant positive relationship for uncertainty, weak modal, and negative word lists. A finding echoed by Guo et al. (2022), albeit only for negative and uncertain sentiments. The results presented in Table 6, however, do not validate the positive effect of higher frequencies of negative words on underpricing. Given that no significant coefficients are reported, the results from the POW variables do not provide support for the conjectured impact of litigious, positive, and negative sentiments on underpricing. Nonetheless, the findings from the reference studies regarding the relationship between uncertain sentiment and underpricing can be confirmed. The subsequent chapters explore the hypothesis that the updated methodologies might better capture textual semantics and provide a clearer picture between prospectus content and underpricing.

### 5.2.2. FastText Variables

To evaluate the potential of the revised methodology, using fastText word embeddings, the regression models from the previous chapter are repeated, replacing POW with fastText variables. Table 7 presents the results of this set of multivariate regressions. On the basis of the  $R^2$  values, the explanatory power of the models in Table 7 is slightly higher than in Table 6. Specifically, the  $R^2$  value for litigious sentiment remains consistent across both tables, registering at 0.076. The  $R^2$  value for negative sentiment, with a value of 0.077, records a marginal increase. Notably, the variable accounting for negative sentiment records the most substantial  $R^2$  value of 0.088, representing an increase of 0.011 relative to the values observed in Table 6. This is subsequently followed by the value of uncertainty-POW in column (4), which stands at 0.081. The results for the base predictors mostly align with the findings from Table 6. The tech company and regulated market dummy variables continues to display significant positive associations with underpricing.  $\text{Log}(\text{Employees})$ , the pre-file NASDAQ return, and the IPO dummy variable again yield insignificant coefficients. In the presence of these control variables, it is observed that half of the fastText variables exhibit coefficients that are statistically insignificant. This includes the litigious sentiment variable illustrated in column (1) and the negative sentiment variable depicted in column (2). In column (3), contrary to the results from Table 6, the coefficient for the positive-POW variable is statistically significant (t-statistic of 5.757). A one-standard deviation increase in this variable corresponds to a 0.043 rise in underpricing (0.014 standard deviation, 3.097 regression coefficient). The economic magnitude is similar to those of the significant variables found in the study by Loughran and McDonald (2013, p. 8). Consistent with Table 6, the uncertainty variable remains statistically significant, with a t-statistic of 1.816. The economic significance stands at 0.030, derived from multiplying the standard deviation of 0.013 by the positive regression coefficient of 2.205. This outcome closely mirrors those from the POW approach and the study by Loughran and McDonald (2013).

**Table 6:** Multivariate regressions models for POW variables

| <b>Underpricing</b>    | <b>(1)</b>          | <b>(2)</b>          | <b>(3)</b>          | <b>(4)</b>          |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Litigious-POW          | 0.057<br>(0.983)    |                     |                     |                     |
| Negative-POW           |                     | -0.019<br>(-0.380)  |                     |                     |
| Positive-POW           |                     |                     | 0.073<br>(0.961)    |                     |
| Uncertainty-POW        |                     |                     |                     | 0.091*<br>(1.820)   |
| Log(Employees)         | -0.009<br>(-1.125)  | -0.008<br>(-1.000)  | -0.009<br>(-1.125)  | -0.008<br>(-1.333)  |
| Pre-file NASDAQ return | 0.476<br>(1.021)    | 0.477<br>(0.996)    | 0.479<br>(1.002)    | 0.472<br>(1.011)    |
| Tech company (D)       | 0.119***<br>(4.958) | 0.119***<br>(5.174) | 0.118***<br>(5.130) | 0.126***<br>(6.300) |
| Regulated market (D)   | 0.065***<br>(3.250) | 0.067***<br>(3.526) | 0.067***<br>(3.722) | 0.069***<br>(3.450) |
| IPO offering (D)       | -0.036<br>(-0.529)  | -0.056<br>(-0.836)  | -0.048<br>(-0.750)  | -0.021<br>(-0.412)  |
| Year FE                | Included            | Included            | Included            | Included            |
| FF12 FE                | Included            | Included            | Included            | Included            |
| FMA FE                 | Included            | Included            | Included            | Included            |
| Observations           | 707                 | 707                 | 707                 | 707                 |
| R2                     | 0.076               | 0.076               | 0.077               | 0.080               |

This table shows the regression models of underpricing as explanatory variables with the standard set of control variables and one POW sentiment variable in the respective columns (1) to (4). The t-statistics are presented in parentheses. \*\*\*, \*\* and \* indicate significance on the 1%, 5%- and 10%-levels, respectively.

As a result, the findings displayed in Table 7 demonstrate that word embeddings can serve as an effective tool to enhance the analysis of document tone. In the following chapter, the technologically advanced, SBERT model, is employed to further investigate the relationship between sentiment variables and underpricing.

### 5.2.3. Sentence-BERT Variables

The usage of fastText variables has already proven to be more effective in terms of the number of significant variables and explained variance in the regression model. This chapter now explores the relationship between SBERT variables, using technologically more advanced contextualized word embeddings, and underpricing.

The significant set of predictors has a positive impact on the  $R^2$  values of the models, all of which demonstrate a higher explanatory power compared to those in Tables 6 and 7. Specifically, the  $R^2$  values sequentially for columns (1) through (4) are 0.088; 0.087; 0.090; and 0.090, respectively. The results for the base predictors align closely with previous tables. Examining the coefficients of the SBERT variables, notable differences in comparison to Tables 6 and 7 can be observed. In column (1), the litigious-SBERT has a coefficient of 3.481 with a t-statistic of 3.430. A one-standard deviation increase is associated with an 0.042 increase in underpricing

(based on a standard deviation of 0.012). For the negative sentiment variable, the reported coefficient is 2.588, with an associated t-statistic of 3.034. A one-standard deviation increase for this predictor corresponds to an approximate 0.041 rise in underpricing (based on a standard deviation of 0.016). Contrary to previous models, both litigious and negative sentiments demonstrate a positive and statistically significant relationship with underpricing. For SBERT, the positive sentiment variable remains significant with a t-statistic of 2.125 and exhibits a coefficient of 2.901. Given its standard deviation of 0.018, a one-standard deviation higher variable value translates into an economically significant rise in underpricing by 0.052. Column (4) assesses uncertainty-SBERT, which has a coefficient of 2.546 (t-statistic = 2.714). An increase of one standard deviation in the uncertainty sentiment is associated with an increase in underpricing by about 0.039 (2.546 multiplied by a standard deviation of 0.015). The presented results match some of the findings from the previous chapters. Similar as in the context of fastText-based regressions, positive and uncertain sentiment are significant predictors, with positive sentiment showing the most pronounced effect. Contrary, through the adoption of contextualized embeddings both litigious and negative variables turned significant. This demonstrates a novel insight compared to the



**Table 7:** Multivariate regressions models for fastText variables

| <b>Underpricing</b>    | <b>(1)</b>          | <b>(2)</b>          | <b>(3)</b>          | <b>(4)</b>          |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Litigious-fastText     | 0.473<br>(0.423)    |                     |                     |                     |
| Negative-fastText      |                     | 1.399<br>(1.345)    |                     |                     |
| Positive -fastText     |                     |                     | 3.097***<br>(5.757) |                     |
| Uncertainty-fastText   |                     |                     |                     | 2.205*<br>(1.816)   |
| Log(Employees)         | -0.008<br>(-1.000)  | -0.008<br>(-1.143)  | -0.013<br>(-1.625)  | -0.006<br>(-0.857)  |
| Pre-file NASDAQ return | 0.476<br>(1.004)    | 0.476<br>(1.026)    | 0.497<br>(1.096)    | 0.477<br>(1.053)    |
| Tech company (D)       | 0.119***<br>(6.263) | 0.119***<br>(5.409) | 0.117***<br>(4.680) | 0.122***<br>(6.100) |
| Regulated market (D)   | 0.066***<br>(3.667) | 0.067***<br>(3.190) | 0.079***<br>(4.158) | 0.061***<br>(3.813) |
| IPO offering (D)       | -0.051<br>(-0.813)  | -0.050<br>(-0.850)  | -0.059<br>(-0.952)  | -0.053<br>(-0.917)  |
| Year FE                | Included            | Included            | Included            | Included            |
| FF12 FE                | Included            | Included            | Included            | Included            |
| FMA FE                 | Included            | Included            | Included            | Included            |
| Observations           | 707                 | 707                 | 707                 | 707                 |
| R2                     | 0.077               | 0.077               | 0.088               | 0.081               |

This table shows the regression models of underpricing as explanatory variables with the standard set of control variables and one fastText sentiment variable in the respective columns (1) to (4). The t-statistics are presented in parentheses. \*\*\*, \*\* and \* indicate significance on the 1%-, 5%- and 10%-levels, respectively.

findings by Loughran and McDonald (2013) and Guo et al. (2022). The final chapter of this section with regression results describes the relationship of document similarities on underpricing.

#### 5.2.4. Similarity Variables

The similarity analysis aims to understand how information revelation in the prospectus impacts underpricing levels. Both the BOW (cosine similarity) and simBERT methods assess the similarity of a given prospectus compared to those of prior comparable listings. Considering the cost associated with information production, it is suggested that higher similarity levels are associated with more underpricing. The regression models follow the identical structure as those for the similarity analysis. The findings are described in Table 9. Column (1) displays the results of BOW (cosine similarity) and column (2) includes the model with simBERT as the respective textual variable.

Neither BOW (cosine similarity) nor simBERT exhibits a significant coefficient. The BOW variable has a coefficient of 0.213, while simBERT has a coefficient of 1.150, which are associated with insignificant t-statistics of 0.653 and 1.067. The results from this study fail to confirm the findings by Hanley and Hoberg (2010, p. 2848). The researchers reported a positive and significant relationship between stan-

dard content (i.e., content that is similar across prospectuses) and underpricing. This relationship is represented by a one-standard deviation increase in standard content, which translates into a 6% increase in underpricing. The variable construction used in their study follows a different methodology, however, the measured construct is expected to be similar, as previous analysis has indicated.

While the predictors are not statistically significant, the  $R^2$  values for BOW (cosine similarity) and simBERT are comparable to those observed for SBERT sentiment variables, registering at 0.086 and 0.087, respectively. This suggests that some explanatory power of the variables is present. However, due to the insignificance of the predictors no meaningful conclusion can be drawn. It is possible that a larger sample size might reveal a significant relationship between document similarity and underpricing in European IPOs. However, for the given context no relationship between information revelation and underpricing can be established. The subsequent chapter elaborates the interpretations of the findings from this and previous chapters, contextualizing them within the framework of the developed hypotheses.

#### 5.3. Interpretation of Regression Results

This section links the results from our regression analyses with the hypotheses outlined in Chapter 2.4, relating

**Table 8:** Multivariate regressions models for SBERT variables

| <b>Underpricing</b>    | <b>(1)</b>          | <b>(2)</b>          | <b>(3)</b>          | <b>(4)</b>          |
|------------------------|---------------------|---------------------|---------------------|---------------------|
| Litigious-SBERT        | 3.481***<br>(3.430) |                     |                     |                     |
| Negative-SBERT         |                     | 2.588***<br>(3.034) |                     |                     |
| Positive-SBERT         |                     |                     | 2.901**<br>(2.125)  |                     |
| Uncertainty-SBERT      |                     |                     |                     | 2.546***<br>(2.714) |
| Log(Employees)         | -0.008<br>(-1.143)  | -0.007<br>(-1.000)  | -0.010<br>(-1.111)  | -0.006<br>(-1.000)  |
| Pre-file NASDAQ return | 0.477<br>(1.089)    | 0.473<br>(1.068)    | 0.504<br>(1.086)    | 0.472<br>(1.068)    |
| Tech company (D)       | 0.112***<br>(4.870) | 0.120***<br>(5.455) | 0.105***<br>(4.375) | 0.119***<br>(5.174) |
| Regulated market (D)   | 0.073***<br>(3.650) | 0.072***<br>(3.600) | 0.084***<br>(4.941) | 0.071***<br>(3.737) |
| IPO offering (D)       | -0.056<br>(-1.018)  | -0.036<br>(-0.667)  | -0.060<br>(-1.034)  | -0.047<br>(-0.870)  |
| Year FE                | Included            | Included            | Included            | Included            |
| FF12 FE                | Included            | Included            | Included            | Included            |
| FMA FE                 | Included            | Included            | Included            | Included            |
| Observations           | 707                 | 707                 | 707                 | 707                 |
| R2                     | 0.088               | 0.087               | 0.090               | 0.087               |

This table shows the regression models of underpricing as explanatory variables with the standard set of control variables and one SBERT sentiment variable in the respective columns (1) to (4). The t-statistics are presented in parentheses. \*\*\*, \*\* and \* indicate significance on the 1%-, 5%- and 10%-levels, respectively.

underpricing to key academic theories. The ex-ante uncertainty hypothesis (H1) is supported by our findings. A clear link between uncertain sentiment in IPO prospectuses and anticipated underpricing is observable. Every methodological approach yielded a positive, statistically significant outcome, with the economic magnitude paralleling the findings of Loughran and McDonald (2013). This result is notable when considering that underpricing in the reference study was significantly higher. It is important, however, to note that some variables with high explanatory power from the reference study were omitted. If included, these variables could influence the effect's magnitude. Nevertheless, the results robustly support the theory that uncertain language in a prospectus, is a good proxy for ex-ante uncertainty. In line with the theory of Beatty and Ritter (1986), the uncertainty explains a notable portion of the underpricing observed in our sample highlighting the heightened risk and valuation uncertainty for investors associated with the listing.

The legal liability hypothesis (H2) is validated through the SBERT-based sentiment variable, revealing a positive connection between ex-ante litigation risk and underpricing. This suggests that legal language in the prospectus can effectively represent a company's ex-ante litigation risk. Importantly, it appears that this risk is not simply recognized

though word counts or individual word meanings (as obtained from classical word embeddings) but is represented through specific contexts. This explains, that only the SBERT methodology can establish a significant relationship with underpricing. The results emphasize the theory that companies with elevated levels of ex-ante litigation risks employ higher underpricing as a strategy to deter lawsuits, a finding emphasized by Lowry and Shu (2002). It is important to acknowledge that scores for litigious sentiment are strongly correlated with those of negative and uncertain sentiments. It appears that the selected methodologies do not allow to make a clear distinction between legal risk and general firm uncertainty. Determining whether the results can be definitively attributed to either the ex-ante uncertainty or the legal liability theory is challenging, as both appear plausible. To gain a clearer understanding, data concerning post-IPO litigation would be essential.

The neutral language hypothesis (H3) is confirmed in this study. The positive sentiment variable shows significance for both fastText and SBERT models, with the negative sentiment variable significant only when based on the SBERT methodology. The original hypothesis of Ferris et al. (2013), is extended with the idea of investors' skepticism towards excessive positive language in prospectuses. The link between un-

**Table 9:** Multivariate regressions models for similarity variables

| <b>Underpricing</b>     | (1)                 | (2)                 |
|-------------------------|---------------------|---------------------|
| BOW (cosine similarity) | 0.213<br>(0.653)    |                     |
| simBERT                 |                     | 1.150<br>(1.067)    |
| Log(Employees)          | -0.009<br>(-1.125)  | -0.011<br>(-1.222)  |
| Pre-file NASDAQ return  | 0.472<br>(0.925)    | 0.475<br>(0.942)    |
| Tech company (D)        | 0.112***<br>(5.600) | 0.108***<br>(5.143) |
| Regulated market (D)    | 0.076***<br>(4.000) | 0.079***<br>(3.591) |
| IPO offering (D)        | -0.062<br>(-1.107)  | -0.058<br>(-1.160)  |
| Year FE                 | Included            | Included            |
| FF12 FE                 | Included            | Included            |
| FMA FE                  | Included            | Included            |
| Observations            | 671                 | 671                 |
| R2                      | 0.086               | 0.087               |

This table shows the regression models of underpricing as explanatory variables with the standard set of control variables and one similarity variable in the respective columns (1) to (2). The t-statistics are presented in parentheses. \*\*\*, \*\* and \* indicate significance on the 1%-, 5%- and 10%-levels, respectively.

derpricing and the positive sentiment variables of fastText and SBERT suggest that classical and contextual word embeddings can accurately detect positive sentiment in documents. An aspect that, as noted by Guo et al. (2022, p. 7), citing Tetlock (2007), is difficult to be captured by conventional word count methods. The analysis corroborates the association between neutral language and underpricing. In this context, the findings support the conjecture that investors favor neutral language as a trust-building mechanism.

The information revelation hypothesis (H4) could not be confirmed. This suggests that underwriters do not have the ability to influence underpricing by revealing more information in the IPO prospectus. It appears to be the case that this inconsistency is not related to measurement, since both similarity metrics align with patterns observed in Hanley and Hoberg (2010), as shown in Figure 11. Moreover, it can be concluded that the anticipated positive impact of higher document similarities on underpricing is not evident in this sample. The findings suggest that underpricing is more reflective of specific firm characteristics than of the effort issuers put into pre-market due diligence and information disclosure. As a result, this finding strengthens hypotheses H1, H2, and H3, indicating that the contents of the prospectus are predominantly utilized to evaluate the risk profile of a firm and the credibility of this information, which in turn impacts the discount required on the expected firm value. In contrast, the results contradict the findings of Hanley and Hoberg (2010) and Hanley and Hoberg (2012), who found that increased disclosure has a negative effect on the level of underpricing.

This conclusion resonates with observations on the financial magnitude of underpricing for certain listings, which can exhibit first-day returns as high as 200% in extreme cases. It appears unrealistic that firms willingly leave that much money on the table if they would have the option to reveal more information in the IPO prospectus.

The methodological approach hypothesis (H5) is supported by the findings in Tables 7 and 8. For the neural network hypothesis (H5.1), the fastText sentiment variables consistently exhibit higher values of  $R^2$  in comparison to the POW variables in Table 6. While uncertain sentiment is significant in both models, positive sentiment also demonstrates a significant correlation with underpricing for the fastText variable. This underscores the constraints of word lists. They are frequently defined too restrictively and miss the semantic essence of words not covered in the dictionary. Similarly for the transformer model hypothesis (H5.2), which is supported again by higher levels of explained variance in Table 8 and significant coefficients for all textual variables. However, the similarity analysis results in Table 9 fail to validate the hypothesis. Here, both the BOW, rooted in word counts, and simBERT produce insignificant outcomes. It is probable that this is not a limitation of the methodology but could rather be attributed to sample characteristics or a lack of causal linkage among the variables. The impact of negative language on underpricing, which was found to be statistically significant in the studies by Loughran and McDonald (2013) and Guo et al. (2022), could only be confirmed by the SBERT methodology. As previously mentioned, the challenges faced

by word count methods in capturing positive sentiment were also addressed by fastText and SBERT. The elevated correlations of these newly developed approaches with the POW method also acts as a sanity check, ensuring the accurate measurement of the intended concepts. These results support the validity and efficacy of both methods developed for this study.

## 6. Conclusion

This study establishes a clear link between the language used in prospectuses of European IPOs and underpricing. Therefore, traditional word count-based methods for sentiment and similarity analysis, as conceptualized by Loughran and McDonald (2013) and Hanley and Hoberg (2010), are augmented and refined. This is achieved by leveraging recent advances in the field of NLP and making use of neural network-based word embeddings and transformer-based language models. FastText and SBERT, respectively, are chosen as the most suited models for this purpose. For the sentiment analysis, this study relies on a subset of the sentiment categories defined in Loughran and McDonald (2011), namely litigious, negative, positive and uncertainty sentiment. The POW approach measures document tone by simply totaling the frequencies of words from the corresponding sentiment word list. In contrast, for the fastText and SBERT methodologies, cosine similarity is employed to ascertain how closely the sentiment of a given document aligns with the sentiments from the LM word lists. Given that these word lists were originally developed for word count methods, they often include multiple words for the same word group or connecting words that lack standalone meanings. This study introduces an updated version, refining these lists to a concise dictionary that captures the most important topics within each word list. Notably, for SBERT – which exhibits optimized results with full sentence inputs – the reduced word lists are augmented into a dictionary of short sentences. Based on the geometrical representations obtained from both document and word or sentence dictionary, cosine similarity is used to compute the sentiment score. The resulting scores express how similar the text of a prospectus is compared to the dictionary. The results of the newly developed sentiment measures are benchmarked against the results of the POW approach. The findings support the validity of the extended methodologies.

The similarity analysis is based on the BOW approach of Hanley and Hoberg (2010) and the simBERT methodology of Breitung and Müller (2022). For both approaches, the prospectus of a given company is compared to related documents from comparable listings. Date and industry filters are used to identify the comparable items. Similarity scores are again determined using cosine similarity. The BOW (cosine similarity) measure makes use of normalized vectors of word frequencies, while the simBERT score determines document similarity by averaging the maximum cosine similarities across all sentence pairs. The values obtained from the simBERT methodology are coherent with those of the reference

study and correlate with BOW (cosine similarity). The findings show that simBERT can be used as a robust alternative to the traditional BOW method.

The results of the regression analyses can be used to explain several dimensions of IPO underpricing. Evidently, the relationship between uncertain sentiment in IPO prospectuses and underpricing is substantive. The findings mirror those of Loughran and McDonald (2013) and are consistent across all variable groups. The significant relationship between legal language and underpricing allows to successfully link prospectus sentiment to the legal liability hypothesis of Lowry and Shu (2002). To properly detect legal sentiment, the document's context is important which requires the application of SBERT-based sentiment scoring. Inspired by the theory proposed by Ferris et al. (2013), a link between the neutrality of prospectus language (impacting the perceived credibility) and underpricing is identified. In this study, neutrality is defined as avoiding negative and positive language and is anticipated to reduce levels of underpricing. The neutrality theory is corroborated as there is a statistically significant positive relationship observed between both negative and positive sentiments and underpricing. This indicates that investors are more inclined to trust information when it is conveyed in a neutral and objective manner, without hyperbolic expressions. However, for the similarity analysis, neither the BOW (cosine similarity) nor the simBERT scores deliver significant results. Consequently, the information revelation hypothesis, which suggests that underpricing serves as a compensation mechanism for investors in exchange for revealing information, based on the theory of Benveniste and Spindt (1989), cannot be confirmed in this study. This suggests that underwriters do not have the control to make the choice between committing more resources to information production or employing more underpricing as an incentive for investors to reveal their private information truthfully.

As a critical analysis of the methodologies employed, it is essential to recognize that interpreting sentiment scores can prove difficult. The utilization of neural network-based word embeddings and transformer-based language models adds a layer of complexity that makes interpretation in some parts impossible. These models represent text in high-dimensional vector spaces. Thus, attributing a specific meaning to the individual values contained within such a vector is impossible from a human perspective. Although the developed metrics show a positive correlation with conventional word count approaches, subjective evaluations cannot rule out the possibility that the improved sentiment measurement is due to another confounding factor present in both the vector representations of the sentiment dictionary and the prospectus. Additionally, Kaserer and Treßel (2023, p. 18) note that the translation of documents using Google Translate might distort the intended meaning of the prospectus passages. This could have a detrimental impact on the effectiveness of our methodologies and introduce biases, as they rely on semantic interpretations of words rather than do traditional word count methods. Furthermore, in contrast to the reference studies on textual analysis and underpricing, the



current research faces certain data constraints. The listings from exchange-regulated markets in this study display less comprehensive data coverage in financial databases. Therefore, a considerable portion of the utilized variables were hand-selected for the study conducted by Kaserer and Treßel (2023). Since the scope of this research was limited, it was not possible to extend the dataset with the missing control variables used in the reference studies. Another limitation based on the missing variables, is the overall explanatory power of the models which all show limited levels of explained variance. Therefore, it is essential to acknowledge that the results obtained in this study should be interpreted accordingly and may not fully capture the complexity of the relationships between textual variables and underpricing in European IPOs.

In synthesizing the findings and insights from this research, several directions for future research are presented, serving as a conclusion to this study. Firstly, the results of this study can be replicated by using language models that have been specially trained on financial domain-specific language. This could reduce potential biases from misinterpretations of words that convey a different meaning in general than in financial language. This suggestion follows the idea of LM word lists, which, as mentioned in Loughran and McDonald (2011), were introduced specifically to avoid this type of bias. In addition, it could be beneficial to extend the sentence dictionaries used for sentiment analysis with SBERT with different sentence examples. Here, it might be useful to take advantage of recent advances in generative AI to automate the generation process. Furthermore, to affirm the robustness of the findings in this study, it would be valuable to replicate it using a more extensive dataset. This replication should ideally account for variables that were omitted in the present study. Lastly, drawing inspiration from the study conducted by Cao et al. (2023), it would be compelling to explore how the increased adoption of textual analysis methods has prompted underwriters to modify the language used in prospectuses. In this context, it could be investigated if a link between adopted language and underpricing exists. The publication dates of word list methods or the release dates of language models could be used to create an experimental setting.

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# Impact of the European Carbon Border Adjustment Mechanism (CBAM) on the German Industry

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## Abstract

The European Commission's proposal for a Carbon Border Adjustment Mechanism (CBAM) aims to address carbon emissions in imports to the EU. This thesis researches the financial implications for exporting countries due to CBAM's implementation, focusing on how it may alter production costs, demand dynamics, and global trading relationships. Using a quantitative research approach, the study analyzes existing carbon market landscapes and Germany's trade ties with non-European exporters in key sectors like iron, steel, aluminum, polymers and chemicals. It evaluates CBAM guidelines and assesses potential weaknesses in determining embodied CO<sub>2</sub> emissions. Results suggest CBAM may not drastically shift production costs or demand patterns immediately. China, with inherent cost advantages, may maintain competitiveness, while India's advantages could diminish by 2035. However, uncertainties persist on CBAM's long-term impact on global trade dynamics. The analysis highlights CBAM's uneven financial burden across exporters, influenced by energy structures and production technologies. Weaknesses in CBAM's calculation methods are highlighted, recommending standardized guidelines to ensure accurate emissions reporting. This study prompts policymakers to evaluate CBAM's effectiveness in meeting climate goals while maintaining global trade equity.

**Keywords:** CBAM; carbon pricing; corporate ESG; decarbonization; European Carbon Border Adjustment Mechanism

## 1. Introduction

The Sixth Assessment Report of the IPCC paints a sobering picture of the impacts of climate change already being witnessed, including humanitarian crises and irreparable environmental damage. According to the assessment, to prevent a 1.5°C temperature rise, global emissions of greenhouse gases would have to fall by 43% by 2030. To achieve this, all sectors of the economy must rapidly reduce their emissions (IPCC, 2022). Late in 2022, world leaders congregated for the Conference of the Parties of the UNFCCC (COP 27), where they reinforced their pledge to prevent a 1.5°C temperature rise.

According to analysis by the International Energy Agency (IEA), however, there is a considerable discrepancy between what nations have committed and what can be accomplished with the current implemented policy. Many nations require additional policies to reach their targets (IEA, 2021, 2022b; UNFCCC, 2022). The European Commission, in an effort to expand its carbon pricing policy and reach its targets, released a proposal for a Carbon Border Adjustment Mechanism (CBAM) in July 2021. The CBAM basically involves imposing a carbon price to imports of specific products from non-European countries into the European Union (EU), proportionate to the items' "embodied carbon dioxide (CO<sub>2</sub>) emissions," or the emissions of CO<sub>2</sub> created during their manufacturing. CBAM will initially cover several specific goods from some of the most carbon-intensive sectors, comprising iron and steel, cement, fertilisers, aluminum, electricity, and hydrogen, as well as some precursors and downstream products.

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The aim of this thesis is to examine the potential financial repercussions that may arise from the implementation of the Carbon Border Adjustment Mechanism (CBAM) for exporting countries. The research seeks to estimate to what extent CBAM will affect the production costs of goods, leading to changes in demand and trading relationships between countries in both the short and long term. Specifically, the analysis will investigate whether the financial burden resulting from CBAM will be equitably distributed among all nations or if it will disproportionately affect major trading partners.

To accomplish this, the study will analyze the current global landscape of the carbon market, including initiatives taken by non-European countries to price CO<sub>2</sub> emissions. Additionally, it will identify Germany's trading relationships with non-European exporters of goods in the scope of CBAM. The study will focus on goods such as iron, steel, aluminum, and polymers, which are likely to have a significant impact, given Germany's strong automotive industry.

The analysis will also identify key characteristics of the CBAM guidelines and evaluate its weaknesses, with particular focus on the actual determination of embodied CO<sub>2</sub> emissions in goods. It will highlight the fact that without a standardized method for calculating embodied CO<sub>2</sub> emissions, the effect of CBAM may be diminished in the short and long term. To illustrate this point, it will calculate the embodied emissions contained in goods exported to Germany in 2021 using different methods and compare the results.

Finally, this study will assess how the existing cost advantages of the major non-European trading partners of Germany will be affected by CBAM, depending on the method of calculation of embodied emissions in goods. It can be inferred that the production processes and technologies used in each country will have an impact on the individual financial burden of each country. The study will conclude by discussing potential shifts in demand for goods from one country to another and analyzing whether CBAM will have a significant effect on global trade.

## 2. Literature review

### 2.1. Carbon pricing

Governments can utilize carbon pricing, a policy instrument, as part of their overall plan to reduce greenhouse gas (GHG) emissions, such as CO<sub>2</sub>. Once the CO<sub>2</sub> (referred to as "carbon") emissions are priced, there is a monetary incentive to lessen them or promote removals. Carbon pricing can alter production, consumption, and investment patterns, therefore promoting low-carbon growth by factoring climate change costs into economic decisions. Carbon may be priced using a wide range of policy mechanisms, which can each be customized to local conditions, priorities, and demands. Carbon pricing's climatic impact is determined by how extensively the price is implemented, the price level, and the availability of abatement possibilities (The World Bank, 2022).

As of April 2022, there are 68 carbon pricing instruments (CPIs) operating worldwide. These are either carbon taxes

or emissions trading systems (ETS). A carbon tax is a policy tool that allows a government to charge a levy for emissions. The overall volume of emissions in one or more sectors of the economy is controlled or capped in an emissions trading scheme. The government then sells or distributes tradable emission permits to entities subject to the cap. Each allowance reflects the right to release a specific volume of emissions, which is usually one metric ton of CO<sub>2</sub>-equivalent (tCO<sub>2</sub>e), and the overall volume of allowances equals the emissions cap. During a compliance period, organizations must surrender permits for their emissions. They can either purchase extra allowances as needed or sell surplus allowances. This strategy is also known as a "cap-and-trade" scheme (United Nations Committee of Experts on International Cooperation in Tax Matters: Environmental Tax Issues, 2020).

The graph in Figure 1 depicts the global carbon pricing systems in operation as of 2022, whereas carbon pricing schemes are regarded as "scheduled for implementation" until they have been legally established by law and have a clear start date. Carbon pricing efforts are categorized as "under consideration" if the government has proclaimed its intention to work toward implementing a carbon pricing program and this has been explicitly acknowledged by official government sources.

The adoption of carbon pricing continues growing steadily in the Americas and Asia, but the global coverage remains low. Several jurisdictions, such as Brazil, Turkey or Taiwan continue to assess the potential to implement the CPIs. Implementing carbon prices remains a policy challenge, especially given rising energy commodity prices coupled with current geopolitical issues and the ongoing COVID-19 pandemic's impact on economies. The European Commission estimates the proportion of global emissions covered by the CPIs in operation to be approximately 23% (Joint Research Centre (European Commission), 2022).

The largest carbon market, by traded value, is the European Emissions Trading System (EU ETS). It was launched in 2005 as a major pillar of the European energy policy and was quickly followed by counterparts in New Zealand (NZ ETS), South Korea, California and the RGGI. The Regional Greenhouse Gas Initiative is abbreviated as RGGI<sup>1</sup>. Over the past years, carbon prices have reached record highs, as shown in Figure 2.

Following a combination of policy decisions, increased speculation, and broader economic trends - particularly global energy prices - it is fair to conclude that carbon prices react to market conditions. The spikes in the different ETS prices have been driven by more ambitious climate targets and reforms.

Germany, the EU ETS's largest emitter, successfully deployed its domestic energy ETS on January 1, 2021, at a fixed

<sup>1</sup> The Regional Greenhouse Gas Initiative (RGGI) is a cooperative, market-based effort among the US states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia.



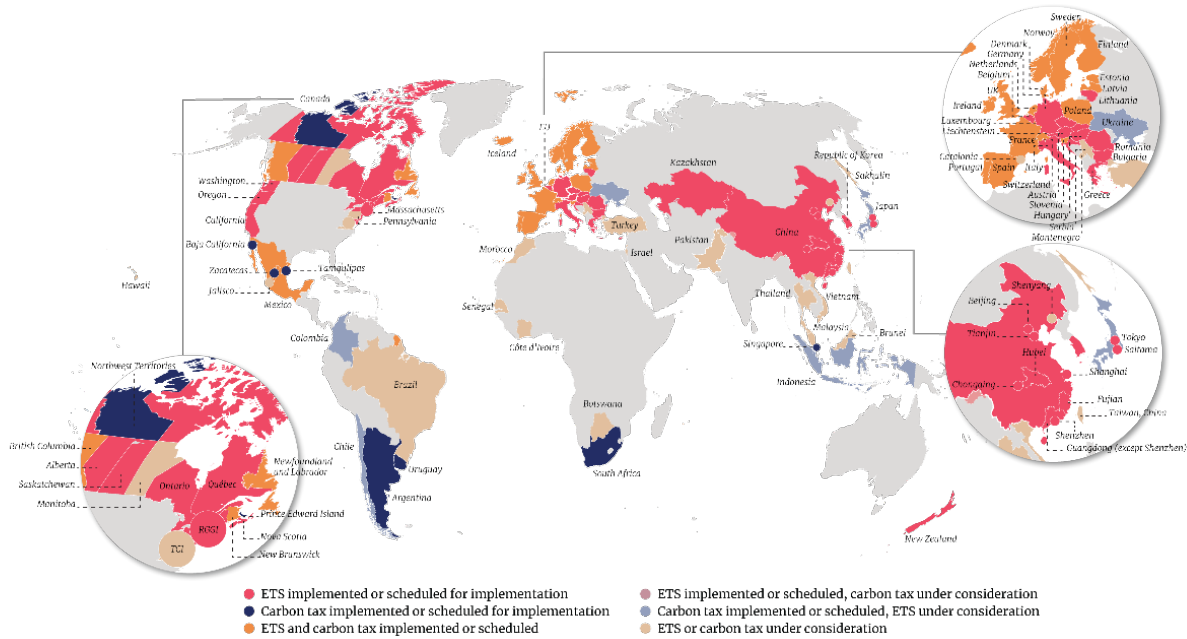


Figure 1: Map of carbon taxes and emission trading systems operating worldwide as of April 2022 (The World Bank, 2022)

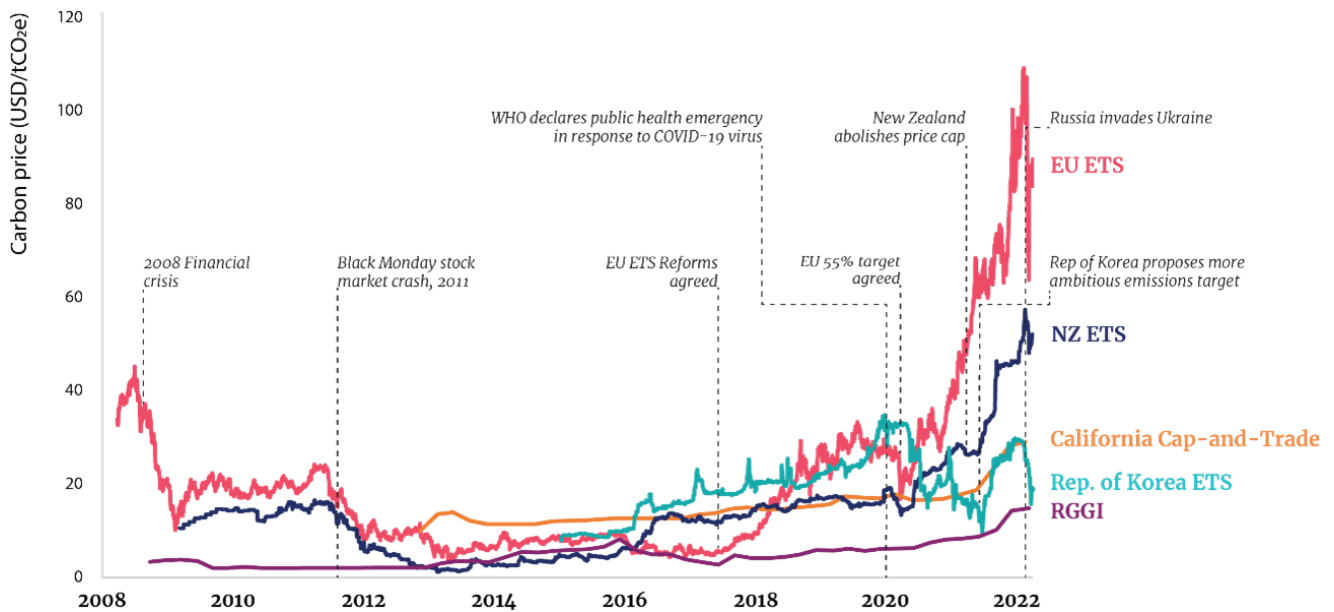


Figure 2: Price evolution in selected ETS, 2008-2021 (International Carbon Action Partnership, 2022)

fee of 25 euros per tonne CO<sub>2</sub> equivalent, with the sale of National Emissions Trading Scheme (nEHS) permits beginning in October 2021. All energy emissions that have not been regulated by the EU ETS (primarily heating and transport transportation) have been included. Such emissions are released by a range of sources, including heating, oil, natural gas, petrol, and diesel. Some fuels (such as coal and garbage) will be phased in later in 2023. From 2021 to 2025, the nEHS will be brought in progressively, with a set price on emission allowances. The set price will continue to climb over time. After that, allowance pricing will be determined by the mar-

ket beginning in 2027. The cap on the emissions is based on Germany's mitigation goals for industries not covered by the EU ETS (Bundesministerium der Justiz, 2021; The World Bank, 2022).

Germany's domestic ETS and the EU ETS mirror a reality that all CPIs share, namely that its prices remain below what is required to meet the Paris Agreement's goals. According to the High-Level Commission on Carbon Prices, CPIs should range between 70-100 €/tCO<sub>2</sub>e to keep global warming to below 2°C by 2030 (Stiglitz & Stern, 2017). Newer estimates indicate that even higher prices may be needed to reduce

emissions to net zero by 2050, as required by the IPCC to reach the 1.5°C target. A poll of 30 environmental analysts conducted in 2021 estimates that prices ranging from 70 to 250 USD *per* tCO<sub>2</sub>e would be required to meet this objective, with an average estimate of 100 USD *per* tCO<sub>2</sub>e (Bhat, 2022).

The current state of carbon pricing worldwide reflects the gap between policy and commitments reported by the IEA. In most countries, higher carbon pricing and a further set of complementary policy actions will be required to meet both short-term mitigation targets and long-term net zero policies. This is especially true for promoting decarbonization in complex, energy-intensive sectors, where low-carbon technologies are underdeveloped (IEA, 2022b).

## 2.2. Carbon Leakage and the Carbon Border Adjustment Mechanism (CBAM)

As governments expand their carbon pricing aspirations, carbon leakage becomes a growing concern. Carbon leakage refers to the possibility that reduced emissions in one state will be reversed by higher emissions in another. This might be caused by increased output or relocation to a state with less rigorous emission regulations. Carbon leakage holds the potential to harm GDP, jobs, and tax revenue in the most audacious states, creating a deterrent to act. It also decreases the effectiveness of environmental legislation by relocating emissions to countries with poorly enforced regulations, potentially leading to an increase in global carbon emissions (Aichele & Felbermayr, 2015).

To date, there is little empirical evidence of carbon leakage. An econometric investigation of carbon leakage caused by the EU Emission Trading Scheme (ETS) on the cement and iron and steel sectors discovered no indication that the EU ETS has had any impact on net imports in these energy-intensive industries, arguing that so far, most jurisdictions have responded to leakage concerns by granting exemptions, refunds, or free allocation of allowances to sensitive sectors. These approaches have downfalls, however. Decreasing the carbon price weakens the motivation to use resources more efficiently or the switch to lower-carbon technologies and products (Chevallier et al., 2017; European Parliament and European Council, 2003; Felbermayr, 2020).

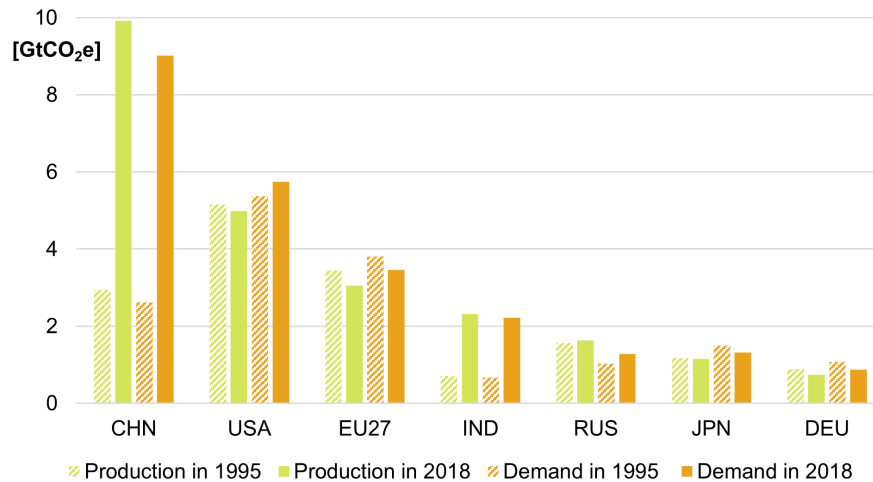
According to the OECD, overall carbon emissions embodied in international trade have increased by about 50% between 1995 and 2018. China, the United States, India, the Russian Federation, Japan, and Germany were the six greatest producers and consumers of carbon emissions in 2018, as shown in the Figure 3.

While emissions production and consumption have decreased in Japan, Germany, and the European Union (EU27) since 1995, there has been a large growth in China and India. China has the biggest absolute emissions, both in terms of consumption and production. While the OECD countries shown (United States, Japan, and Germany), in total, are net-importers of embodied carbon, the non-OECD countries shown (China, India and the Russian Federation) are net-exporters of embodied carbon emissions.

Numerous countries are examining trade measures to mitigate any possible carbon leakage caused by carbon pricing. One of those measures, proposed in academic and policy literature, is Border Carbon Adjustments (BCAs). BCAs address such worries about carbon leakage by employing trade mechanisms to guarantee that products from overseas manufacturers facing lower (or no) carbon costs are treated equally with domestically produced commodities. Despite its intuitive economic appeal, BCAs pose difficult regulatory decisions, including its scope of applicability (i.e., which policies, goods, sectors and countries), the methodology for assessing the carbon content of products, the type and price of the adjustment, and how the resulting revenues will be used. Any BCA must be designed in accordance with international accords controlling trade and climate policy duties (Cosbey et al., 2019; Horn & Mavroidis, 2011).

BCAs generate important questions about the accountability for climate action. Indeed, the principle that countries have a common but differentiated responsibility to tackle climate change, has long been rooted in global climate cooperation. Developing countries claim that wealthier countries that implement BCAs affect trade by unilaterally imposing carbon pricing on manufactured goods. On the other hand, there are calls for industrialized nations to accept responsibility for their consumption's carbon footprint, which a BCA would help to achieve (Ranjan Mishra, 2021; United Nations Conference on Trade and Development (UNCTAD), 2021).

The European Commission released its proposal for the CBAM in July 2021 and reached an agreement after revising it in December 2022. The CBAM is part of the EU's action plan, "Fit for 55", which seeks to reduce European emissions by at least 55% by 2030 and achieve net zero emissions by 2050 while ensuring competitive strength and avoiding carbon leakage. As previously mentioned, the CBAM basically involves imposing a carbon price to imports of specific products into the European Union—, proportionate to the items' "embodied emissions," or the emissions of greenhouse gases created during their manufacturing, as *per* draft regulations issued in July 2021. According to Article 21 of the CBAM regulation proposal, importers of included goods will be obligated to acquire emission certificates in relation to their embodied emissions. The price of such certificate would be equal to the price of EU ETS allowances. CBAM will initially cover several specific goods from some of the most carbon-intensive sectors, comprising iron and steel, cement, fertilizers, aluminum, electricity, and hydrogen, as well as some precursors and a small selection of downstream products, according to the first Annex of the regulation. CBAM will begin operations in October 2023, and initially, a simpler CBAM between 2023 and 2025 will apply to reporting obligations. The CBAM is designed to progressively replace the existing free allocation of permits as the primary mechanism under the EU ETS to address carbon leakage. The method will be phased in proportionally to the phase-out of the present free allocation, according to Article 31 of the proposed CBAM draft. Importers of such goods can minimize or at least lessen prospective CBAM expenses. According to Article 9 of the CBAM



**Figure 3:** Production and consumption of embodied emissions in international trade per country, 1995 vs. 2018 (Organisation for Economic Co-operation and Development, 2021)

regulation proposal, goods that are subject to a direct carbon price (i.e. a carbon tax or ETS) in their country of origin are eligible for a rebate equal to the price already paid prior to export. In that way, according to EU regulating bodies, the CBAM will ensure a balanced treatment of such imports and it will encourage trading partners around the world to join the EU's climate efforts (European Commission, 2021; European Council, 2021; Pausch-Homblé, 2022).

Recent studies addressing CBAM outcomes suggest that, if implemented widely, it will reduce greenhouse emissions, thus being beneficial in terms of decreasing global warming (Balistreri et al., 2019; Clerc et al., 2021; Eugster, 2021; Kahn et al., 2019). On the other hand, legal challenges and trade conflicts are to be expected. The CBAM's compliance with the trade laws of the General Agreement on Tariffs and Trade (GATT) is not secured. Contrary to the EU's justification, the international community perceives CBAM as a significant barrier to trade camouflaged as a mitigation policy, claiming that the CBAM also violates the trade principles of the World Trading Organization (WTO). The CBAM may boost prices of goods, causing perhaps another trade disruption and affecting developing countries (Appunn & Wettenge, 2023; Dias et al., 2021; Gläser et al., 2021; Lim et al., 2021; Lowe, 2021; Sapir, 2021).

Although some lawmakers have advocated for CBAM exemptions in least developed countries, others argue that doing so would decrease the effectiveness of the mechanism. There is an alternative approach to fostering equity by using CBAM revenues to provide low-carbon development assistance to developing countries. While the initial EU proposal involved allocating the revenue to the EU budget, lawmakers agreed that the revenue will be redirected to least developed countries to offset the costs that the mechanism imposes on them, according to Article 24a of the updated CBAM proposal from December 2022 (Gore, 2021; Incir, 2022).

In July 2021, a survey of major German stakeholders including businesses, civil institutions, and research revealed

that there is considerable support for CBAM and an anticipation that the mechanism will be eventually implemented. Industry stakeholders supported continuing the free allocation of allowances, refunds for EU exporters and using profits for domestic spending. Meanwhile, civil institutions rather favor phasing out free allocation, exempting low-income countries and countries without climate policies, and using revenues to fund the green transition in low-income countries (Kuehner et al., 2022).

Figure 3, which depicts the production and consumption of embodied carbon emissions in international trade by country, presents China, the United States, Russia, Japan and India as the countries with the highest amounts of produced and consumed emissions. These countries are highly likely to have large production industries in energy-intensive production sectors, which are targeted by CBAM. It can be deduced, therefore, that such countries may play a significant role as top trading partners for Germany's imports of CBAM goods, as their products are in high demand globally (World Trade Organization, 2022). China, for example, is the world's largest producer of steel and aluminum, and it also has an enormous capacity for chemical and polymer manufacturing. Similarly, the United States is the world's greatest producer of natural gas and a substantial manufacturer of aluminum and steel, while Japan has a considerable capacity for high-quality steel and chemicals. India is also becoming a significant producer of iron and steel, chemicals, and polymers (International Aluminum Institute, 2023; Japan External Trade Organization - JETRO, 2022; U.S. Energy Information Administration, 2022; World Steel Association, 2023).

### 2.3. CO<sub>2</sub> emissions embodied in CBAM goods

There is a further issue that has not been brought under the spotlight yet. The CBAM requires the development of methodologies to estimate the emissions embodied in goods. Importers of CBAM goods will be obligated to acquire emission certificates in relation to their embodied emissions. Ac-

According to the CBAM proposal, embodied emissions of goods may be based on real emissions reported and validated by accredited verifiers or using default values, where importers are unable to demonstrate actual emissions. The use of default values may be problematic, as there are different approaches to determine such values. The following chapter discusses in detail this issue (European Commission, 2021).

According to Article 7 of the CBAM, embodied emissions in goods shall be calculated pursuant to the methods set out in its third Annex. The third Annex stipulates that embodied emissions of goods are to be based on real emissions or using default values. If real monitoring values for emissions cannot be supplied, a default value is used. The third Annex further determines that “only real values from the country where actual emissions occurred must be used as default values. In the absence of actual, country specific values, literature values may be used. Literature values shall be determined based on the best available data” (European Commission, 2021).

Default values, whether country specific or taken from literature, can be deliberately set lower than the likely embodied emissions. Exporters of goods could then benefit from the failure to provide reliable data on actual emissions, using default values and avoiding a major financial burden. The EU argues that “default values shall be set at the average emission intensity of the 10% worst performing installations in each exporting country and for each of the goods listed in Annex I other than electricity, increased by a mark-up, the latter to be determined in the implementing acts [of the CBAM]. When reliable data for the exporting country cannot be applied for a type of goods, the default values shall be based on the average emission intensity of the 5 % worst performing EU installations for that type of good” (European Commission, 2021).

To the greatest degree practicable, “best available data” used for default values should be based on accurate and publicly accessible information on the type of technology and methods utilized, energy source, and input materials. It is further determined in the third Annex that “default values shall be updated on a regular basis, depending on the most recent and trustworthy information. The EU also promises to “publish [additional] guidance for the approach taken to adjust for greenhouse gases used as process input”. In the updated version of the CBAM it is clearly stated that “under no circumstances shall default values be lower than the likely embodied emissions and the exporter shall not benefit from the failure to provide reliable data on actual emissions so that default values are used”. Although the calculation of embodied emissions seems accurate at first sight, the third Annex of the CBAM is, until this point in time, vaguely formulated. The exact methodology to calculate embodied emissions based on actual data or available literature still must be developed. (Carbon Market Watch, 2021).

### 3. Methodology

#### 3.1. Outline

The research approach of this thesis employs a quantitative research method, as the embodied emissions of goods can be measured. The study relies primarily on secondary data, utilizing existing quantitative data rather than collecting new information. However, original quantitative data is generated through the analysis of secondary sources, including legal texts and press releases related to the Carbon Border Adjustment Mechanism (CBAM). All data used in the study is publicly accessible and external to the research project.

This thesis builds a model, on an Excel basis, to determine to what extent CBAM will impact the trading patterns of exports and imports between Germany and non-European countries. It seeks to determine if the financial burden of CBAM is unevenly distributed across exporters and determined by each country’s energy production structure. To do so, the research is subdivided into individual research steps, shown in Figure 4.

The research commences by examining the EU’s Carbon Border Adjustment Mechanism (CBAM) to establish the model’s boundary conditions. The objective is to quantitatively replicate the legislative framework, ensuring that all calculations adhere to the specified regulations (see 2.3).

Subsequently, considering the CBAM rules and boundary conditions, trade statistics from the German Federal Statistical Office are utilized to determine the traded value, volume, and trading partners associated with CBAM goods (see 3.3.1). The next step consists in calculating the embodied emissions using the previous step and data from the OECD on intensity of emissions (see 3.3.2).

The results from the third step are then compared in the fourth step of the research, by using data from the IEA and the USGS on the metal industry (see 3.3.3). All data is then validated with literature values and values from existing calculation models, such as the GHG Protocol Tool in the following step (see 3.3.4).

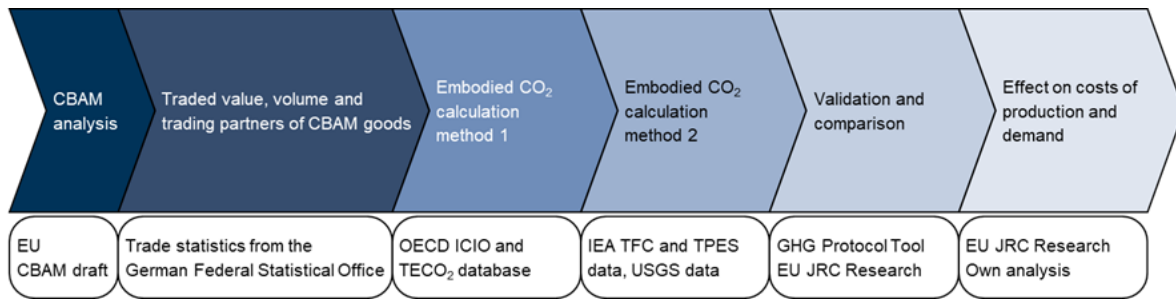
The last step of the research analyzes the potential impact of the proposed CBAM on Germany’s demand for energy-intensive goods, such as metals, as well as the impact on its major trading partners (see 3.3.5).

#### 3.2. Data collection

##### 3.2.1. Trade statistics

The International Monetary Fund’s Dissemination Standards Bulletin Board (DSBB) allows users to access online datasets for all available categories for a country, even if compiled by multiple statistical agencies. The DSBB comprises data for Germany throughout the different sectors of its economy, such as the financial, the fiscal and the external sector. The latter one describes the features related to the economic interaction with other countries, such as balance of payments, external debt, and merchandise trade (International Monetary Fund, 2015).





**Figure 4:** Research steps (above) and used data sources (below) in each step (Own illustration, 2023)

Statistics in Germany about merchandise trade are collected by the Federal Statistical Office. The goal of merchandise trade statistics is to track the movement of goods across borders between Germany and other nations. Since 1993, German merchandise trade data has been divided into two categories, Extra- and Intra-EU trade statistics. The quantities and values of imported and exported commodities are published primarily broken down by commodity types and countries.

The classification of commodities used for reporting imports and exports is the European Customs nomenclature, published in Germany as *Warenverzeichnis (WA)* (Federal Statistical Office (DESTATIS), 2019). The first Annex of the CBAM specifies exactly which traded goods are targeted according to its nomenclature, as seen in Table 1.

The Federal Statistical Office provides data on each imported good individually, according to its specific nomenclature. As determined in the first Annex of the CBAM, there are (initially) 104 goods included in the CBAM. The data on imports is presented as a monetary value, in accordance with international standards. The value of each good is based on its entry value at the German border. Generally, it is derived from the invoice value with some adjustments for transport costs. Tariffs and taxes or other charges which have been levied on import or export are not included in the statistical value. The yearly cumulated sum of imports, in thousand euros (T€), is provided for each country. Additionally, the yearly cumulated weight sum of each good is also provided in tons.

### 3.2.2. OECD TECO<sub>2</sub> database

The Organization for Economic Cooperation and Development (OECD) is known as a statistical agency that compares policy experiences and coordinates domestic and international policies. Since 2014, the OECD publicly releases its main statistical databases on subjects such as agriculture, population, and economic projections from industry and services. The Structural Analysis (STAN) database offers insights on industrial performance across nations. It comprises yearly measurements of production, labor input, and investment.

In the framework of this research, the Input-Output Tables (IOTs) of the STAN database provide helpful information. IOTs explain the sell and purchase interactions that

exist within an economy between producers and consumers and show flows (sales and purchases) of final and intermediate commodities and services (Organisation for Economic Co-operation and Development, 2018).

More recently, the OECD merged the 2021 version of the Inter-Country Input-Output (ICIO) tables with the IEA's statistics on carbon emissions from fuel combustion to estimate the distribution across economies of final demand for embodied carbon that has been emitted along global production chains. Using information from both databases, the emission intensity of production is calculated for each industry in each country. In that way, the Trade in Embodied CO<sub>2</sub> (TECO<sub>2</sub>) database presents a set of indicators to identify patterns of carbon demand and carbon production in each nation. The database includes indicators such as carbon emissions based on production (emitted by countries), emissions embodied in domestic final demand (consumed by countries), net exports of carbon emissions and the country origin of emissions in final demand. Policymakers, such as the EU, profit from such insights into the environmental implications of global industrial systems. The impact of international trade can be measured by allocating emissions to consuming and producing nations, thus disclosing whether nations are lowering or growing their emissions in production and consumption processes (Yamano & Guilhoto, 2020).

### 3.2.3. IEA World Energy Statistics and Balances

The IEA compiles data on energy commodities such as oil, natural gas, and coal to publish yearly information books on specific fuels. Such commodity balances are presented in a simple way, by presenting all the data in comparable physical units. This could be joules or cubic meters for natural gas or tons for coal, for example. Yet such commodities are consumed for their energy content and can be transformed into one another through different processes. Simple commodity balances must be integrated to create an overall view of the energy system. Energy balances fulfill this task by showing how one product is turned into another. Such balances highlight the many links between energy commodities and demonstrate how all sources of energy are consumed (Márquez Alberto & Villatoro Flores, 2022; Millard & Quadrelli, 2017).

In an energy balance, data elements on different commodities appear in a common physical unit. It enables, in the

**Table 1:** Statistical nomenclature of CBAM goods (Federal Statistical Office (DESTATIS), 2019)

| CBAM good category and abbreviation | Statistical nomenclature ( <i>Warenverzeichnis</i> ) |
|-------------------------------------|--|
| A: Aluminum                         | WA76xx   |
| C: Cement                           | WA2523xx   |
| CH: Chemicals                       | WA29xx; WA280410 and WA2814xx                        |
| E: Electricity                      | WA271600   |
| F: Fertilisers                      | WA3105xx   |
| IS: Iron and Steel                  | WA72xx and WA73xx                                    |
| P: Polymers                         | WA39xx   |

framework of this research, to see the total amount of energy consumed and the relative contribution of each source for the economy as a whole and for each sector of consumption. It also allows for the determination of energy transformation efficiencies, the development of aggregate indicators, and the forecasting of carbon emissions from fuel combustion (EUROSTAT, 2018). An energy balance may also be used to visualize the energy system using Sankey charts. The key data of an energy balance is the Total Primary Energy Supply (TPES), the Total Final Consumption (TFC) and the electricity generation by fuel type. The TPES measures the total supply of energy available for use in a country, while the TFC shows the energy that is used by final consumers, namely the energy used in households, transport, and businesses. Data on electricity production reflects the relative importance of each energy source in the generation mix. In the TFC, the product “electricity” comprises electricity generated from all energy sources, but in the TPES, just the appropriate primary equivalent quantity for each generation source is included (EUROSTAT, 2020).

Industry, transport, and the other sectors (mainly residential) are fed by energy sources such as oil and oil products, coal, natural gas, electricity, and biofuels. Oil and oil products are the major source of energy consumed, primarily in the transport sector, amounting to roughly 40% of the TFC. The industry sector, worldwide, consumes energy mainly in form of coal, natural gas and electricity. The obtained information from the IEA will be further used to estimate the embodied emissions of goods, for each country, based on their TFC.

### 3.3. Research methods

#### 3.3.1. CBAM goods traded to Germany and trading partners

Determining the trading quantities and top trading partners for CBAM goods is of relevance in understanding the embodied emissions of the imports. Production of the same good in different countries can have vastly different carbon footprints due to differences in energy generation matrix, production processes, and regulations. By identifying trade nations and quantities, the embodied emissions of items may be calculated more easily. Furthermore, identifying the top trading partners can guide Germany in strategizing its trade policies and promoting sustainable trade practices. The government may collaborate with its trade partners to minimize

carbon emissions from goods production and foster a more sustainable global economy.

Additionally, Article 9 of the CBAM specifies that a reduction in the number of CBAM certificates will be surrendered if the carbon price paid in the country of origin for the declared goods is considered. This means that importers can lower their CBAM liability by providing evidence of the carbon price paid in the country of origin. To calculate the reduction in the number of CBAM certificates to be surrendered, a methodology is required, which includes the conversion of the carbon price paid in foreign currency into Euros at the yearly average exchange rate. Therefore, knowing the country of origin and the carbon pricing policies in those countries is critical to accurately calculate the CBAM certificates and to implement the CBAM effectively.

The first step of the analysis consists in generating a matrix that comprises all CBAM goods imported and all the exporting countries. The German Federal Statistical Office, in compliance with the Federal Foreign Office, includes 262 countries, some of which are no longer one country, such as the Soviet Union or Yugoslavia. Furthermore, there are countries listed as confidential or “not determined”. To account for this, the analysis filters out all countries that did not export even a single unit of CBAM goods to Germany during the period of 2012 to 2021.

According to the second Annex of the CBAM, the adjustment mechanism does not apply for the 28 country members of the EU, including the recently joined Croatian Republic. Additionally, the regulation does not apply to goods originating from Iceland, Liechtenstein, Norway and Switzerland. After filtering out all irrelevant countries the matrix comprises 122 exporting countries. The matrix of exported CBAM goods *per* country uses the latest (2021) and the earliest (2012) data available, to compare the recent development of trade<sup>2</sup>.

The analysis continues by breaking down the CBAM goods per trading partner, considering the CPIs of the countries of origin of the goods. The goal is to prioritize the detailed calculation of embodied emissions of those trading partners with the highest financial impact, based on the traded value and/or CPI.

<sup>2</sup> There is no data available before 2012 for all the 122 countries listed in this matrix for all CBAM goods

### 3.3.2. CO<sub>2</sub> emissions embodied in traded goods according to OECD TECO<sub>2</sub>

The OECD analyses carbon footprints of global production networks and provides estimates of carbon emissions embodied in final demand and international gross trade for all major economies. The most recent data was compiled over the period of 2005 to 2018 using a revised methodology to allocate territorial emissions (measured in a country) to economic output-based emissions. The database provides information on total embodied emissions in demand and production of a country and, on the intensity of the CO<sub>2</sub> emissions embodied in imports and exports. In addition to the overall factor of a country, the intensity factors are provided for specific industries, such as the metal industry or the chemical industry (Yamano & Guilhoto, 2020). Figure 5 depicts the comparison of the intensity factors of the CO<sub>2</sub> emissions embodied in the total gross exports of the overall industry [DTOTAL], the metal industry [D24T25] and the chemical industry [D19T23] for the selected trading partners in the year 2018.

The analysis shows that, when comparing the intensity of the CO<sub>2</sub> emissions of the total industry, Russia has the largest factor, followed by China and India. These, however, change when looking at the specific intensity factor for the chemicals and non-metallic mineral products [D19T23]. China emerges as the largest polluter *per* million dollars of a product, followed by India and Russia. The emissions intensities *per* country of the metal sector [D24T25] follow the same pattern that the total industry of the country follows. Russia is the largest polluter *per* unit of value, followed by India and China. The intensity of emissions of the metal products represents roughly three times the total industry factor *per* unit.

Due to the diverse nature of the products addressed by the CBAM, it is not feasible to calculate specific emissions *per* category without breaking them down into subcategories. Thus, the analysis is conducted by estimating emissions for distinct groups of goods. On the one hand, emissions from the metals sector, encompassing iron, steel, and aluminum, are computed. On the other hand, emissions from the chemicals, polymers, and fertilizers industries are evaluated separately. This approach enables a more comprehensive analysis.

To calculate the embodied emissions of exported goods in the metals sector *per* country, the specific factor [D24T25] is used. The value traded to Germany in 2021 of each good in the iron, steel and aluminum category (in M€) is multiplied by the factor [D24T25] to calculate the respective embodied emissions. This is done individually *per* country. It relies, however, on the premise that the exchange rate from USD:EUR equals 1:1. The factor [D24T25] accounts for both basic metal products and fabricated metal products, which are included in the CBAM goods from iron, steel, and aluminum. However, the emissions are also calculated separately with the factors [D24] and [D25], which account only for basic metal products and fabricated metal products, re-

spectively. It is fair to assume that the factor [D24T25] provides a good compromise between both individual factors [D24; D25] as it considers both types of products, like the goods tackled by CBAM and listed in the first annex of the CBAM guideline (see 7.1.1). Additionally, the factor [DTOTAL], which represents the overall emissions intensity of a country's industry, is included for comparison purposes.

Analogous to the metals sector, to calculate the embodied emissions of exported goods in the polymers, chemicals and fertilisers sector *per* country, the specific factor [D19T23] is used. The emissions are also calculated separately with the factors [D20T21] and [D20], which account for chemical/pharmaceutical products and only for chemical products, respectively. In all three calculations [D19T23; D20T21 and D20], the embodied emissions of polymers are calculated with the factor [D22], which specifically portrays the intensity factor of CO<sub>2</sub> emissions in the rubber and plastics industry, where most of all CBAM goods classified as polymers belong (see 7.1.1). Additionally, the factor [DTOTAL], which represents the overall emissions intensity of a country's industry, is included for comparison purposes.

### 3.3.3. CO<sub>2</sub> emissions embodied in traded goods according to IEA

The aim of this chapter is to validate and compare the outcomes obtained from calculating the embodied emissions with the OECD TECO<sub>2</sub> database with the outcomes from the IEA database and from literature. Additionally, it seeks to estimate the short- and long-term impacts of CBAM on the demand and/or production shift, if any, by prioritizing the metal production in China, Russia, and India, which are the largest exporters and polluters. The possibility of production relocation to western countries is evaluated by including the United States in the study. The detailed effects of CBAM on Turkey have been extensively explored in other research works; hence it is excluded from this analysis (Acar et al., 2022). For clarity and ease of presentation, Korea has been excluded.

To calculate the embodied emissions in the iron, steel, and aluminum industry, CO<sub>2</sub> emission intensity factors *per* ton of good and *per* country are determined. The analysis intentionally employs the traded volume of goods instead of traded value, to identify any additional effects arising from price shifts and dynamics of goods in each country. The intensity factors of CO<sub>2</sub> emissions *per* ton are derived by calculating the total emissions produced in the relevant sector (i.e., aluminum or iron and steel) according to the TFC of primary energy of each country (IEA, 2023).

This total amount of emissions is then divided by the total amount of tons produced in that same year in each country. The global industry sector is known to primarily consume energy in form of coal, natural gas and electricity.

The graph in Figure 6 provides an illustration of the input data required to calculate the emission intensity of a good. It displays the primary energy input required to produce iron and steel in Petajoules as stacked areas, while the annual production of iron and steel according to the US Geological

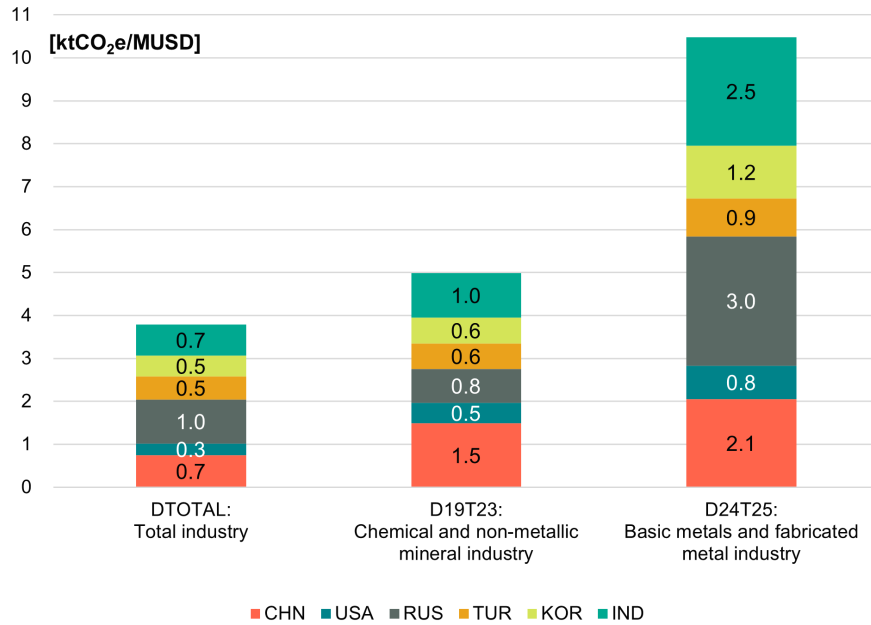


Figure 5: Comparison of the intensity factors of CO<sub>2</sub> emissions embodied in total gross exports, 2018 (Organisation for Economic Co-operation and Development, 2021)

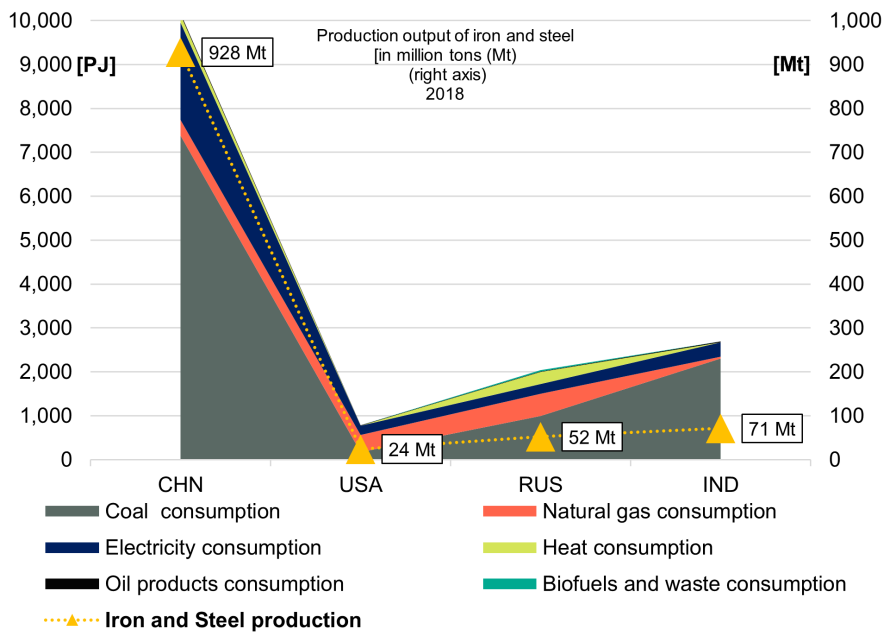


Figure 6: TFC of primary energy in the production of iron and steel (left axis) and production output (right axis), 2018 (IEA, 2023; U.S. Geological Survey, 2019b)

Survey of each country is presented as a data point for the year 2018 (U.S. Geological Survey, 2019b).

The graph illustrates that China is the dominant producer of iron and steel. However, a crucial point to note is that each unit of primary energy source consumed in the production of iron and steel has a CO<sub>2</sub> emission intensity, which must be considered to calculate the total emissions and intensity of iron and steel production *per* country. To do so, the analysis assumes an emission factor for each source of primary en-

ergy based on data from the German Environmental Agency (UBA), which again relies on the emission factor database from the IPCC (IPCC, 2023; Umweltbundesamt, 2022).

However, this only represents the initial step, as the production of iron, steel, and aluminum also requires electricity and heat as primary energy sources. To determine these factors, a weighted average is calculated based on each country's electricity generation matrix and the primary energy source emission factors. The objective is to estimate the extent to



**Table 2:** Emissions factors of primary energy sources; 2022 (IPCC, 2023; Umweltbundesamt, 2022)

| Primary energy source | Explicit fuel name in the data source | Emissions factor [tCO <sub>2</sub> e/TJ] | Emissions factor [gCO <sub>2</sub> e/kWh] |
|-----------------------|---------------------------------------|--|---|
| Oil products          | Rohbenzin (Crude gasoline)            | 73,3                                     | 263,9                                     |
| Oil                   | Erdöl (Oil)                           | 73,3                                     | 263,9                                     |
| Coal                  | Steinkohle (Bituminous coal)          | 93,6                                     | 337,0                                     |
| Natural gas           | Erdgas (Natural gas)                  | 55,8                                     | 200,9                                     |
| Biofuels and waste    | Biogas                                | 0,04                                     | 0,2                                       |

which a country's electricity generation matrix affects the CO<sub>2</sub> emission intensity factors of iron, steel, and aluminum. It can be anticipated that the greater the proportion of fossil primary energy sources in a country's electricity generation matrix, the higher the CO<sub>2</sub> emission intensity factor per ton of iron, steel, and aluminum. The graph in Figure 7 depicts the primary energy sources utilized for electricity generation in China, the United States, Russia, and India in the year 2018.

The Figure 7 indicates one key takeaway, namely that India and China are likely to have the highest emission factor *per* unit of electricity. However, it is important to note that the graph is only intended to provide the reader with an idea of the relative cleanliness or dirtiness of each country's electricity generation, suggesting that the United States has the less polluting electricity generation.

To determine the emission factors for electricity in each country, the individual emission factors from Table 2 are weighted based on each primary energy source's percentage share in the electricity generation matrix for the year 2018. Moreover, the calculated factors are compared with data from the BP Statistical Review of World Energy 2019 on emissions of electricity in each country to ensure the plausibility of the results. (BP, 2019, 2022) The chart in Figure 8 presents the findings.

The comparison of the calculated electricity CO<sub>2</sub> emission factors *per* country with actual data reveals a significant deviation, suggesting that the initial calculation may be inaccurate. This discrepancy is observed across all countries, making it highly unlikely that the calculated values are entirely correct. Consequently, it appears that the electricity input required has approximately twice the amount of CO<sub>2</sub> emissions per kWh than initially calculated. After determining the emission factors for all primary energy input sources used in the production of iron, steel and aluminum, the intensity factor of CO<sub>2</sub> emissions for each group of goods can now be established.

### 3.3.4. Validation with GHG Protocol Tool and literature values

To validate the outcomes obtained, the investigation proceeds with computing the total emissions generated in each country's iron and steel industry, utilizing the GHG Protocol calculation tool. The GHG Protocol is an internationally recognized system that provides consistent and extensive frameworks to quantify and regulate GHG emissions from private and public sector operations and value chains (GHG Protocol

& Gillenwater, 2005). To investigate the significant deviation in the results obtained (see 4.3), an additional step is taken to calculate the overall emissions produced in the iron and steel industry *per* country using the GHG Protocol calculation tool. This tool records the primary energy sources required for iron and steel production and automatically calculates the total amount of CO<sub>2</sub> emissions produced.

The next phase involves comparing the outcomes of this study with the current literature on CO<sub>2</sub> emission production in the iron and steel sector. A recent study by the European Joint Research Centre (JRC) provided estimates of GHG intensities in the iron and steel sector of the EU and its primary global trading partners. The report utilizes publicly available databases and transparent methodologies to determine the intensity factors in the iron and steel industry of the EU and its global partners. The goal of the study by the JRC is to enhance comprehension of carbon leakage risk and support the implementation of default values within the CBAM framework (Koolen & Vidovic, 2022). Additionally, the average worldwide intensity factor of CO<sub>2</sub> emissions to produce iron and steel (1,53 tons of CO<sub>2</sub>e *per* ton of steel) according to (IEA, 2022a) is also compared.

The final step of the analysis consists in presenting the resultant embodied emissions for the selected countries according to the different methods discussed, as shown in Figure 23. The goal of the final step is to demonstrate that the financial burden posed by CBAM on exporting countries is uneven and, as shown in the analysis, depends strongly on the primary energy sources put in and the technologies used to produce goods. This raises the question if the uneven burden posed by CBAM will shift import and export patterns in the short- and long-term.

### 3.3.5. Effect of the CBAM on production costs and demand patterns

The goal of this chapter is to examine whether certain countries may experience a shift in their market position based on their production costs and sale prices. Specifically, the chapter focuses on the iron and steel industry by assessing each country's production costs and identifying their cost advantages and disadvantages. The aim is to determine the extent to which the uneven financial burden posed by CBAM may alter the production costs of iron and steel. To do so, the discussion begins in Table 3 by breaking down the production costs of the EU and its major trading partners (European Joint Research Centre et al., 2020).

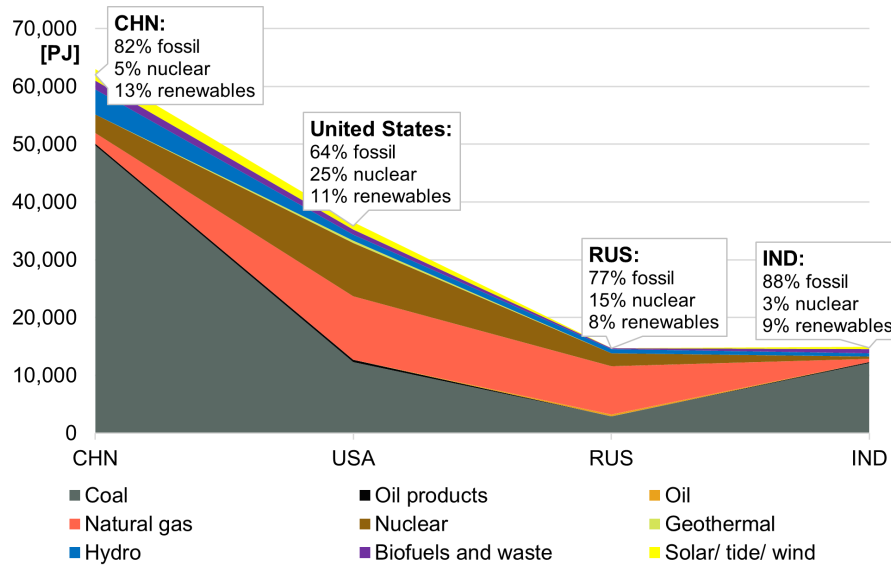


Figure 7: Primary energy consumption of electricity production per country, 2018 (IEA, 2023)

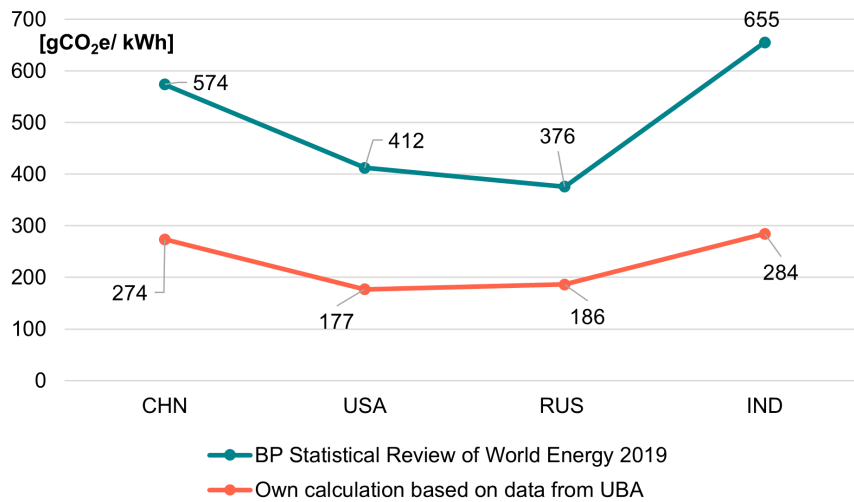


Figure 8: Comparison of electricity CO<sub>2</sub> emission factors per country, 2018 ((BP, 2022; IEA, 2023; Umweltbundesamt, 2022)

Table 3: Breakdown of the production costs of iron and steel, 2020 (European Joint Research Centre et al., 2020)

| Cost breakdown     | Cost components by Moya and Boulamanti  |
|--------------------|---|
| Energy             | <ul style="list-style-type: none"> <li>Energy (Coke oven gas, Blast furnace gas, Basic oxygen furnace gas, Corex gas, Custom iron gas, Custom steel gas, Heavy fuel oil, Natural gas, Thermal coal, other fuel and Steam)</li> <li>Purchased electricity</li> </ul> |
| Labour             | <ul style="list-style-type: none"> <li>Sum of all wages paid, employee benefits and payroll taxes</li> </ul>  |
| Raw material       | <ul style="list-style-type: none"> <li>Iron ore, reductants, metallics and ferroalloys and purchased semis</li> </ul>   |
| Credits            | <ul style="list-style-type: none"> <li>Savings from recycled scrap and self-power generation</li> </ul>   |
| Other (incl. CBAM) | <ul style="list-style-type: none"> <li>Other consumables (auxiliary and operating materials)</li> <li>Other costs (overheads and sustaining capital)</li> <li>CO<sub>2</sub> costs and future <b>CBAM costs</b></li> </ul>  |

Taking into consideration the cost structures of each producing country, the discussion proceeds to evaluate the additional costs that would be imposed by the CBAM. To do this, the intensity factors for CO<sub>2</sub> emissions presented in Figure 21 are utilized and converted into additional costs by setting the price of a CBAM certificate at 100 euros per ton of CO<sub>2</sub>. For instance, an intensity factor of two tons of CO<sub>2</sub> per ton of steel would imply an additional cost of 200 euros per ton to be paid under CBAM. Consequently, this would raise the production costs, although the full impact of CBAM would not be realized immediately, as it will be gradually phased-in over a ten-year period from 2026 to 2035 (see 2.2). Thus, the full effect of CBAM is expected to be observed in the long-term rather than the short-term, suggesting that the impact on production costs may not be significant in the short run.

This study forecasts the shift in total production costs of iron and steel during the ten-year phase-in period of CBAM, spanning from 2026 to 2035. The forecast is based on the study carried out by the EU JRC (presented in Figure 25) and relies on certain assumptions. Firstly, the intensity factors of CO<sub>2</sub> emissions, derived from 2018 data, assumes a yearly decline of 1% for every country due to technological advancements and process efficiency improvements. Secondly, the study assumes a yearly 5% increase in labour costs. Material costs are set to increase 2,5% per year for all countries. The same applies to the energy costs in each country. It is also assumed that savings in production costs will increase by 1% each year for all countries because of their shared intention to improve recycling processes. The gradual phase-in of CBAM is assumed to take place over the ten-year period, with only 10% of the certificate price being paid in 2026, and this percentage increasing by 10% each year until reaching 100% in 2035. In the initial analysis, the price of a CBAM certificate is set at 100 euros per ton of CO<sub>2</sub> and is assumed to remain constant throughout the decade.

The analysis assumes that there will be no implementation of a carbon pricing instrument (CPI) in Russia and India during the period of 2026-2035. Additionally, it is assumed that the domestic CPI price in China and the United States will remain unchanged, as shown in Table 4. The European iron and steel industry is expected to pay the same price in the EU Emissions Trading System (EU ETS) as a CBAM certificate. As per the CBAM guidelines, the free allocation of certificates in the EU ETS for the domestic iron and steel industry will be phased out during the same period as CBAM is phased in (see 2.2). Therefore, it is assumed that the EU27 will only pay 10% of the certificate price in 2026, 20% in 2027, and so on, until reaching 100% in 2035. The intensity factors of CO<sub>2</sub> emissions in the iron and steel production considered in this analysis are [OECD D24T25] and [EU JRC] (see 4.2 and 4.3).

## 4. Results

### 4.1. CBAM goods traded to Germany and trading partners

The analysis throws the following results: the total amount of CBAM goods traded in 2012 summed up to

roughly 14,1 billion Euro (B€), while in 2021 it accounted for 20,2 B€, an increase of 43% (Federal Statistical Office (DESTATIS), 2022b). The imported amount of CBAM goods in 2021 represents 1,7% of the total imports of Germany in that year (1204 B€), according to (Federal Statistical Office (DESTATIS), 2022a).

Surprisingly, the traded volume of goods does not increase proportionally to the monetary value imported. In 2012, the 122 exporting countries shipped roughly 9,6 million tons (Mt). A decade later, the shipping volume of traded CBAM goods amounts to 10,9 Mt, an increase of 13,8%. The percentual increase of the traded monetary value is roughly thrice the increase of the traded volume, which can be due to different reasons, such as drastic price increases of certain goods or trade conflicts between major economies.

As mentioned previously, the 104 traded CBAM goods are subdivided into seven categories: iron and steel, cement, fertilisers, aluminum, electricity, chemicals, and polymers. The traded quantities of CBAM goods in 2021 and 2012 (striped) are shown in the graph in Figure 9 in B€.

The import of polymers, such as plastics, polyesters, polyethers and polymers of ethylene add up to 6,9 B€, roughly one third of all traded CBAM goods to Germany. The traded value of goods increased by approximately 60,5% in a decade. The import of polymers grew the most between 2012 and 2021, compared to the other goods. Imported polymers are mostly utilized in the packaging industry, as well as in construction and in the automotive industry (Gesellschaft Deutscher Chemiker, 2020).

Iron and steel imports add up to 5,4 B€, second to polymers. The imports of iron and steel in Germany increased by 35,0% between 2012 and 2021. Two thirds of the imported iron and steel products in Germany are utilized in the construction and the automotive industry (Wirtschaftsvereinigung Stahl, 2021). The graph in Figure 10 shows the percentual share of traded value to Germany *per* category in 2021.

Figure 9 and Figure 10 display aluminum as the third largest group of goods imported. Like iron and steel, aluminum is mostly used in the automotive and construction industry. Additionally, aluminum plays an important role in the packaging industry. The imports of aluminum in 2021 add up to 4,0 B€, an increase of 42,9% in comparison with the traded value in 2012 (Statista, 2021). Fertilisers and cement play a minor role in the matrix of imported CBAM goods. Importation of both goods decreased in the last decade for countries covered by CBAM. Electricity, according to the Federal Statistical Office, is not imported from the scoped countries.

Chemicals represent 18,5% of the imported CBAM goods, equaling 3,7 B€ in 2021. The group of chemicals in the CBAM goods is the most diversified one, as it brings under one hat commodities for several applications. These include carboxylic acids, hydrocarbons, ammonia and hydrogen. The principal chemical good imported to Germany in 2021 is saturated acyclic monocarboxylic acid (SAMA). It is an organic chemical used in manufacturing of detergents, disinfectants and antiseptics. It accounts for 16% of the imported chem-

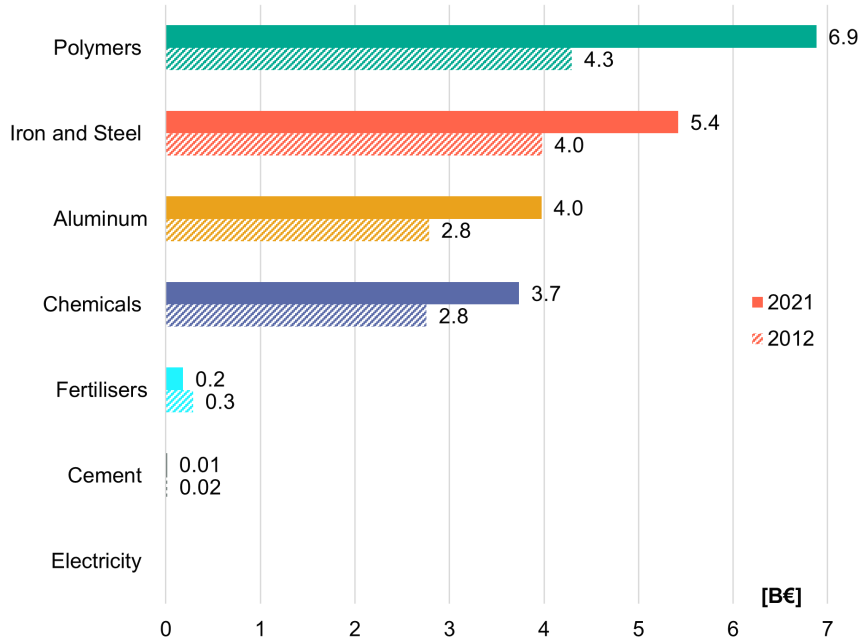


Figure 9: Import of CBAM goods to Germany, 2012 (striped) vs. 2021 (Federal Statistical Office (DESTATIS), 2022b)

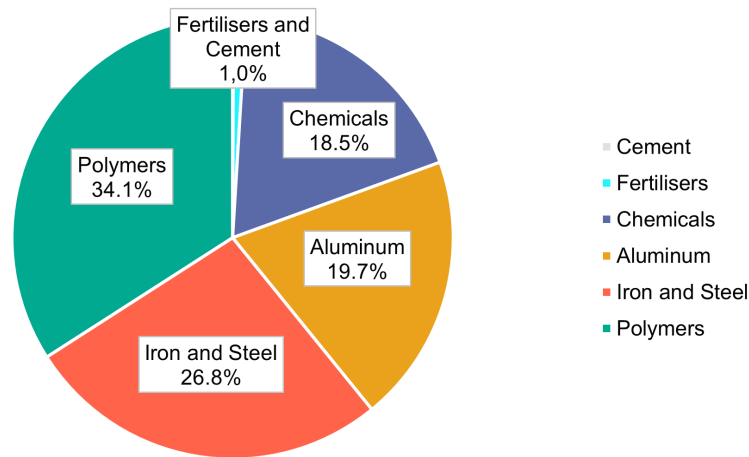


Figure 10: Percentual share of traded value to Germany per category of good, 2021 (Federal Statistical Office (DESTATIS), 2022b)

icals under the CBAM scope, or 0,6 B€, closely followed by acyclic alcohols (14%) and cyclic hydrocarbons (9%). Surprisingly, hydrogen imports are beneath all imports (with 24 T€) of other chemicals in this group, accounting for 0,001% of the imports of chemicals.

Raw aluminum is the mostly imported good in the small group of aluminums (14 goods) and, furthermore, the largest imported good (in value) of all 104 CBAM goods. It adds up to 46,1% of the aluminums and represents 9,1% of the total traded value in 2021. The apparent benefit of employing aluminum, for example in the automotive industry, is that it is much lighter than its steel counterpart. Less weight translates into a better fuel economy for the automobiles and trucks, lowering pollutants and making it ecologically beneficial. Aluminum is resistant to corrosion and rusting, outlasting steel or other metals in environments such as rain or

snow. With a low weight and high strength-to-weight ratio, aluminum provides an improved handling during assembly, appropriate for high-performance automobiles (Aluminium Deutschland e.V., 2021).

According to the data from the Federal Statistical Office, “other articles of iron and steel” are the main goods imported in this category, overall comprising 30 different goods. Its top good represents 29,0% of all iron and steel products imported and 7,8% of all CBAM goods imported. According to the Federal Customs Service, other articles of iron and steel comprise all goods forged, but not further machined as well as articles of iron or steel wire. Examples are ladders and steps, pallets and similar stackable transport equipment and several construction articles. Other important iron and steel products imported are constructions and construction parts made of iron and steel as well as tube or pipe fittings. Overall,



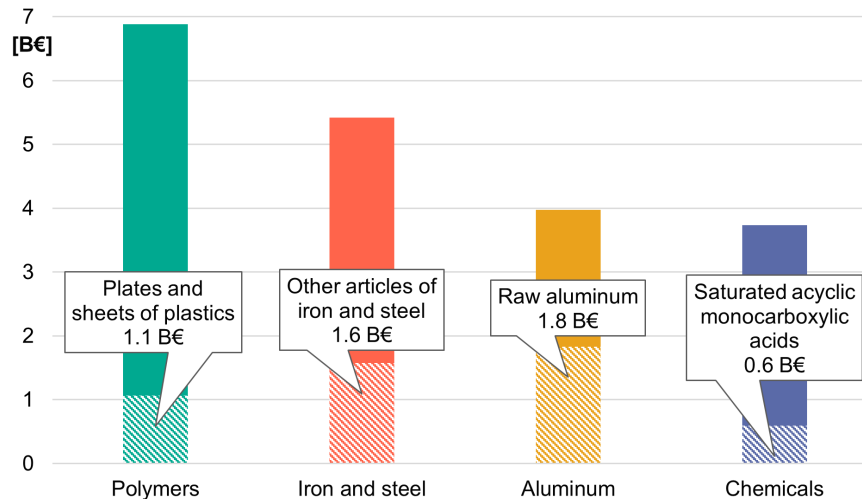


Figure 11: Principal imported good per group according to its imported value, 2021 (Federal Statistical Office (DESTATIS), 2022b)

steel is a highly advantageous material for use in the construction industry due to its strength, durability, versatility, cost-effectiveness, sustainability, and fire-resistant properties (Wirtschaftsvereinigung Stahl, 2021).

From the group of polymers, the dominant good imported is plastic in sheets and plates. It accounts for 16% of all imports of polymers and 5,2% of all CBAM goods. According to the Federal Customs Service, plastic in sheets and plates is an overall term that encompasses additionally film, foil and strip of unfoamed plastics, mostly out of polyethylene. Polyethylene is extensively used in the packaging, construction, and automotive industry. In the packaging sector, it is employed to produce bags, films, and containers for a range of products, including food and beverage and medical supplies. In construction, polyethylene is utilized for pipes, wire and cable insulation, and insulation for buildings. In the automotive sector, it is used for fuel tanks, hoses, and electrical components (Arbeitsgemeinschaft Verpackung und Umwelt, 2022).

Ultimately, the top three group of products in CBAM imports to Germany in 2021 – polymers, iron and steel, and aluminum – are all critical materials for sectors such as packaging, construction, and the automotive industry. Because of their adaptability, these materials are appropriate for a variety of applications in many areas. Germany's huge manufacturing economy is strongly reliant on these commodities, and the country's strict environmental standards require the use of high-quality raw materials.

In the context of emissions trading, it is important to note that many specific emission intensity factors are calculated based on the production of a certain number of tons of a given product. As a result, when trading emissions, the trading volume in tons, in addition to the traded value, becomes an important indicator to convey. Because the quantity of emissions released is directly related to the volume of a manufactured product, trading volumes in tons serve as a significant measure of the overall emissions produced by a certain

industry or sector. Both the traded value and the trading volume in tons must be considered, as these two metrics provide complementary information that, when combined, provides a more complete picture of the emissions generated. By taking both elements into account, it is feasible to precisely quantify the environmental impact. The graph in Figure 12 displays the traded quantities of CBAM goods in 2021 and 2012 (striped) in Mt.

The data presented reveals that the volume of aluminum traded in tons increased by less than 10%, while the traded value increased by over 40% in the last decade, suggesting a significant shift in the pricing dynamics of this commodity over the period under consideration. Furthermore, the volume of steel traded in tons increased by 10% over the given period, while the traded value increased by 35%, indicating a substantial rise in the price of steel and iron. According to the figures shown in Figure 12, the growth in traded value between 2012 and 2021 does not follow a proportionate connection with the increase in traded volume in tons. This disparity raises the question of how much goods' prices have changed in the recent decade, as a rise in traded value does not always imply an increase in the actual number of items traded. Based on data from the Federal Statistical Office, the graph in Figure 13 shows the price shift of the CBAM goods from 2012 (striped) to 2021 in Euros per ton (€/t).

The price of polymers rose drastically from 2012 to 2021 due to various factors such as increasing demand, rising production costs, and fluctuations in the price of raw materials. Additionally, supply chain disruptions caused by natural disasters and the COVID-19 pandemic also contributed to the rise in polymer prices. The price of polyethylene, the most widely used polymer, rose by more than 150% from January 2012 to December 2021 due to the factors mentioned above (Independent Commodity Intelligence Services, 2023) (Independent Commodity Intelligence Services, 2023). Further research out of the scope of this thesis is needed to identify how price variations have influenced trade volumes and val-

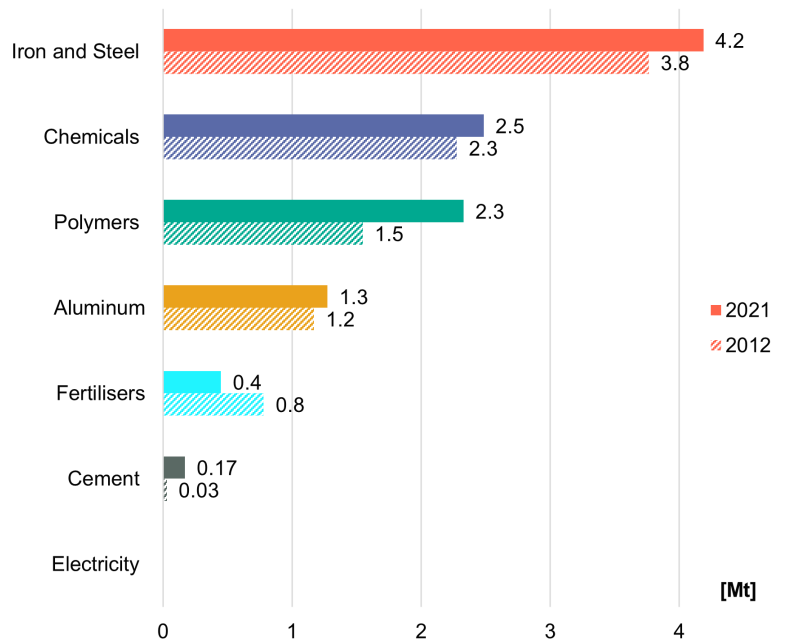


Figure 12: Import of CBAM goods to Germany, 2012 (striped) vs. 2021 (Federal Statistical Office (DESTATIS), 2022b)

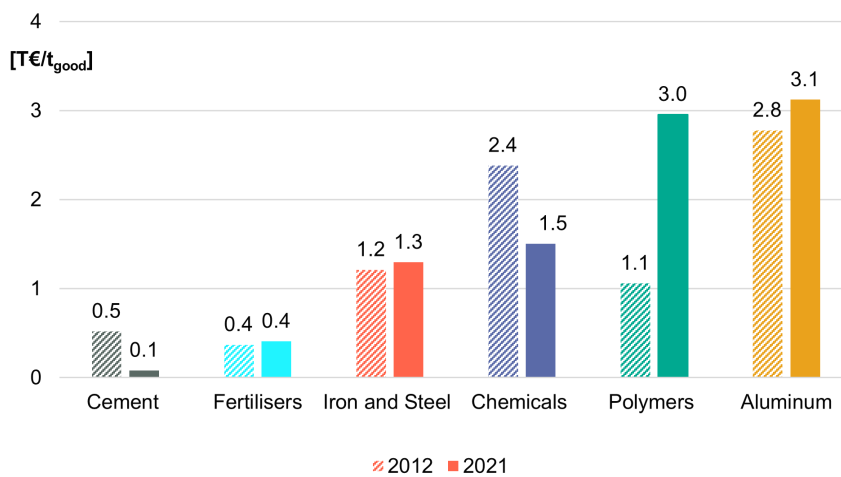


Figure 13: Price shift of CBAM goods, 2012 (striped) vs. 2021 (Federal Statistical Office (DESTATIS), 2022b)

ues, and how these trends may affect the larger economic environment in the future.

The top 15 countries that exported the highest amount of CBAM goods to Germany in terms of traded value in billion Euros are shown in Figure 14, with data comparing the years 2012 and 2021 (to contrast changes of exports in one decade). The countries listed exported, together, 89.4% of all CBAM goods in 2021.

As expected, the first country on the list is China, that exported 4,5 B€ worth of CBAM goods to Germany in 2021, compared to 2,2 B€ in 2012. This represents an increase of 104,5% in traded value. China alone exported in 2021 almost a quarter (22,8%) of all CBAM goods to Germany. Second is the United States, that exported 2,9 B€ to Germany in 2021, an increase of 38.1% in traded value compared to 2012.

Third is the United Kingdom, which surprisingly reduced its exports to Germany, decreasing 28.4% of its traded value. It is possible that the Brexit referendum in 2016 may have negatively affected the trade relationship between the United Kingdom and Germany. Uncertainty about future trade agreements and regulations may have led to a decrease in confidence and investment, which could have impacted exports. This, however, should be fully researched and is only one of many possibilities. Fourth on the list is Russia, which exported 1,8 B€ to Germany in 2021, an increase of 38,5%. Turkey closes the Top 5 exporters, increasing its traded value by 114.3% in a decade. Roughly two thirds of all CBAM goods imported to Germany were produced by the Top 5 countries. Ultimately, the data in the graphic suggests that there has been a significant increase in traded value for CBAM goods from most of the countries in the list

between 2012 and 2021, with some countries experiencing more notable increases than others.

Figure 14 is of great significance as it further reveals a key aspect of the CBAM. As *per* the data provided by the World Bank in Figure 1, some of the top trading partners do not have any form of CPI, which puts them in a vulnerable position. These countries will bear the full financial burden of CBAM, according to Article 9, implying that goods that have not paid any kind of carbon fee in their home country will not receive any rebate or discount, a costly affair for these trading partners. As a result, big emerging markets such as Russia or Turkey may suffer more from the implementation of CBAM than countries like the UK or the United States. India, Taiwan, and the Arabian Peninsula will face a higher burden due to the lack of a carbon pricing system than Japan, Korea or South Africa. However, it should be noted that this statement assumes that all trading partners have similar emissions intensity of production, which is not the case (see Chapter 4.2).

The Table 4 shows the trading partners that have a carbon pricing mechanism, indicating the current price of one unit and the rebated price certificate per CBAM. The rebated price of the CBAM certificate is calculated by subtracting the domestic price of each CPI from the current price of one emission certificate in the EU ETS, according to Articles 21 and 31 of the CBAM. The current price of a CBAM certificate is set to 100 euros *per* ton of CO<sub>2</sub>, based on data from the World Bank (The World Bank (IBRD and IDA), 2022). The selected countries for the analysis thereafter, according to the methodology presented in 3.3.1, are highlighted.

China and the United States are particularly selected for further analysis due to its massive trade value with Germany. Although both countries already implemented a domestic CPI and have rebated CBAM prices, it is expected that both countries carry an additional financial burden from CBAM. Great Britain is, in contrast, not considered, as its domestic CPI has equal prices *per* certificate than those assumed for CBAM. Russia and Turkey are interesting countries as both have neither implemented nor considered a domestic CPI (to the current standing) and display a similar traded value. Korea and India are also considered to compare the impact of a domestic CPI, which Korea has and India not, on countries with similar traded value. The chart in Figure 15 reveals the traded volume *per* group of CBAM goods in 2021 of the trading partners considered.

China emerges as the most prominent exporter of iron and steel and chemicals. The United States, similarly to China, export the most considerable share of polymers and a considerable share of chemicals. This may indicate different advantages or disadvantages in the production costs structure of each country, that lead to higher costs *per* unit and thus a lower demand from Germany. Meanwhile, Russia appears to be the greatest producer of aluminum and fertilisers. Turkey competes with Russia for the biggest share of aluminum production while Korea exports mostly polymers to Germany. India exports mostly chemicals and iron and steel.

#### 4.2. CO<sub>2</sub> emissions embodied in traded goods according to OECD TECO<sub>2</sub>

The chart in Figure 16 compares the results of the CO<sub>2</sub> emissions embodied in the metal sector *per* exporting country for the year 2021, depending on the intensity factor of CO<sub>2</sub> emissions used (see 3.3.2).

The chart clearly shows that China is the largest producer of emissions in the metals sector, which is not surprising given the traded value of its iron, steel and aluminum products and the high intensity of its emissions. In fact, China's emissions are higher than any other country included in the analysis. Russia follows behind as the second-largest producer of emissions in the metals sector, with emissions levels very similar to China's when comparing the factor [D24T25]. Overall, it is noticeable that the results of the analysis follow a consistent pattern *per* country, with the embodied emissions calculated using the intensity of emissions for basic metals [D24] being the highest, followed by [D24T25], [D25], and then [DTOTAL].

The most surprising aspect of this chart is that, except for China, the embodied emissions are nearly identical between all countries based on both factors [D24T25] and [D24]. Particularly in the cases of Russia and the United States the results are practically indistinguishable. However, the case of China stands out, as iron and steel emissions according to [D24] alone exceed all emissions based on [D24T25]. Furthermore, the overall result varies by almost 2 MtCO<sub>2</sub>e in the case of China. The graphs in Figure 17 clearly illustrates the difference between China and all other countries compared.

The Figure 17 provides evidence that in countries other than China and India, the variables [D24T25; D24] and [DTOTAL; D25] exhibit a consistent pattern and are approximately equal. However, in the case of China and India, these variables range without any discernible similarity. It also reinforces the statement that the CBAM will pose an uneven financial burden on exporters, evidencing that China, Russia and India will have to bear the greater burden as, for example, a million USD worth of iron and steel exported will generate twice or even thrice as much emissions as the same unit produced in the United States or Turkey. This, however, does not necessarily imply that demand and production will shift, as the individual structures of the production costs must be considered as well. A million dollars' worth of a product in a country does not automatically contain the same produced volume than the same unit in another country. Price dynamics and price shifts, as mentioned above, play a significant role. The intensity of emissions portrayed in Figure 17 above must be, therefore, validated and compared with other methods of calculating embodied emissions.

The chart in Figure 18 compares the results of the CO<sub>2</sub> emissions embodied in chemicals, polymers and fertilisers *per* exporting country for the year 2021, depending on the intensity factor of CO<sub>2</sub> emissions use. The chart shows that China is the largest producer of emissions in this sector as well. China's emissions are again higher than any other country included in the analysis. The United States follows behind

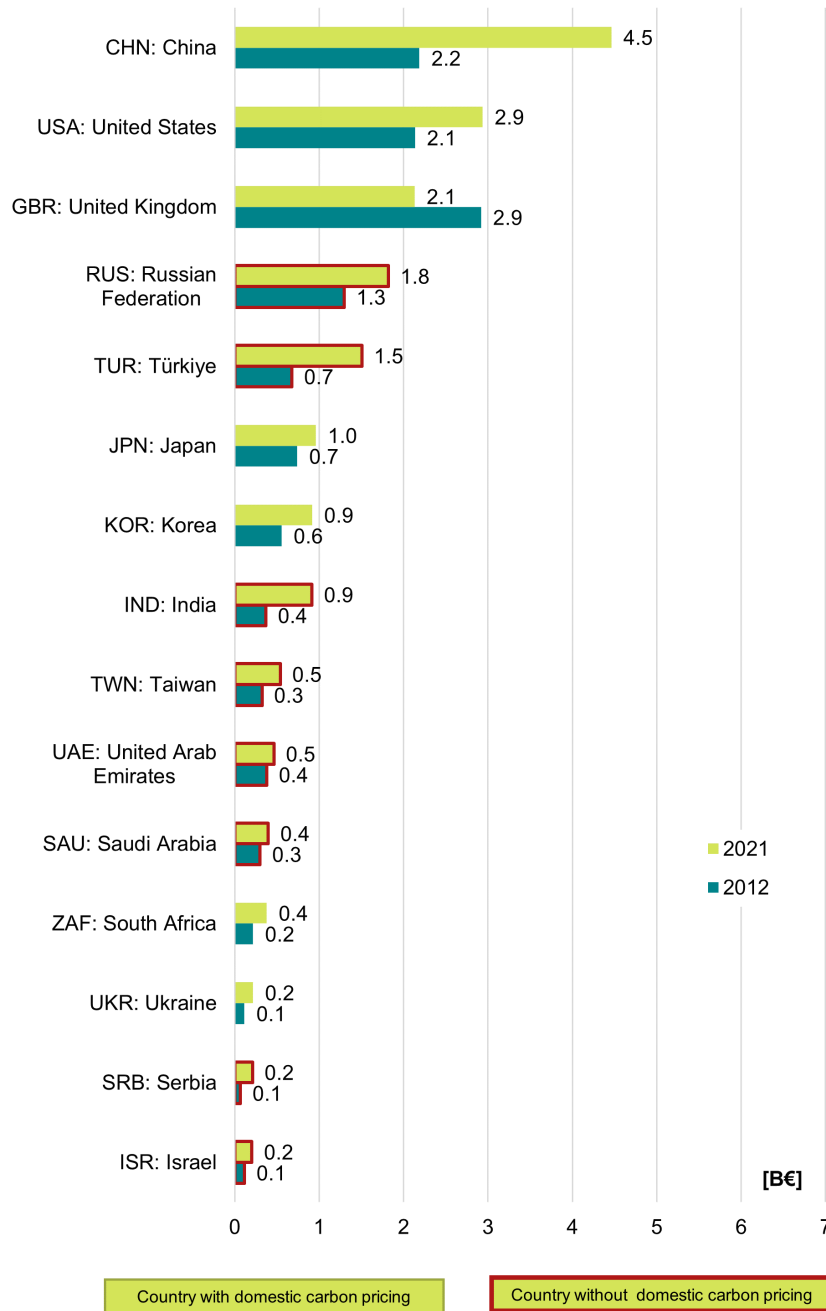


Figure 14: Top CBAM trading partners of Germany, 2021 vs. 2012 (Federal Statistical Office (DESTATIS), 2022b)

as the second-largest producer of emissions. Overall, it is noticeable that the results of the analysis follow a consistent pattern with smaller deviations *per* country. The embodied emissions calculated using the intensity of emissions for [D19T23] are often the highest, followed by [D20], [D20T21], and then [DTOTAL]. In this chart, except for China, the embodied emissions are in the same order of magnitude between all countries based on the factors [D19T23], [D20T21] and [D20]. Russia is the only country significantly affected by CBAM regarding the export of fertilisers.

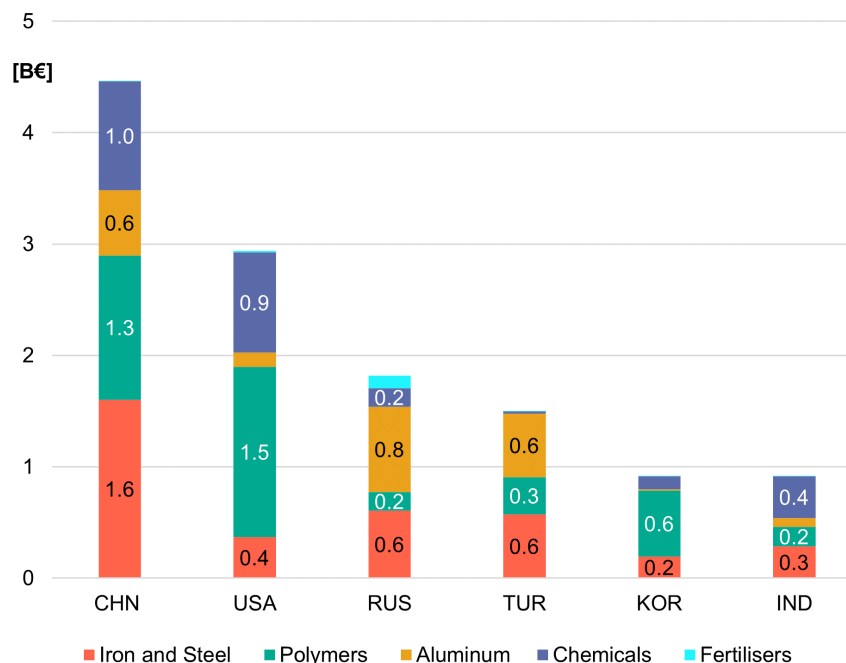
All in all, the analysis reveals that Russia, China and India have the largest CO<sub>2</sub> emissions intensity, but China is the

largest polluter *per* million dollars of products in the chemical and non-metallic mineral products category. The analysis suggests that the CBAM will impose an uneven financial burden on exporters. The approach used to calculate embodied emissions of exported goods in the metals sector *per* country considers specific factors for basic metal products and fabricated metal products. The results show that China is the largest producer of emissions in the metals sector, followed by Russia, while other countries have similar levels of embodied emissions.



**Table 4:** Assumed rebated CBAM certificate prices for each trading partner (The World Bank (IBRD and IDA), 2022)

| Trading partner            | Name of the domestic CPI         | Price of Domestic CPI [€/tCO <sub>2</sub> e] | Hypothetical rebated CBAM certificate price [€/tCO <sub>2</sub> e] |
|----------------------------|----------------------------------|--|--|
| CHN                        | China national ETS               | 10   | 90   |
| United States              | California CaT                   | 30   | 70   |
| GBR:                       | United Kingdom ETS               | 100  | 0  |
| RUS and TUR                | Full CBAM certificate price: 100 |  |  |
| JPN                        | Japan Carbon Tax and Tokyo ETS   | 10   | 90   |
| KOR                        | Korea ETS                        | 20   | 80   |
| IND                        | Full CBAM certificate price: 100 |  |  |
| TWN, UAE, SAU, ISR and SRB | Full CBAM certificate price: 100 |  |  |
| ZAF                        | South Africa carbon tax          | 10   | 90   |
| UKR                        | Ukraine carbon tax               | 1,0  | 99   |

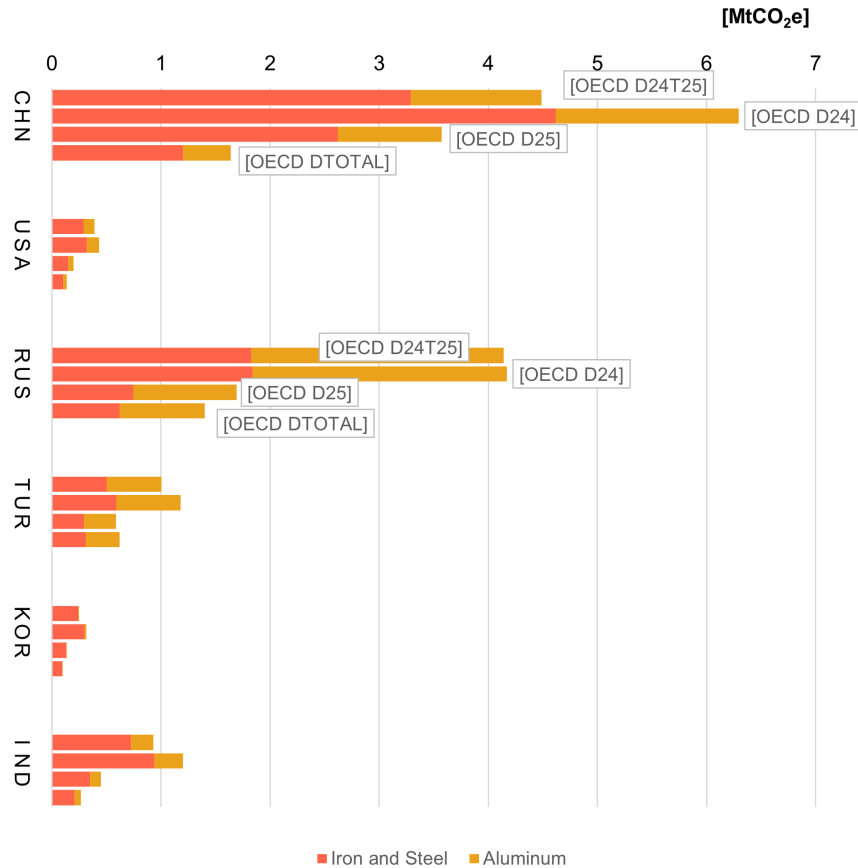
**Figure 15:** Cumulative traded value of selected countries, stacked per group of CBAM goods, 2021 (Federal Statistical Office (DESTATIS), 2022b)

#### 4.3. CO<sub>2</sub> emissions embodied in traded goods according to IEA

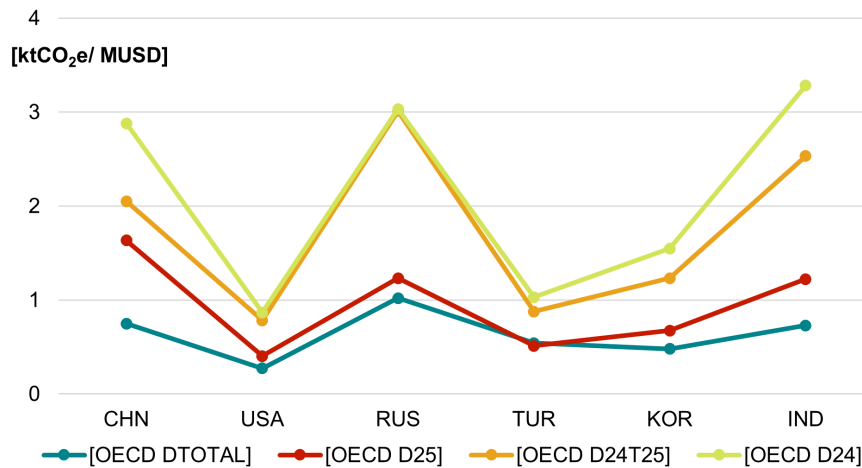
The graph in Figure 19 presents a comparison of the intensity factors for each country in the production of iron and steel, as calculated through the method described in 3.3.3. Additionally, the intensity factors from the OECD TECO<sub>2</sub> database with the factors [DTOTAL] and [D24T25] are shown to validate the results from chapter 4.2.

The analysis reveals a notable disparity between the two calculation methods. On one hand, the [OECD D24T25] method shows a contradictory trend compared to the intensities obtained using [IEA PECM] and [IEA PECMBP]. It implies that China has the highest emission intensity per ton of iron and steel, while the [IEA PECM] and [IEA PECMBP] results

suggest it has the lowest intensity among all countries. At first glance, this seems implausible. However, it could be due to the vast volume of production in China, or there might be inconsistencies in the primary energy input data provided to the IEA. Such speculation will not be explored further in this study. For India only, the results from both methods roughly coincide, indicating that the emission intensity of iron and steel production in India falls between 3,5 and 4,5 tons of CO<sub>2</sub> per ton of iron and steel produced. As for the United States, it remains unclear which factor better represents the production reality. The case of Russia is surprising, as the [OECD D24T25] factor is below the estimated intensities according to [IEA PECM] and [IEA PECMBP]. It is also evident that the emission factor of electricity per country plays a role



**Figure 16:** Embodied CO<sub>2</sub> emissions in the imported goods of iron, steel and aluminum depending on the factor used, 2021 (Organisation for Economic Co-operation and Development, 2021)

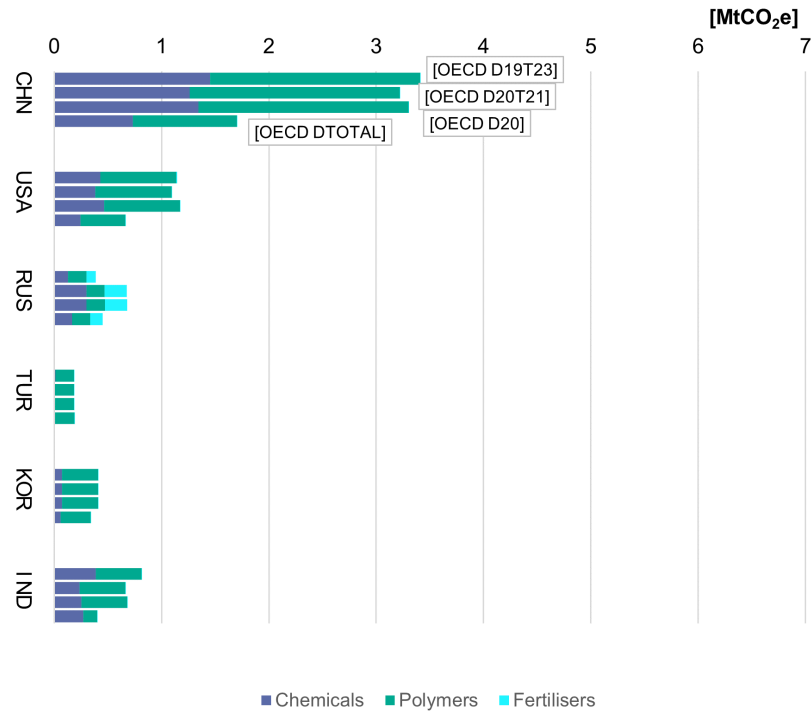


**Figure 17:** Comparison of the intensity factors of CO<sub>2</sub> emissions embodied in the metals sector, 2018 (Organisation for Economic Co-operation and Development, 2021)

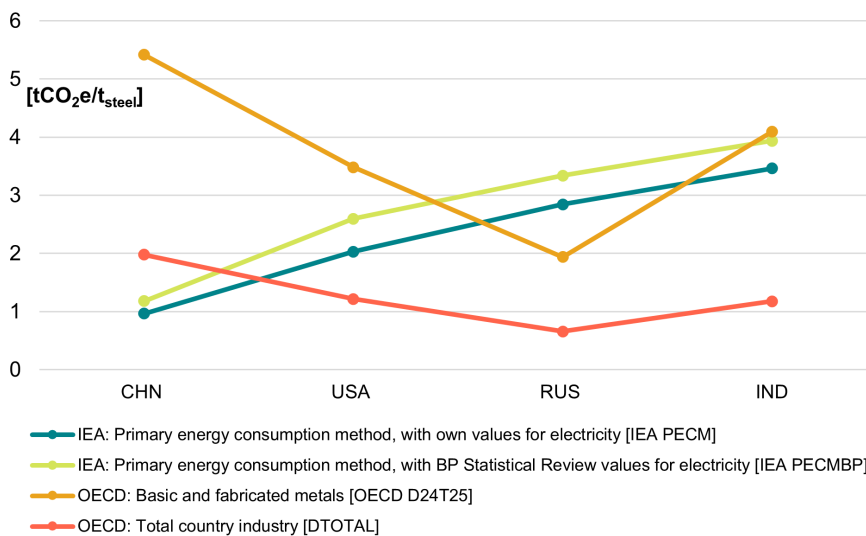
in the intensity factors of CO<sub>2</sub> emissions for iron and steel. This implies that if the electricity emission factor is twice as polluting as originally determined, the intensity of iron and steel will be roughly half a ton of emissions higher per ton produced across all countries.

#### 4.4. Validation with GHG Protocol Tool and literature values

The primary objective of this step is to identify the possible reasons for the deviation in the results. One hypothesis is that the fuel emission factors for each primary energy source, such as coal and natural gas, are incorrect. However, the results displayed in the graph in Figure 20 contradict this hypothesis.



**Figure 18:** Embodied CO<sub>2</sub> emissions in the imported goods of chemicals, polymers and fertilisers depending on the factor, 2021 (Organisation for Economic Co-operation and Development, 2021)



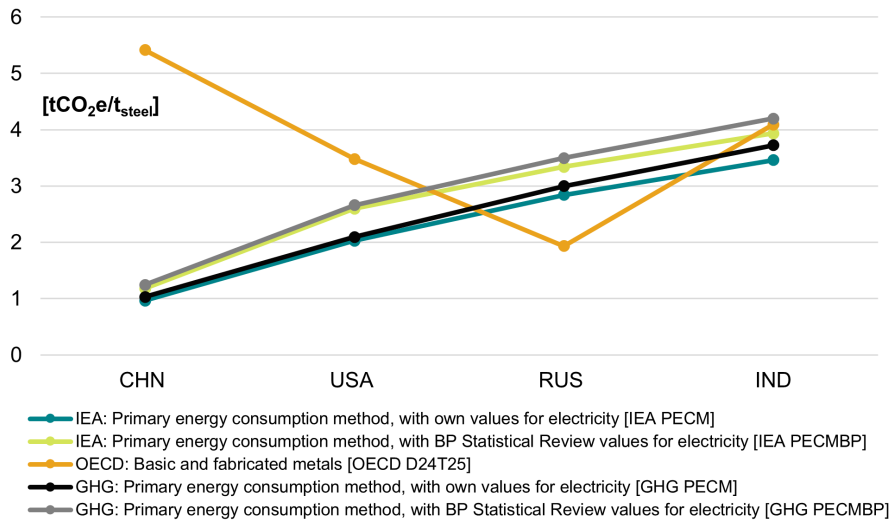
**Figure 19:** Comparison of intensity of CO<sub>2</sub> emissions factors of steel depending on the data source and method of calculation, 2018 (BP, 2022; IEA, 2023; Organisation for Economic Co-operation and Development, 2021; U.S. Geological Survey, 2019b)

Figure 20 suggests that the fuel emission factors assumed for each primary energy source are in a similar range of values, undermining therefore the possibility of low intensity CO<sub>2</sub> emission factors of iron and steel.

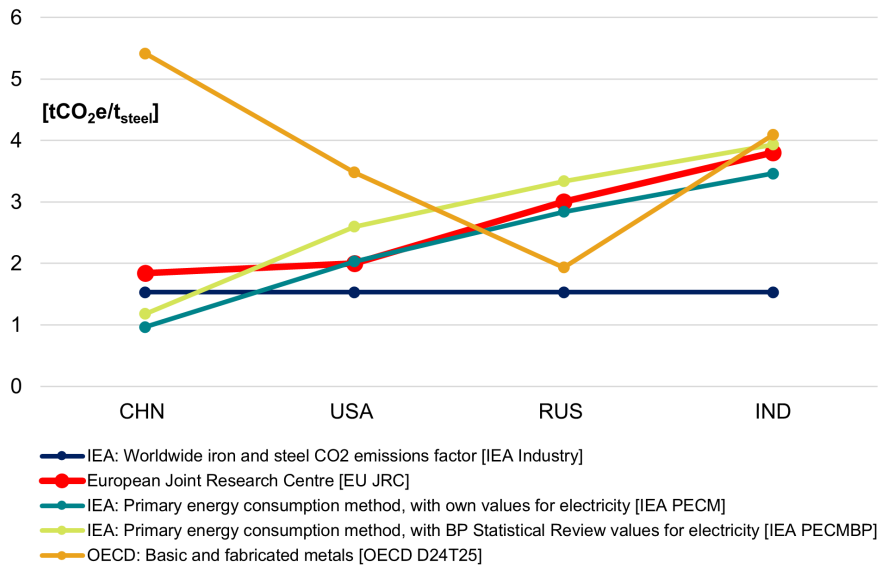
The next phase involves comparing the outcomes of this study with the current literature on CO<sub>2</sub> emission production in the iron and steel sector. The aim is to investigate the hypothesis that the entire assumptions and approach adopted are flawed in principle, and that the CO<sub>2</sub> emission intensity factors in the iron and steel industry may differ significantly.

The results are shown in the chart in Figure 21 and compared.

The analysis shows that the intensities calculated are plausible and raises the question of how the factor [OECD D24T25] is higher than all other calculation methods. This will be further discussed in chapter 5.2. It is clear, however, that the intensities estimated for China according to [IEA PECM] and [IEA PECMBP] are too low and that a fair value for further research is the value [EU JRC]. Still, the analysis suggests that China has the lowest intensity factor of CO<sub>2</sub> emissions of the major trading partners, followed by United



**Figure 20:** Comparison of intensity of CO<sub>2</sub> emissions factors of steel depending on the data source and method of calculation, 2018 (BP, 2019; GHG Protocol & Gillenwater, 2005; IEA, 2023; Organisation for Economic Co-operation and Development, 2021; U.S. Geological Survey, 2019b)



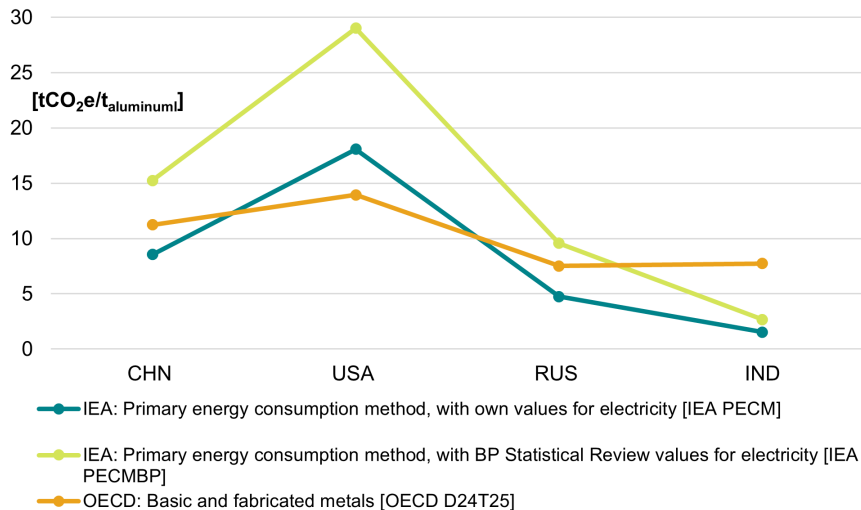
**Figure 21:** Comparison of intensity of CO<sub>2</sub> emissions factors of steel depending on the data source and method of calculation, 2018 (BP, 2019; GHG Protocol & Gillenwater, 2005; IEA, 2023; Koolen & Vidovic, 2022; Organisation for Economic Co-operation and Development, 2021; U.S. Geological Survey, 2019b)

States, Russia and India. The analysis further suggests that it is highly likely that the intensity factor of India lies somewhere between 3,5 and 4,5. Additionally, it can be assumed roughly that the intensity factors of Russia and United States lie somewhere between 2,0 and 3,5 tons CO<sub>2</sub> per ton of iron and steel, narrowing at least a range of intensities for further research. One could draw the inference that the factor [OECD D24T25] represents additional emissions, commonly known as scope 3 emissions. This could potentially explain the marked variation in the case of China and the United States. However, it is unexpected that the Russian value for [OECD D24T25] is considerably lower than other estimates, including the estimation from [EU JRC].

The same analysis, analogous to the iron and steel industry, is carried out for the aluminum industry (U.S. Geological Survey, 2019a), presenting the results in Figure 22.

The presented chart reveals that the intensity of CO<sub>2</sub> emissions in the aluminum industry is considerably higher when compared to the iron and steel industry. Additionally, the variances in intensities between countries are more pronounced in the aluminum industry, where the results from [D24T25] exhibit both lower and higher intensities than those reported in [IEA PECM] and [IEA PECMBP]. Except for the United States, the deviations of intensities among countries fall within the range of 5 to 7 tons of CO<sub>2</sub> per ton of aluminum produced. Notably, the values from [IEA PECM]





**Figure 22:** Comparison of intensity of CO<sub>2</sub> emissions factors of aluminum depending on the data source and method of calculation, 2018 (BP, 2019; GHG Protocol & Gillenwater, 2005; IEA, 2023; Organisation for Economic Co-operation and Development, 2021; U.S. Geological Survey, 2019a)

and [IEA PECMBP] for the United States are significantly higher than those from [OECD D24T25]. It is noteworthy that the substantial difference between [IEA PECM] and [IEA PECMBP] indicates that distinct emission factors for electricity have a significant impact. Therefore, the United States is presumed to have the highest electricity consumption per ton of aluminum produced, followed by China and Russia. In contrast, India relies less on electricity to produce iron and steel, according to [IEA PECM] and [IEA PECMBP]. Nevertheless, the values reported for India seem implausibly low and are likely miscalculated.

According to this analysis, the data on embodied emissions suggests that the exporting countries most affected by CBAM, when importing to Germany, will be China and Russia, followed by India. This statement, however, is to be proven in the next chapter as the additional production costs posed by CBAM may have a diminished effect due to the costs advantages that such countries have compared to western countries. Figure 23 reinforces the suggestion that the impact of CBAM is greatly dependent on the approach used for calculating the embodied emissions, as demonstrated in the iron, steel, and aluminum sectors. Except for India, the intensity factors per country exhibit substantial variation in all cases. The effect is particularly evident in China and Russia, perhaps owing it to the significant quantity of iron and steel traded with Germany.

The following chapter scrutinizes the analysis, emphasizing the potential implications of CBAM on the production cost structure of each country.

## 5. Discussion

### 5.1. Effect of the CBAM on production costs and demand patterns

This chapter analyzes the potential impact of the proposed CBAM on Germany's demand for energy-intensive

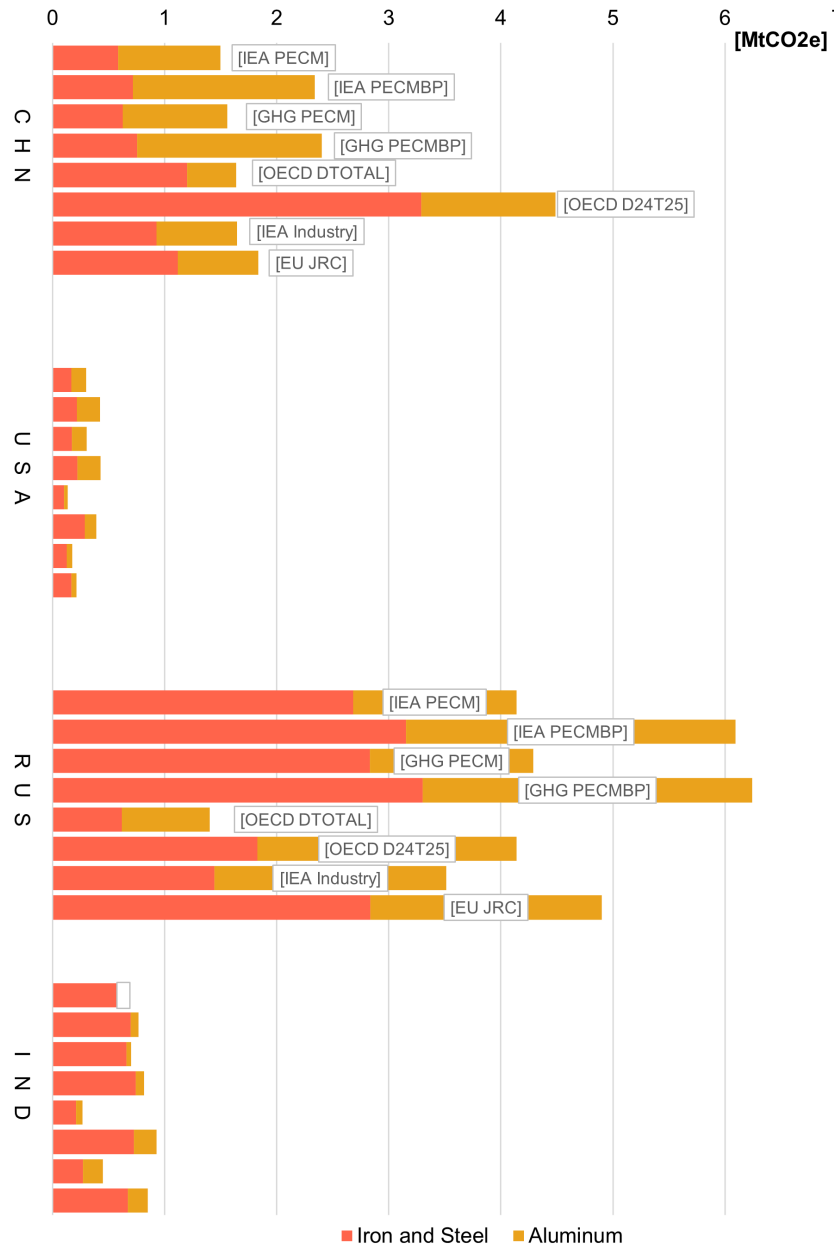
goods, as well as the impact on its major trading partners, including China, Russia, and India. The breakdown of the production costs per country<sup>3</sup> is presented in Figure 24. The average production costs of the EU are also considered in this chart, for the sake of comparison. The average total production costs in EU27 are the second highest after the United States. Germany's major trading partners in the iron and steel industry, Russia; India and China have all lower production costs.

According to the data presented, Russia has the lowest production costs with a cost advantage of approximately 100 euro per ton of steel produced, compared to the EU27. This is primarily due to its position as the country with the second-lowest material costs and the lowest energy costs out of all countries analyzed. In addition, Russia benefits from low labor costs and other costs, positioning it competitively in the market. However, the data suggests that Russia, like the United States, does not prioritize savings from production by using recycled scrap or self-power-generation in its production plants.

Following Russia, India ranks second with slightly higher energy and other costs, but significantly lower material costs. Meanwhile, China has the highest material costs among all exporters examined, approximately 100 euro per ton higher than India. However, China compensates for this disadvantage through the lowest labor and other costs. Furthermore, China's savings from using recycled scrap and self-power-generation almost fully counterbalance its cost disadvantage in the raw materials procurement, according to the data provided.

The data reveals that in the comparison of iron and steel producers, the EU27 and the United States are the least com-

<sup>3</sup> In this chapter, the trading partners of Germany in the iron and steel industry are presented from left to right following the least costs of production, and not the hierarchy presented in the chapters before.



**Figure 23:** Comparison of embodied emissions in the iron, steel and aluminum industry imported to Germany in 2021 per country depending on the data source and the correspondent intensity factor of CO<sub>2</sub> emissions (BP, 2019, 2022; Federal Statistical Office (DESTATIS), 2022b; GHG Protocol & Gillenwater, 2005; IEA, 2023; Koolen & Vidovic, 2022; Organisation for Economic Co-operation and Development, 2021)

petitive. Although they have slightly lower material costs than China, their labor costs are the highest among all facilities examined. Moreover, European facilities have the highest energy costs while the United States exhibits lower energy costs than China and India. However, the EU27 has a significant advantage over other countries in terms of a high share of savings from recycled scrap and self-power-generation, which is crucial for maintaining competitiveness in the market.

To provide a visual representation of the potential impact of CBAM on production costs, this study forecasts the shift

in total production costs of iron and steel according to the methods set in 3.3.5. The graphs in Figure 25 and Figure 26 present the results of the analysis.

Figure 25 and Figure 26 present an analysis of the impact of intensity factors of CO<sub>2</sub> emissions on the overall effect of CBAM during the 2026-2035 phase-in period. Based on the data presented in Figure 25, it can be deduced that CBAM may not significantly affect the structure of production costs. Moreover, there may not be a substantial shift in production and demand patterns in the short or long term, and China is likely to maintain its cost advantages. Russia will

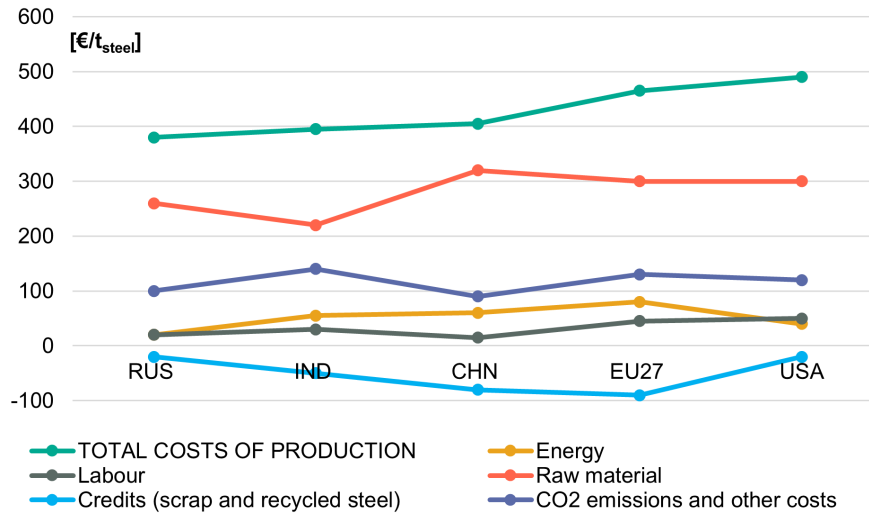


Figure 24: Breakdown of the costs of production of iron and steel per country; 2020 (European Joint Research Centre et al., 2020)

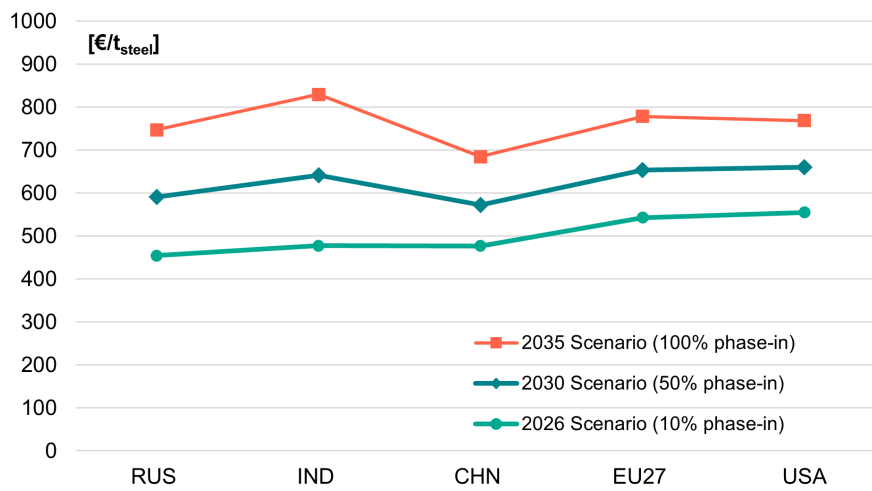


Figure 25: Shift of the total production costs of iron and steel over the phase-in period of CBAM (2026-2035) with [EU JRC] (European Joint Research Centre et al., 2020)

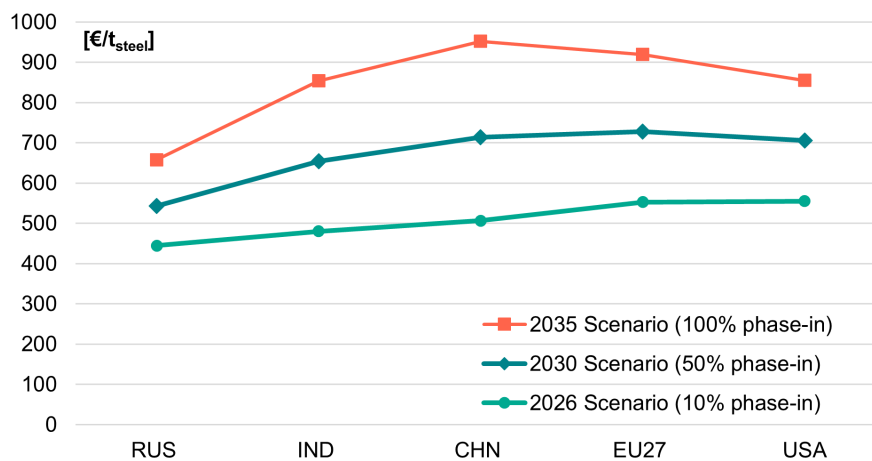


Figure 26: Shift of the total production costs of iron and steel over the phase-in period of CBAM (2026-2035) with [OECD D24T25] (European Joint Research Centre et al., 2020; Organisation for Economic Co-operation and Development, 2021)

remain more competitive than the EU27 and United States, with all three countries having a more leveled structure of costs. However, the data suggests that India may lose its current cost advantages and competitiveness by 2035. The data indicates that the impact of CBAM will likely become visible at the end of its phase-in period in 2035.

In contrast, Figure 26 indicates that there will be a short-term shift in demand. By 2030, China's production costs will be on par with those of the EU27 and the United States, while India and Russia will improve their price competitiveness. However, in the long-term, China's cost advantage will be offset by the high CO<sub>2</sub> emissions intensity and the resulting high costs associated with CBAM. As expected in all scenarios, the EU27 will continue to be one of the producers with the least cost advantages. The data suggests that the United States's price competitiveness will improve over time, reaching levels well below those of the EU27 and China. This suggests a possible shift in demand from China to the United States and India. According to the data, Russia's competitiveness will also improve over time, giving it the best market position in the long-term.

The main takeaway from comparing both figures is that it is uncertain whether CBAM will lead to a shift in demand in the short or long term. Without further research, it is difficult to determine whether the additional costs imposed by CBAM will undermine each country's cost advantages and structures to the extent that it will lead them out of their market position and competitiveness. According to the scenario analysis [EU JRC], there will be no shift in the long-term, as China's prices will remain significantly lower, India is not a major exporter and will have the worst competitiveness, and Russia's trading relations are under strong scrutiny. Even in the scenario [OECD D24T25] depicted in Figure 26, CBAM will only impact China's cost advantages to the point where it levels the cost of production with that of the EU27. The data suggests that there is no significant option to shift demand from non-EU imported goods to EU27 imports, as one of the major trading partners will always have significantly higher cost advantages.

In addition, the analysis carried out in this study is based on relatively bold assumptions aimed at enhancing the EU27's competitiveness. However, exporting countries are expected to respond quickly to counter the financial burden imposed by CBAM, for example, by implementing a domestic CPI in their production to pay rebated CBAM prices or by adjusting existing domestic CPI prices. A sensitivity analysis is conducted to assess the potential effect of trading partners' counteractions and to determine if there is a scenario where the EU27 emerges as the market leader or one of the most competitive producers.

The findings presented in Figure 27 indicate that a 10% annual increase in the price of CBAM certificates over the decade of 2026-2035 would render China uncompetitive, according to the data from OECD D24T25. However, China could easily maintain its market competitiveness by raising its domestic CPI price by 10% annually. If the US also raises its domestic CPI price, it could become the market leader,

assuming the intensities of [OECD D24T25] and no future trading agreements with Russia. However, it is highly debatable whether the intensities determined in [EU JRC] will be used instead of those determined in [OECD D24T25]. In that case, as the data suggests, China will remain the market leader even if CBAM prices rise yearly and China doesn't adjust its current CPI price over a decade.

## 5.2. Remarks of the discussion

Throughout the research, it became apparent that there is a notable difference in the intensity factors of emissions between [OECD D24T25] and the other sources, as depicted in Figure 22 for the iron and steel industry. This section aims to investigate the possible reason for this deviation in intensity factors. To achieve this, the analysis takes a reverse look at the calculation process of the intensity factors.

The intensity factors [OECD D24T25] for iron and steel were derived by multiplying the CO<sub>2</sub> emissions embodied in total gross exports [EXGR\_TCO2INT] of the OECD TECO<sub>2</sub> database for 2018 per country with the traded value of each good traded to Germany in 2021 in the iron and steel category. It is noteworthy that this calculation assumes an equal currency exchange rate from USD to EUR, as the CO<sub>2</sub> emissions embodied in total gross exports [EXGR\_TCO2INT] of the OECD TECO<sub>2</sub> database for 2018 are presented in tons of CO<sub>2</sub> per million US Dollars. In contrast, the traded value of iron and steel into Germany is based on data from the Federal Statistical Office, presented in euros. This could potentially affect the outcome. However, the assumption of an equal exchange rate is justifiable as, according to the European Central Bank, the average exchange rate from USD to EUR in 2018 was approximately 1,18 (European Central Bank, n.d.).

Chapter 3.1 and 3.2 of this study have already highlighted the importance of considering price dynamics and shifts over time. It is important to note that a rise in the traded value of a good does not necessarily indicate a proportional increase in volume traded. Therefore, it cannot be assumed that a rise in traded value due to higher prices or price shifts will lead to a proportionate increase in embodied CO<sub>2</sub> emissions, especially if the traded volume for that same period did not change proportionally.

The calculation of total embodied emissions in the iron and steel industry according to [OECD D24T25] raises the question of whether emissions from the same type of good produced in two different countries with significantly different prices can be compared, as shown in the chart in Figure 28.

Take the case of WA7205 (grains and powders of pig iron, iron or steel). The data from this chart suggests that the same unit imported to Germany in the year 2021, once providing from China and once from Russia, had a price difference of a factor ten. This means, hypothetically, that a million dollars' worth of this product had a traded volume of 50 tons, in the case of China.

In the case of WA7205, which consists of grains and powders of pig iron, iron, or steel, data from the chart suggests



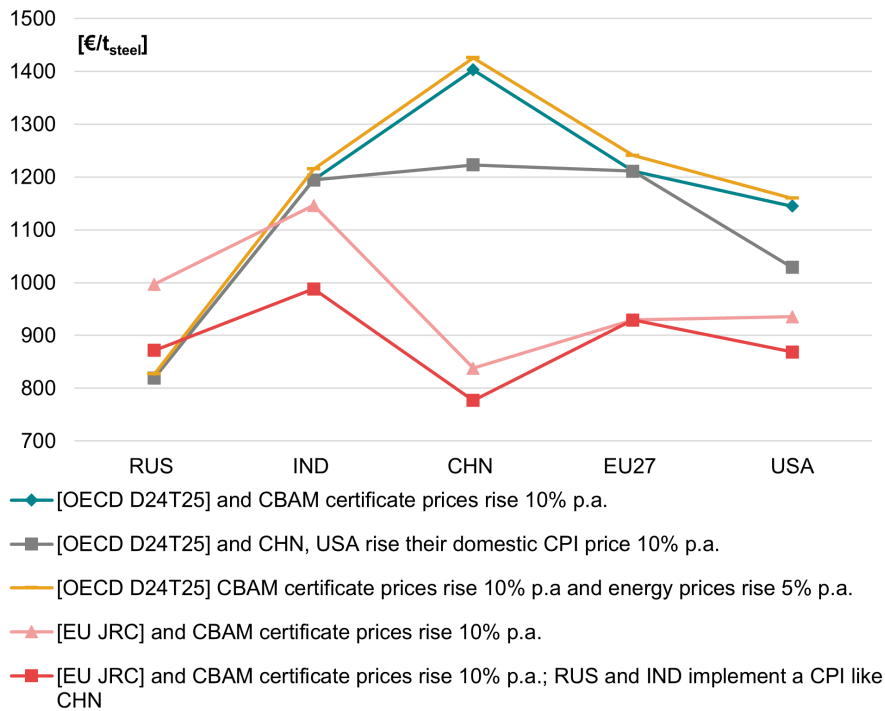


Figure 27: Sensitivity analysis, Effect of CBAM on the total production costs of iron and steel in 2035, [OECD D24T25] or [EU JRC] (European Joint Research Centre et al., 2020; Organisation for Economic Co-operation and Development, 2021)

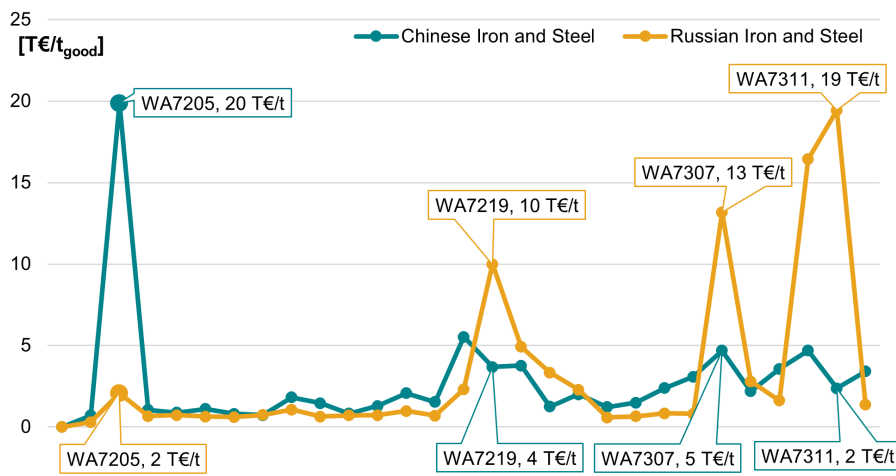


Figure 28: Comparison of the specific prices of iron and steel goods traded to Germany from China and Russia, 2021 (Federal Statistical Office (DESTATIS), 2022b)

that importing the same unit to Germany in 2021 from China and Russia resulted in a tenfold price difference. Therefore, hypothetically, a million dollars' worth of this product had a traded volume of 50 tons from China and nearly 500 tons from Russia. As a result, 50 tons imported from China to Germany had approximately 5,500 tons of embodied CO<sub>2</sub> emissions, assuming a factor of 5.5 ktCO<sub>2</sub>e/MUSD, while 500 tons imported from Russia contained 3,000 tons of embodied CO<sub>2</sub> emissions, assuming a factor of 3.0 ktCO<sub>2</sub>e/MUSD according to the calculation from [OECD D24T25] (see 4.2). These intensity factors differ significantly from literature and research values, such as those presented in [EU JRC].

Considering that the OECD intensity factors are presented in emissions per monetary value rather than emissions per ton of physical product, and that the monetary value of the same good can vary between countries, the calculation of embodied emissions may be impacted. Thus, this thesis suggests the use of specific intensity factors based on the traded volume of a good instead.

## 6. Conclusion

According to the analysis presented in this thesis, it is unclear to what extent CBAM will impact the trading patterns

of exports and imports between Germany and non-European countries, if at all. The data suggests that CBAM is unlikely to have a significant effect on the cost advantages of exporting countries, such as China, Russia, and India. Rather, it is probable that existing advantages related to low labor, material, or energy costs will remain bigger in the short and long-term. Thus, CBAM may only reduce a country's specific advantage compared to the cost of production within the EU. Major trading partners of Germany, particularly China and Russia, may need to tolerate or accept an inherent disadvantage that may lower their profit margins to maintain their market position.

Furthermore, the analysis indicates that the financial burden of CBAM is unevenly distributed across exporters and determined by each country's energy production structure and technologies used in production processes. The data suggests that there is no significant option to shift demand from non-EU imports to EU imports as one of the major trading partners will always have a significant cost advantage. This study's analysis is based on bold assumptions aimed at enhancing EU competitiveness. However, exporting countries are expected to respond quickly to counter the financial burden imposed by CBAM. For example, they may implement a domestic CPI in their production to pay rebated CBAM prices or adjust existing domestic CPI prices. According to the analysis carried, there is a scenario where the EU emerges as the market leader or one of the most competitive producers.

The analysis presented in this thesis also highlights weaknesses of CBAM that could significantly reduce its intended impact. Specifically, there is no clear, standardized definition for calculating the embodied emissions of energy-intensive products such as iron, steel, and aluminum, which may lead exporting countries to use the lowest available method and report fewer emissions than are actually emitted. Therefore, this thesis recommends that the governing bodies of the EU revise the third annex of their CBAM guideline to provide a concrete method for calculating embodied emissions. It is also suggested that they evaluate whether CBAM will have the desired impact and if it aligns with the goals of addressing climate change.

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# Reusable Packaging Systems for Restaurants and Delivery Services: A Study of Consumer Preferences and Adoption Barriers to Promote Public Acceptance in Germany

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## Abstract

Germany, the EU's top plastic waste contributor, sees rising demand for single-use packaging, especially in coffee-to-go, take-away, and food delivery. To promote a sustainable circular economy, Germany amended its packaging law in 2023, mandating gastronomic businesses to offer reusable packaging alternatives. However, consumer acceptance of reusable packaging systems (RPSs), crucial for success, is relatively unexplored. This study examines drivers and barriers to RPS adoption in Germany, offering recommendations for improvement. It includes a literature review, market research, and a representative online survey of 405 participants. A binary logistic regression model identified key adoption factors. Sustainability-focused intrinsic motivations were found to drive acceptance, while time and effort to return packaging pose significant barriers. Overall, the findings emphasize the importance of prioritizing both sustainability and convenience in the design of RPSs to promote consumer adoption. These insights can guide gastronomic businesses, pool system providers, and policymakers to improve RPS design and implementation, fostering public acceptance and adoption in Germany.

**Keywords:** circular economy; consumer acceptance; gastronomic industry; reusable packaging system (RPS); sustainability

## 1. Introduction

Against the backdrop of climate change, sustainability has become a key issue on political agendas worldwide. One element to counteract global warming is the reduction of plastic waste which poses a serious threat to the environment. Not only because its combustion contributes to the greenhouse gas effect but also because its improper disposal pollutes land and water which has a dramatic impact on the world's ecosystem (Accorsi et al., 2014; Bradley & Corsini, 2023; Keller et al., 2021; Long et al., 2022; Njoku & Edokpayi, 2019; Singh et al., 2016; Tan et al., 2023).

A large source of plastic waste is generated from packaging where plastic has unparalleled benefits due to its chemical and physical characteristics (Evode et al., 2021). In the European Union alone, the waste of plastic packaging is projected to double between 2019 and 2060 (OECD, 2022) with Germany taking by far the lead in the annual generation of plastic waste (Eurostat, 2019). One reason for this is the demand for single-use packaging in the context of takeaways and delivery services that is immediately discarded after use (Tan et al., 2023). According to the Berlin Consumers' Office, German citizens are accountable for a substantial 770 tons of plastic waste generated daily through the utilization of take-away packaging for food and beverages (Verbraucherzentrale Berlin, 2022). On top of this, there is an escalating demand for online food deliveries from platforms or restaurants which is almost twice as high in 2023 compared to 2017 (Statista, 2020).

I would like to take this opportunity to express my sincere appreciation to my supervisor Prof. Dr. Alexa Burmester for her unwavering support, invaluable guidance, and intellectual contributions throughout the development of this master thesis. Her expertise and dedication have significantly enriched the quality of this research, and I am deeply grateful for her mentorship.

To address the problem of plastic waste generated through single use packaging in the gastronomic industry, the German government has set forth an amendment which obliges gastronomic businesses to provide reusable packaging as an alternative to single-use packaging effective since the beginning of 2023 (Bundesregierung, 2022). Thereby, the reusable alternative must be as accessible as the single-use packaging which implies that the price for food purchased in either packaging needs to be the same. To achieve this, businesses cannot just sell the reusable packaging along with the order. Considering their own price for purchasing or producing the reusable alternative, they would either have to increase the overall price which leads to a loss of customers and price competitiveness or make a losing bargain. Instead, they are challenged to come up with smart solutions for the implementation of RPSs or become part of one of the RPS networks offered by startups in this field.

Despite the financial penalty that gastronomic businesses have to pay if they do not adhere to the new amendment (Bußgeldkatalog, 2023), only few of them provided reusable alternatives in the beginning of 2023. One of the reasons is the lack of awareness both on the consumer and provider side that arises due to the novelty of the amendment (Schuster & Thürmer, 2023). Another reason could be the uncertainty of gastronomic businesses with regards to how and what type of RPS they can employ so that it is feasible and well accepted by customers (NDR, 2023).

However, research in this area currently provides little guidance. While the economics of such systems have previously been analyzed (Accorsi et al., 2014; Bortolini et al., 2018; Bradley & Corsini, 2023; Coelho et al., 2020; Dembek, 2020; González-Boubeta et al., 2018; R. Li et al., 2023; Loft-house et al., 2009; Schuermann & Woo, 2022; Simoens et al., 2022; Singh et al., 2016; Wang & Zhao, 2022), consumer preferences and behavior linked to the usage of RPS have only been investigated in the UK (Greenwood et al., 2021; Lofthouse et al., 2009; Long et al., 2022), the Netherlands (Miao et al., 2022), Switzerland (Dorn & Stöckli, 2018), South Korea (Schuermann & Woo, 2022), China (Jiang et al., 2020) and Canada (Ertz et al., 2017). The preferences of German consumers who generate most plastic within the European Union remain underexplored with only two studies providing insights into consumer behavior towards RPSs with regards to lock-in effects and the transition to reusable drinking cups (Keller et al., 2021; Simoens et al., 2022).

To address the existing knowledge gap, this research presents a comprehensive examination of RPSs in Germany. The study encompasses an analysis of the political context, prevalent types of RPSs, and the current market landscape. Additionally, the research investigates German consumers' preferences for RPSs and the barriers hindering their adoption, aiming to formulate informed recommendations for designing such systems to achieve widespread public acceptance.

To achieve these objectives, an exploratory approach and quantitative methods were employed in this study. Initially, a systematic literature review was conducted to consolidate

foundational knowledge and summarize the state-of-the-art research on RPSs in the gastronomic industry. Subsequently, extensive research was undertaken to assess the current status of RPSs in Germany. Lastly, a representative online survey was administered, and the data were analyzed using a binary logistics regression model to explore the factors influencing the adoption of RPSs in the German context.

It is anticipated that the findings will be of theoretical as well as practical relevance. Theoretically, this study advances the knowledge of how to improve RPSs in the gastronomic industry to promote public acceptance. Practically, the research findings hold relevance not only for gastronomic businesses but also for pool system providers and policy makers. Gastronomic businesses and pool system providers can utilize the insights to optimize their current systems and offerings, tailoring them to better align with consumer preferences and foster higher adoption rates. Likewise, policy makers can benefit from this research as they seek to enact future legislation to drive the adoption of RPSs. By understanding the key drivers and barriers identified in this study, policy makers can design and implement more effective and consumer-centric initiatives. This alignment with consumer preferences will not only facilitate the acceptance of reusable packaging but also support the government's environmental agenda in combatting climate change and reducing plastic waste in Germany.

This thesis is organized as follows: The second section encompasses the theoretical framework, which commences with an exhaustive review of the existing literature concerning RPSs in the context of the gastronomic industry. This involves a comprehensive evaluation of the overall sustainability of RPSs, an overview of the various existing types, and an examination of prior studies on consumer preferences. Furthermore, the section delves into the current state of RPSs in Germany, encompassing their political relevance, a description of the predominant types of RPSs, and an analysis of the RPS market in the country. Moving forward, Section 3 elucidates the research methodology employed in this study, providing insights into the approach adopted to investigate the subject matter. Section 4 offers a comprehensive exposition of the research findings. It encompasses a meticulous examination and analysis of consumer preferences and adoption barriers. The results are further discussed, and insightful design recommendations are presented based on the obtained data. The concluding Section 5 provides a comprehensive synthesis of the study's outcomes, highlighting its significant contributions to the field. Additionally, the section acknowledges any encountered limitations and offers suggestions for future research in this area.

## 2. Theoretical Background

This section is divided into two segments. Firstly, it provides a synthesis of the literature review findings, covering the origin and evolution of the RPS concept, an assessment of its environmental impact, and an exploration of the drivers and barriers affecting consumer and economic adoption. The

second part of this section outlines the findings derived from the market research. This includes an examination of the current status of RPSs in Germany, encompassing its political significance and consumer sentiment. Furthermore, the section addresses the prevailing types of RPSs in the market and analyzes the overall market configuration.

## 2.1. Literature Review

A systematic literature review was conducted to summarize fundamental knowledge as well as state of the art research on RPSs with focus on the gastronomic industry. Overall, the review is subject to 50 articles that were published in academic journals. The articles were identified using the databases Scopus, Web of Science and Google Scholar. Given the central emphasis on RPSs in the gastronomic industry within this study, the search query was crafted to encompass relevant aspects, employing the combined strings: "Reusable Packaging" and "Food," or "Beverages," or "Take-away," or "Delivery Services," or "Gastronomy", along with "Reusable Cups." Subsequently, the results were filtered according to their relevance with respect to the research topic.

In the next step, the snowball method was applied in which the citations and references of the most insightful papers were analyzed to discover more literature that is meaningful for this study. In the final stages, the collected literature was organized into clusters based on criteria such as the year of publication, country of origin, predominant industry of study, and underlying research methodologies employed, thereby facilitating a systematic and coherent analysis of the information acquired.

As a result, two notable aspects emerged regarding the composition and content of the literature body. Firstly, the discourse surrounding RPSs has strongly evolved over the last years (see Figure 1). While research on RPS dates back to the previous century, the topic gained considerable attention from 2018 onwards, where the academic output increased from one to five papers published per year. In 2022, a global optimum with 10 papers per year was achieved which highlights the rising importance of research in this area, particularly in the context of climate change and the imperative for sustainable solutions. Notably, the pandemic-induced surge in food delivery during 2020 further intensified interest in this area due to the corresponding increase in single-use packaging waste (Bitkom, 2020).

Secondly, a discernible geographic distribution of research on RPSs is evident, with Europe emerging as the most progressive continent in this field. Nearly 60% of all papers selected for this review focus on RPSs in Europe, while North America and Asia account for 18% and 16% of the research, respectively (see Figure 2). Within Europe, the United Kingdom stands as the primary locus for RPSs research in the gastronomic industry, followed by Italy. Among the limited studies on RPSs in Germany, two noteworthy contributions provide insights into consumer behavior. Simoens et al. (2022) offer a socio-technical analysis of systemic lock-in effects, while Keller et al. (2021) investigate the key factors

influencing consumers' transition from single-use to reusable drinking cups.

### 2.1.1. Origin and Evolution of Reusable Packaging Systems

Product packaging plays a vital role in efficient storage, protection, hygiene, and distribution of goods (Rundh (2005) as cited in Miao et al. (2022)). Although the concept of reuse is not new, with evidence of repair and reconditioning practices dating back to ancient times (Muranko et al., 2021), the adoption of reusable packaging in the business-to-consumer market (B2C) has been limited. Historically, deposit systems for bottles and containers, such as those used for beer, soft drinks, spring water, and dairy products, have represented the major B2C experience with reusable packaging (Coelho et al., 2020).

Over the past few decades, there has been a shift towards single-use packaging which is designed to be used just once before being recycled or discarded, driven by simplified logistics for distributors and retailers (Coelho et al., 2020). Consumer lifestyles and preferences have also influenced the dominance of single-use packaging. Factors such as globalization, individualization, and urbanization have led to an increased demand for fast-moving and convenient products which predominantly utilize single-use packaging. Especially in Germany, demographic shifts such as the aging population and smaller households emphasize the importance of convenient and lightweight packaging as well as smaller portion packs (Coelho et al., 2020; Simoens et al., 2022). According to Ertz et al. (2017), these preferences create behavioral lock-in mechanisms that reinforce the use of single-use packaging over reusable alternatives.

Nowadays however, there is a growing concern for environmental sustainability. In the effort to stop climate change and preserve the planet, consumers realize the negative effects of their consumption habits and seek less wasteful and more eco-friendly packaging solutions. As a result, reusable packaging regained prominence. This is particularly true for Germany. In his study Herbes et al. (2018) found that Germans, unlike people from the US or France, consider reusable packaging as the most environmentally friendly option even before recyclable and biodegradable packaging. According to the author, the prevalence of reusability among German consumers can be attributed to the widespread adoption of the returnable bottle system. In 2015, reusable packaging accounted for 44% of the total beverages sold (Umweltbundesamt (2020), as cited in Herbes et al. (2018)).

The concept of reusable packaging entails the use of packaging materials or components that are specifically designed for multiple trips or rotations within a system of reuse (International Organization of Standardization (2013) as cited in Miao et al. (2022)). In literature, there are two types of RPSs. The first type is known as returnable packaging systems, wherein the businesses that provide the packaging undertake the responsibility cleaning and refilling. The second type is referred to as refillable packaging systems, in which consumers take care of the cleaning and refilling themselves (Greenwood et al., 2021; Muranko et al., 2021). In this

Number of articles published per year

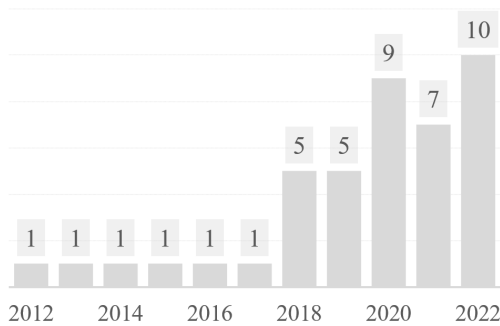


Figure 1: Frequency of Publishing

Number of articles per continent

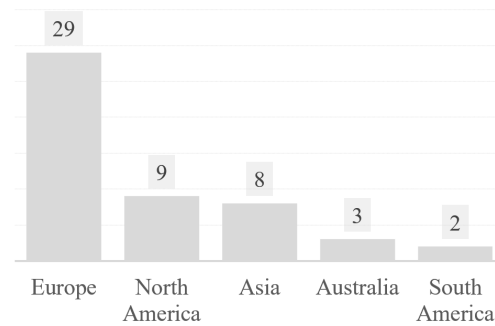


Figure 2: Geographic Distribution of Research

study, RPSs are defined as returnable packaging systems in which the food businesses manage the provision, cleaning, and refill.

### 2.1.2. Environmental Impact of Reusable Packaging Systems

Comparative studies on sustainable packaging have yielded conflicting results regarding the environmental superiority of reusable versus disposable packaging. While reusable packaging is widely recognized as a more sustainable alternative to single-use packaging, there are several studies stressing the trade-offs that need to be considered in the design of RPSs to leverage the environmental benefits. Although these studies examine food and beverage packaging within similar system boundaries, they differ in the specific types of packaging and their usage contexts, as well as supply chain configurations such as transportation distances, the number of reuse cycles, and recycling rates (Pålsson & Olsson, 2023). Taken this into account, Pålsson and Olsson (2023) found, that for takeaway there is either a preference for reusable packaging, or there is no discernible environmental impact difference between disposable and reusable packaging. Similarly, a study by Gallego-Schmid et al. (2019) showed that reusable food containers may exhibit higher energy consumption during their production, transportation, and cleaning. Consequently, the assessment of the sustainability of reusable and single-use packaging necessitates a comprehensive systems approach, considering various factors. Numerous life cycle studies have been conducted to analyse the sustainability of reusable versus disposable packaging.

Life cycle assessments (LCAs) encompass various factors, such as raw material production, energy consumption, transportation, reuse cycles, and end-of-life scenarios. These assessments consistently show that reusable packaging has a lower overall environmental impact compared to single-use packaging. For instance, Gallego-Schmid et al. (2019) conducted an LCA comparing single-use aluminium, polypropylene, and expanded polystyrene containers to reusable polypropylene containers. While polystyrene containers exhibited lower impact across some categories due to reduced material volume and processing energy, their

negligible recycling rates, poor cost effectiveness, and negative implications as marine litter contribute to their overall environmental drawback. Overall, his findings suggest that reusable polypropylene containers are the best option under the condition that they are reused at least 3 to 39 times. In this case, the initial material and energy consumption needed for production are outweighed by the resources and energy that can be saved. In line with the aforementioned findings, studies show that the benefits of reusable packaging extend throughout its life cycle stages. Reusable containers have been found to reduce greenhouse gas emissions by up to 93% and embodied energy by up to 91% over a lifespan of 360 days (Baumann et al. (2018), as cited in Schuermann and Woo (2022)). Moreover, the environmental impacts of food delivery predominantly stem from packaging production (45%) and disposal (50%), emphasizing the substantial potential for sustainability improvements in packaging design (C. Li and Miroso (2020), as cited in Schuermann and Woo (2022)). By adopting RPSs, the negative environmental consequences associated with landfills, such as air pollution and disease transmission, can be alleviated (Njoku and Edokpayi (2019), as cited in Schuermann and Woo (2022)).

To optimize the environmental performance of reusable packaging, it is important to consider factors such as transport distances, return rates, sorting and cleaning processes, maintenance, and product damage. These factors significantly influence the economic and environmental viability of RPSs (Bradley & Corsini, 2023; Coelho et al., 2020; Dubiel, 1996; Greenwood et al., 2021; Mahmoudi & Parviziomran, 2020; Simoens et al., 2022). By implementing efficient return models that incorporate recycled materials, recyclable designs, and optimized logistics, the environmental benefits of reusable packaging can be further enhanced (Greenwood et al., 2021).

In conclusion, the evidence from life cycle studies supports the assertion that reusable packaging is a more sustainable option compared to single-use packaging. Despite trade-offs, such as increased energy usage during specific stages, the reduction in waste, greenhouse gas emissions, and energy consumption achieved through reusable packaging outweighs these drawbacks. Only by adopting comprehensive



strategies that prioritize recycling, optimize logistics, and incorporate recycled materials, the environmental advantages of reusable packaging can be maximized. Moreover, it is essential to recognize that the successful implementation of reusable packaging solutions hinges upon the crucial factor of consumer acceptance. Therefore, this study explores consumer preferences and identifies the barriers to adoption, aiming to provide informed recommendations for the design and implementation of RPSs that effectively maximize consumer acceptance and pave the way for a more sustainable future.

### 2.1.3. Drivers and Barriers for the adoption of Reusable Packaging Systems from an Economic Perspective

The adoption of RPSs in the gastronomic industry holds the promise of economic advantages. However, the successful implementation of such systems requires careful consideration of several factors that may impact their feasibility and effectiveness in offering food and beverages in reusable packaging. This section of the literature review aims to summarize the key drivers and barriers that influence the acceptance and utilization of RPSs in the gastronomic sector starting with the drivers as summarized in Table 1.

Firstly, one notable advantage of RPSs over single-use packaging lies in the potential for long-term cost savings. (Coelho et al., 2020; Cottafava et al., 2019; Dubiel, 1996; Gallego-Schmid et al., 2019; González-Boubeta et al., 2018; Hitt et al., 2023; Jiang et al., 2020; Kunamaneni et al., 2019; R. Li et al., 2023; Lofthouse et al., 2009; Schuermann & Woo, 2022; Wang & Zhao, 2022). While the initial investment in reusable containers is considerably higher (Hitt et al., 2023; Wang & Zhao, 2022), the elimination of frequent purchases of single-use packaging can offset these costs (Cottafava et al., 2019; Gallego-Schmid et al., 2019; Jiang et al., 2020; Lofthouse et al., 2009). In the context of German businesses, the application of the Extended Producer Responsibility further contributes to potential cost savings (Maye et al., 2019). Under this approach, merchants and manufacturers bear full responsibility for a product's lifecycle, ranging from its design to disposal and recycling. As a result, businesses in Germany are obligated to cover the entire cost of packaging waste disposal. By adopting RPSs, businesses can reduce the financial burden associated with waste management (Coelho et al., 2020; Dubiel, 1996; Hitt et al., 2023; Kunamaneni et al., 2019; Lofthouse et al., 2009; Maye et al., 2019).

Another major advantage of RPSs for gastronomic businesses lies in their ability to significantly reduce material usage. By eliminating the constant need for the production and disposal of single-use packaging, businesses effectively reduce their reliance on virgin materials, leading to a minimized depletion of resources (Accorsi et al., 2022; Bortolini et al., 2018; Bradley & Corsini, 2023; Coelho et al., 2020; Ertz et al., 2017; Gallego-Schmid et al., 2019; Greenwood et al., 2021; Jiang et al., 2020; R. Li et al., 2023; Lofthouse et al., 2009; Miao et al., 2022; Muranko et al., 2021; Simoens et al., 2022; Tan et al., 2023). This shift towards reusable packaging aligns with the core principles of a circular econ-

omy, where the focus is on conserving resources, minimizing waste generation, and promoting the circulation of materials for extended periods (Coelho et al., 2020; Cottafava et al., 2019; Muranko et al., 2021; Pålsson & Olsson, 2023; Simoens & Leipold, 2021; Šuškevičė & Kruopienė, 2021). Furthermore, the conservation of resources achieved through the implementation of RPSs contributes to overall efficiency and resilience. By reducing the demand for raw materials, these systems help ensure the long-term availability of resources while simultaneously decreasing dependency on resource-intensive extraction processes (Bradley & Corsini, 2023; Coelho et al., 2020; Ertz et al., 2017; Jiang et al., 2020; Miao et al., 2022; Tan et al., 2023). Eventually, this not only offers economic benefits but also demonstrates a commitment to sustainable practices and responsible resource management.

From a marketing perspective, reusable packaging provides benefits that can enhance brand appeal and customer engagement. On the one hand side, reusable packaging allows businesses to open up opportunities for brand proliferation, expanded marketing strategies and competitive advantage based on the environmental benefits (Bradley & Corsini, 2023; Coelho et al., 2020; Cottafava et al., 2019; Herbes et al., 2018; Lofthouse et al., 2009; Miao et al., 2022; Schuermann & Woo, 2022). On the other hand side, the provision of user-friendly RPSs can improve customer satisfaction and loyalty (Bradley & Corsini, 2023; Coelho et al., 2020; Cottafava et al., 2019; Gallego-Schmid et al., 2019; Lofthouse et al., 2009; Schuermann & Woo, 2022). By utilizing digitized platforms, businesses can further gather valuable insights into consumer preferences, patterns, and usage habits. The collected data enables a deeper understanding of consumer behavior related to the adoption and utilization of RPSs. Such insights can inform strategic decision-making processes and facilitate targeted improvements to the system's functionality and design (Lendal and Lindeblad Wingstrand (2019), as cited in Schuermann and Woo (2022).

However, as depicted in Table 2, the adoption of RPSs also presents challenges for gastronomic businesses.

A primary economic impediment to the adoption of RPSs is associated with additional costs. Implementing RPSs entails expenses related to logistics, cleaning, refurbishment, and maintenance (Bradley & Corsini, 2023; Dubiel, 1996; González-Boubeta et al., 2018; Hitt et al., 2023; Jiang et al., 2020; R. Li et al., 2023; Lofthouse et al., 2009; Schuermann & Woo, 2022; Simoens et al., 2022; Šuškevičė & Kruopienė, 2021). The logistics of managing a system that involves the collection, transportation, and washing of reusable containers can add complexity and costs to the overall operations. Businesses need to invest in appropriate cleaning equipment and processes, refurbishing containers when necessary, and maintaining an inventory of reusable packaging. These additional costs can pose challenges for businesses, especially those with limited financial resources, potentially affecting the feasibility and cost-effectiveness of adopting RPSs.

Particularly in the gastronomic industry, safety and hygiene concerns represent important economic adoption bar-

**Table 1:** Summary of Economic Drivers derived from Literature (Table developed by author)

| Economic Drivers                                     | Evidence in Literature   |
|--|--|
| Cost savings (e.g., production and waste management) | Coelho et al. (2020), Cottafava et al. (2019), Dubiel (1996), Gallego-Schmid et al. (2019), González-Boubeta et al. (2018), Hitt et al. (2023), Jiang et al. (2020), Kunamaneni et al. (2019), R. Li et al. (2023), Lofthouse et al. (2009), Schuermann and Woo (2022), and Wang and Zhao (2022)   |
| Marketing  | Bradley and Corsini (2023), Coelho et al. (2020), Cottafava et al. (2019), Herbes et al. (2018), Lofthouse et al. (2009), Miao et al. (2022), and Schuermann and Woo (2022)  |
| Consumer satisfaction                                | Bradley and Corsini (2023), Coelho et al. (2020), Cottafava et al. (2019), Lofthouse et al. (2009), Miao et al. (2022), and Schuermann and Woo (2022)  |
| Consumer loyalty                                     | Bradley and Corsini (2023), Coelho et al. (2020), Cottafava et al. (2019), Gallego-Schmid et al. (2019), Lofthouse et al. (2009), and Schuermann and Woo (2022)  |
| Reduced material use                                 | Accorsi et al. (2022), Bortolini et al. (2018), Bradley and Corsini (2023), Coelho et al. (2020), Ertz et al. (2017), Gallego-Schmid et al. (2019), Greenwood et al. (2021), Jiang et al. (2020), Keller et al. (2021), R. Li et al. (2023), Lofthouse et al. (2009), Miao et al. (2022), Muranko et al. (2021), and Simoens et al. (2022) |

**Table 2:** Summary of Economic Barriers derived from Literature (Table developed by author)

| Economic Barriers  | Evidence in Literature   |
|--|--|
| Additional costs (e.g., logistics, cleaning, refurbishment, labor) | Bradley and Corsini (2023), Dubiel (1996), González-Boubeta et al. (2018), Hitt et al. (2023), Jiang et al. (2020), R. Li et al. (2023), Lofthouse et al. (2009), Schuermann and Woo (2022), Simoens et al. (2022), and Šuškevičė and Kruopienė (2021) |
| Safety/ Hygiene  | Bradley and Corsini (2023), Lofthouse et al. (2009), and Long et al. (2022)  |
| Additional labor   | Bradley and Corsini (2023), Coelho et al. (2020), Schuermann and Woo (2022), and Simoens et al. (2022)   |
| Storage Space  | Bradley and Corsini (2023), Lofthouse et al. (2009), and Simoens et al. (2022)   |

riers for RPSs. Businesses must ensure that reusable containers are properly cleaned and sanitized to meet food safety standards and regulations. This requires establishing robust cleaning protocols and investing in suitable cleaning equipment and supplies. Failure to maintain stringent hygiene practices can lead to foodborne illnesses and reputational damage, potentially resulting in customer loss and financial losses. Addressing safety and hygiene concerns is crucial to gaining consumer trust and acceptance of RPSs (Bradley & Corsini, 2023; Lofthouse et al., 2009; Long et al., 2022).

The adoption of RPSs may also require additional labor resources. Managing the collection, washing, and restocking of reusable containers can demand additional staff members or a reallocation of existing labor resources. The need for personnel to handle the cleaning process and monitor the inventory can increase labor costs and impact overall

operational efficiency (Bradley & Corsini, 2023; Coelho et al., 2020; Schuermann & Woo, 2022; Simoens et al., 2022). Businesses must carefully consider the impact of these additional labor requirements on their workforce and cost structure.

Finally, RPSs necessitate storage space for both clean and dirty containers, which can pose another adoption barrier for gastronomic businesses, particularly for those with limited physical space. Maintaining an inventory of reusable containers requires adequate storage facilities that are easily accessible and organized. Businesses may face challenges in finding suitable storage space within their premises, leading to additional costs associated with reconfiguring existing space (Bradley & Corsini, 2023; Lofthouse et al., 2009; Simoens et al., 2022).

Apart from the economic benefits and challenges, the current state of research stresses the significance of a high return rate and standardization for the overall feasibility of RPSs. Achieving a high return rate is crucial for optimizing the economic benefits of RPSs. Higher return rates allow for more efficient utilization of the containers, reducing the need for constant replenishment, lowering costs and increasing the environmental benefits (Bradley & Corsini, 2023; Simoens et al., 2022; Šuškevičė & Kruopienė, 2021). As indicated by several studies, implementing deposit fee systems can positively influence return rates by providing an incentive for customers to return the containers (Bradley & Corsini, 2023; Coelho et al., 2020; Hitt et al., 2023; Schuermann & Woo, 2022). Another important aspect is the need for standardization in RPSs. Standardization ensures compatibility and ease of use across different establishments, facilitating the collection, cleaning, and distribution of reusable containers. By establishing common standards for container sizes, materials, and labeling, the logistics and organization of the system can be streamlined, reducing costs and increasing efficiency (Coelho et al., 2020; Dubiel, 1996). To overcome these challenges, Coelho et al. (2020) highlights the significance of engaging with third-party organizations (e.g., pool systems) that specialize in RPSs. These external entities provide essential services including cleaning, maintenance, and transportation, which support gastronomic businesses in the adoption of RPSs. By collaborating with pool systems and adhering to standardized practices, businesses can benefit from their specialized expertise, thereby effectively overcoming implementation barriers.

In conclusion, the literature suggests that adopting RPSs in the gastronomic industry can yield economic benefits. Cost savings, reduced material usage and enhanced consumer loyalty make reusable packaging an attractive option. However, there are adoption barriers to consider, including additional costs, safety and hygiene concerns, labor requirements, and storage space limitations. Engaging with pool systems specializing in RPSs can help overcome these barriers. Moreover, achieving a high return rate and establishing standardization are important for optimizing the economic benefits.

#### 2.1.4. Drivers and Barriers for the adoption of Reusable Packaging Systems from a Consumer Perspective

In the context of the gastronomic industry, the adoption of RPSs by consumers represents a crucial step towards sustainability and environmental responsibility. While the body of literature focusing on German consumers on this subject is relatively scarce, several studies from other countries have made significant contributions to understanding consumer preferences and the barriers influencing the adoption of RPSs. This section of the literature review synthesizes the available research findings, starting with the drivers that motivate consumers to embrace RPSs, and subsequently examining the barriers that may impede their widespread acceptance.

As presented in Table 3, consumer inclination towards adopting RPSs appears to be primarily driven by a combi-

nation of tangible and intangible benefits. Within the existing literature, a consensus is evident regarding the significant role played by financial incentives in stimulating consumer acceptance of RPSs. The provision of discounts, vouchers, free trials, or promotional offers has been identified as a compelling strategy to enhance the attractiveness of reusable packaging options. Research findings consistently demonstrate that the availability of financial benefits directly influences consumers' motivation to adopt and embrace these sustainable alternatives. Therefore, the incorporation of attractive financial incentives represents a potent approach to encourage widespread adoption of RPSs among consumers. (Bradley & Corsini, 2023; Ertz et al., 2017; Jiang et al., 2020; Lofthouse et al., 2009; Long et al., 2022; Miao et al., 2022).

Another significant driver for RPS adoption lies in highlighting the environmental advantages, such as mitigating plastic waste and safeguarding the environment (Coelho et al., 2020; Long et al., 2022; Miao et al., 2022). By accentuating these benefits and concurrently integrating features that acknowledge and incentivize customers' engagement, such as a mobile app scoreboard to monitor CO<sub>2</sub> or resource savings reached through packaging reuse (Long et al., 2022), consumers can be effectively motivated to actively participate in the adoption of RPSs. In addition, research indicates that consumers associate positive emotions with the usage of reusable packaging due to the engagement in sustainable behavior (Coelho et al., 2020; Keller et al., 2021; Long et al., 2022; Miao et al., 2022). In light of this, operators of RPSs should underscore the environmental merits of such systems and integrate mechanisms that acknowledge and appreciate customers' contributions to environmental preservation, into the design of their systems (Long et al., 2022).

Apart from this, the influence of social factors on consumer behavior regarding RPSs is noteworthy (Dorn & Stöckli, 2018; Keller et al., 2021; Muranko et al., 2021). In their experiment, Dorn and Stöckli (2018) observed that consumers were more likely to choose reusable takeaway boxes when they witnessed other customers doing the same. These findings suggest that social influence, particularly through observing others' behavior, can significantly impact consumer choices in favor of reusable packaging.

As analyzed by Greenwood et al. (2021), the material, type of packaging, and closure mechanism constitute other influential factors in consumers' willingness to reuse packaging. Through the conduction of a questionnaire, the author found that packaging made from glass was more preferred for reuse compared to films, flexible plastic, or foil and that the ability to reseal increased the willingness to reuse. In addition, the study by Greenwood et al. (2021) revealed that the durability and resistance to changes in appearance and ease of cleaning are key considerations for consumers when deciding to reuse packaging. Participants indicated that they were more willing to reuse packaging that remained durable and did not undergo significant changes in appearance with use. This finding highlights the need for containers that can withstand frequent reuse and industrial washing.

**Table 3:** Summary of Consumer Adoption Drivers derived from Literature (Table developed by author)

| Adoption Drivers                       | Evidence in Literature   |
|--|--|
| Financial Benefits                     | Bradley and Corsini (2023), Ertz et al. (2017), Long et al. (2022), Miao et al. (2022), and Šuškevičė and Kruopienė (2021) |
| Positive Emotions                      | Coelho et al. (2020), Keller et al. (2021), Long et al. (2022), and Miao et al. (2022)                                     |
| Social Influence                       | Dorn and Stöckli (2018), Keller et al. (2021), and Muranko et al. (2021)   |
| Environmental Value                    | Coelho et al. (2020), Long et al. (2022), and Miao et al. (2022)   |
| User Experience                        | Cottafava et al. (2019) and Long et al. (2022)   |
| Infrastructure                         | Ertz et al. (2017)   |
| Type of packaging (material, design)   | Greenwood et al. (2021)  |
| Durability of packaging                | Greenwood et al. (2021)  |
| Complication of single-use consumption | Ertz et al. (2017)   |
| Transparency of disposal               | Ertz et al. (2017)   |

Besides the characteristics of the packaging, Ertz et al. (2017) emphasize the importance of creating situations that facilitate the use of reusable containers and complicate the recourse to single-use alternatives. By reducing the inconvenience associated with reusable containers and making single-use options more complicated to access, consumers perceive reusable containers as more convenient and are more motivated to engage in their consumption. Ertz et al. (2017) further recommends the establishment of transparent governance of recycling practices and providing evidence of recycling programs. According to the author, companies should communicate their recycling initiatives to the public, creating a context in which container reuse is valued. This increased transparency and positive perception of recycling efforts can enhance consumers' motivation to adopt RPSs.

Nevertheless, as summarized in Table 4, transitioning to RPSs is not without challenges. Despite a strong desire among consumers to purchase products in reusable packaging, the actual engagement with RPSs remains low (Poole (2019), as cited in Miao et al. (2022)). This discrepancy suggests that consumers encounter barriers when it comes to embracing reuse.

Hygiene is of paramount importance when it comes to the consumer adoption of RPSs in the gastronomic industry (Bradley & Corsini, 2023; Ertz et al., 2017; Jiang et al., 2020; Lofthouse et al., 2009; Long et al., 2022; Miao et al., 2022). Particularly during the COVID-19 pandemic, where hygiene practices and germ transmission prevention have gained significant attention, consumers had legitimate concerns about the cleanliness and safety of RPSs (Greenwood et al., 2021; Long et al., 2022; Miao et al., 2022). Research has identified key factors that contribute to consumer apprehensions regarding hygiene, which mainly arise from the inherent nature of reuse. Especially in the context of food and beverages, consumers express specific concerns about the potential con-

tamination resulting from the repeated and shared use of the packaging by others (Bradley & Corsini, 2023; Long et al., 2022; Miao et al., 2022; Numata & Managi, 2012). Moreover, research reveals that visible signs of wear and tear, such as scratches and superficial damage, stemming from the repeated washing, transportation, and refilling processes, can serve as cues for potential contamination, which further exacerbates concerns about health and safety (Ertz et al., 2017; Miao et al., 2022; Numata & Managi, 2012). Effectively convincing consumers about the hygienic aspects of RPSs is found to be challenging, as endeavors to convey hygiene measures might be construed as marketing tactics (Long et al., 2022). Nonetheless, Long et al. (2022) proposes potential strategies to mitigate such concerns. Conducting live demonstrations that showcase the thorough cleaning processes of the packaging can alleviate consumer apprehensions. Additionally, incorporating information from trustworthy and credible sources can enhance the credibility and effectiveness of hygiene communication efforts.

Another important barrier to the adoption of RPSs by consumers can be attributed to their perception of inconvenience. Research indicates that the primary reasons for this perception are twofold: the lack of accessible reuse-enabling infrastructure and the additional time and effort required for the return process (Bradley & Corsini, 2023; Ertz et al., 2017; Jiang et al., 2020; Lofthouse et al., 2009; Long et al., 2022; Miao et al., 2022; Simoens et al., 2022). This is substantiated by Miao et al. (2022) who found that consumers are reluctant to seek such services if they are not readily accessible in their neighborhood. Therefore, RPSs need to be made widely available and designed in a way that minimizes consumer's effort.

In relation to this, it is important to consider that consumer behavior tends to be habitual, meaning that individuals are more inclined to engage in familiar activities (Green-



**Table 4:** Summary of Consumer Adoption Barriers derived from Literature (Table developed by author)

| Adoption Barriers   | Evidence in Literature  |
|---|---|
| Safety (e.g., hygiene and contamination)                  | Bradley and Corsini (2023), Ertz et al. (2017), Jiang et al. (2020), Lofthouse et al. (2009), Long et al. (2022), and Miao et al. (2022)    |
| Inconvenience (extra time and effort required for return) | Bradley and Corsini (2023), Ertz et al. (2017), Jiang et al. (2020), Lofthouse et al. (2009), Miao et al. (2022), and Simoens et al. (2022) |
| Packaging deterioration                                   | Bradley and Corsini (2023), Ertz et al. (2017), Miao et al. (2022), and Numata and Managi (2012)  |
| Habits  | Greenwood et al. (2021) and Simoens et al. (2022)   |
| Availability  | Long et al. (2022) and Miao et al. (2022)   |
| Complexity  | Long et al. (2022) and Miao et al. (2022)   |
| Lock-in effects   | Lofthouse et al. (2009) and Long et al. (2022)  |
| Refundability   | Long et al. (2022) and Miao et al. (2022)   |
| Unwillingness to pay deposit fee                          | Miao et al. (2022)  |
| Skepticism about environmental impact                     | Miao et al. (2022)  |
| Privacy   | Long et al. (2022)  |
| Financial penalty   | Long et al. (2022)  |
| Contextual hindrance                                      | Ertz et al. (2017)  |

wood et al., 2021; Simoens et al., 2022). However, when it comes to RPSs, which are relatively new concepts, many consumers lack awareness and understanding of how to utilize them (Long et al., 2022; Miao et al., 2022). To address this issue, Long et al. (2022) proposes the provision of concise textual information that can be easily comprehended by consumers, coupled with the design of RPSs in a manner that is responsive to consumer inquiries and concerns. Additionally, the findings by Miao et al. (2022) highlight that some consumers struggle to grasp the environmental benefits associated with RPSs, particularly when the system still incorporates single-use packaging. It is therefore necessary to better educate consumers about the usage and advantages of RPSs.

Regarding the alteration of consumer behavior, the research by Ertz et al. (2017) further sheds light on the presence of contextual hindrances, specifically highlighting the perceived “inconvenience and awkwardness” associated with requesting refills from cashiers. To overcome this obstacle, Ertz et al. (2017) recommends businesses to employ more flexible operational approaches that provide consumers with greater freedom to utilize reusable containers. Furthermore, actively encouraging consumers to bring their own containers and introducing price incentives for those who opt for reusable alternatives when taking away meals or beverages can effectively drive behavior change. In addition, a shift towards offering reusable containers as a standard choice, rather than solely providing single-use options, is recommended. By implementing these strategies, as suggested by Ertz et al. (2017), contextual hindrances can be mitigated.

Research further identified barriers linked to the viability of RPSs. In literature, there are two approaches to incentivize consumers to return the packaging: the implementa-

tion of a deposit system (Bradley & Corsini, 2023; Coelho et al., 2020; Cottafava et al., 2019; Hitt et al., 2023; Jiang et al., 2020; Keller et al., 2021; Kunamaneni et al., 2019; Lofthouse et al., 2009; Long et al., 2022; Miao et al., 2022; Muranko et al., 2021; Numata & Managi, 2012; Pålsson & Olsson, 2023; Schuermann & Woo, 2022; Simoens et al., 2022; Šuškevičė & Kruopienė, 2021) or a penalty system (Long et al., 2022). In the deposit system, consumers pay a refundable deposit when obtaining the packaging, which is reimbursed upon returning the packaging. However, Long et al. (2022) found that consumers have concerns regarding the refundability of their deposits, fearing that businesses might use excuses, such as packaging damage, to refuse reimbursement. On the other hand, the penalty system involves consumers providing their financial information, and businesses charging a fee for late or non-return of the packaging (Long et al., 2022). According to Long et al. (2022) this system creates worries among consumers about potential financial charges if they failed to return the packaging on time. To address these concerns, Long et al. (2022) suggests employing RPSs that guarantee returns through deposits and emphasize the full refundability of deposits through the use of personalized texts or rhetorical questions, aimed at dispelling doubts about refundability.

Finally, through the conduction of an online survey, Long et al. (2022) uncovered concerns pertaining to systemic lock-ins and the privacy of personal data, particularly in the case of digitized RPS that utilize mobile apps for borrowing and returning reusable packaging. The study revealed that some businesses tend to prioritize a simplified sign-up process while making the cancellation process more complex, leading to consumer dissatisfaction. Participants specifically

expressed concerns with email cancellation methods, perceiving them as inconvenient. To address this issue, Long et al. (2022) recommends streamlining the opt-out process to make it more user-friendly. Interestingly, when a mobile app was introduced to facilitate cancellations, no respondent raised objections, indicating that this approach would be more acceptable. Moreover, respondents deemed it inconvenient when RPSs collect personal data such as occupation, email address, or home address. To mitigate this concern, Long et al. (2022) advises against collecting consumer data unless it is essential for the service's functionality.

Overall, the investigation of the current body of literature highlights the drivers and barriers for consumer's adoption of RPSs. While financial incentives, environmental benefits, social influence, and convenience encourage the adoption of RPSs, hygienic concerns, inconvenience and accustomed habits stand out as prominent barriers that impede the widespread adoption of RPSs.

## 2.2. Reusable Packaging Systems in Germany

This section provides an in-depth analysis of the current state of RPSs in Germany. It encompasses an examination of the political significance of these systems and explores consumer sentiment towards their adoption. Furthermore, this section delineates the prevailing types of RPSs available in the market and presents an assessment of the overall market configuration for such systems.

### 2.2.1. Status Quo: Political Relevance and Consumer Sentiment

Germany has consistently held the highest packaging waste footprint within the European Union. In 2019, the quantity of packaging waste generated in Germany exceeded 3.2 million metric tons. This was followed by France and Italy, which generated 2.4 million and 2.3 million metric tons of plastic packaging waste, respectively (Eurostat, 2019). Notably, the utilization of single-use plastic packaging has experienced a continuous upward trend due to factors such as increased mobility, shifting demographics, and the impact of the Covid-19 pandemic. Studies have reported a surge in demand for takeaway and delivery food since the outbreak of the pandemic (Bitkom, 2020), as evidenced by the significant growth in turnover of one of Germany's largest food delivery platforms. For instance, Delivery Hero's yearly turnover increased from 1.5 million in 2019 to 6.4 million in 2021 (Rocket Internet, 2022). According to the reusable packaging startup reCup (2022), Germans presently consume 4.5 billion takeaway and delivery boxes for food annually, which equates to 8,500 boxes per minute and 142 boxes per second. Similarly, in terms of beverages, Germans use 5.8 billion single-use cups per year, equating to roughly 11,000 cups per minute or 184 cups per second. The environmental impact of such consumption patterns is significant, with disposable cups for hot beverages alone generating 23,500 tons of waste annually in Germany, alongside an additional 4,000 tons from plastic lids which adds overall up to the weight of over 22,000 VW Golfs (Deutsche Umwelthilfe e.V., 2021).

In response to the escalating packaging waste issue, achieving a circular economy for packaging has emerged as a highly debated topic in the German political, corporate, and societal spheres (Simoens & Leipold, 2021). The concept of a circular economy, particularly in relation to packaging, centers around the idea of retaining the functionality of materials and products through reuse (Coelho et al., 2020). Reusable alternatives have thus garnered significant attention as a key approach to achieving a more sustainable and circular packaging system.

At the European level, the United Nations' sustainable development goals and the European Commission's action plan for a circular economy have laid the foundation for addressing packaging waste (Pålsson & Olsson, 2023). On one side, the 12<sup>th</sup> sustainable development goal emphasizes sustainable consumption and production, aiming to reduce waste generation through prevention, reduction, recycling, and reuse (Bradley & Corsini, 2023; Keller et al., 2021; Pålsson & Olsson, 2023; Schuermann & Woo, 2022). On the other side, the European Commission's action plan focuses on sustainable products, services, and business models, promoting the reuse of products and packaging as part of its Sustainable Product Policy (Pålsson & Olsson, 2023). The implementation of the Disposable Plastics Directive 2019 further reinforces the EU's commitment to limiting single-use plastics, including packaging (Coelho et al., 2020; Pålsson & Olsson, 2023).

In Germany, the need for a plastics directive specifically targeting single-use packaging in the gastronomic industry stems from the persistent dominance of single-use packaging despite the stated ambition to increase the share of reusable alternatives. The German Packaging Ordinance of 1991, followed by its successor, the German Packaging Act of 2019, aimed to promote reusable alternatives but faced challenges in overcoming the existing dynamics favouring single-use packaging (Simoens et al., 2022). In the beginning of 2023 and in line with efforts to promote sustainability and circularity, an amendment has been introduced in Germany, obliging restaurants and delivery services to provide reusable packaging as an alternative to single-use packaging (Simoens et al., 2022). The primary aim of this compulsory measure is to facilitate the industry's transition towards more sustainable practices and mitigate the environmental impact associated with packaging waste. By making reusable packaging readily available, this measure encourages both gastronomic businesses and consumers to choose reusable alternatives over single-use options.

The consumer sentiment in Germany regarding reusable packaging seems to be favorable. Recent studies have consistently indicated a high level of willingness among consumers to switch to reusable alternatives. According to a survey conducted among German consumers, over 70 percent of respondents expressed support for the introduction of a mandatory obligation for reusable packaging in the gastronomic sector (OmniQuest, 2020). Furthermore, 36 percent of individuals who purchase coffee to go in Germany were found to already actively choosing reusable cups (Splendid

Research, 2020). The positive consumer attitude towards reusable packaging reflects a growing awareness and concern for environmental sustainability. Consumers are increasingly conscious of the impact of single-use packaging on the environment and are actively seeking ways to reduce waste and promote more sustainable practices.

In conclusion, Germany faces significant challenges in addressing packaging waste, with single-use plastic packaging presenting a persistent issue. However, efforts at national and European levels, including the promotion of a circular economy and the introduction of mandatory obligations for reusable packaging, provide a promising foundation for mitigating the environmental impact. Furthermore, consumers in Germany have shown a favorable attitude towards reusable packaging which provides a promising foundation for the adoption and success of initiatives aimed at the promotion of RPSs.

### 2.2.2. Types of Reusable Packaging Systems

According to the recent amendment, food sold in reusable packaging must be priced equivalently to its single-use counterparts. This regulation poses a challenge for RPSs that operate with a profit-oriented approach, such as those structured around subscription models. As a result, RPSs in Germany primarily rely on either deposit systems or digital systems as their foundational frameworks. Building upon the findings of Baumann et al. (2018) this section elucidates the fundamental aspects of each system and provides a concise overview of their primary economic advantages and disadvantages as summarized in Table 5.

Deposit systems represent a cost-effective and easily deployable solution, as they necessitate minimal infrastructure. When consumers purchase food or beverages in reusable containers, a deposit fee is seamlessly integrated into the overall cost. Subsequently, when customers return the containers, they either receive a refund of the deposit or are granted a discount on their subsequent food purchase. The underlying principle of deposit systems capitalizes on the psychological concept of loss aversion, assuming that individuals are more inclined to return the containers rather than forfeit their deposit. According to Baumann et al. (2018) it is therefore very critical to establish an appropriate deposit cost, which strikes a delicate balance between not discouraging initial food purchases and offering a sufficiently enticing incentive for container returns. Nonetheless, when compared to digital systems, deposit systems face a limitation whereby customers, upon receiving their deposit refund, lack further motivation to continue opting for reusable packaging. Furthermore, this system does not generate supplementary revenue to offset the expenses associated with procuring reusable containers (Baumann et al., 2018).

In comparison to deposit systems, digital systems offer the added value of container tracking and usage monitoring. These systems function through a combination of a mobile application and QR codes, which are typically affixed to individual containers (Baumann et al., 2018). To utilize reusable

packaging within a digital system, customers are first required to download a designated app and complete the registration process. When they then purchase food or beverages in reusable packaging, the container is scanned upon receipt and return, with the data recorded in a centralized database managed by the system operator (Baumann et al., 2018). In contrast to deposit systems, digital systems do not involve the payment of a deposit. Instead, customers are obligated to return the packaging within a specified timeframe, or else they incur a penalty fee (Long et al., 2022). The primary advantage of digital systems lies in their ability to gather valuable data on usage patterns and environmental benefits. Research indicates that incorporating tracking of environmental savings within the mobile app enhances consumer awareness of their individual impact, fostering a positive sense of contribution (Coelho et al., 2020; Keller et al., 2021; Long et al., 2022; Miao et al., 2022). Consequently, this serves as an effective means to incentivize repeated purchases with reusable packaging. Notwithstanding the advantages of digital systems, they do present a noteworthy drawback in the form of significant capital costs, primarily arising from the establishment of dedicated components such as a customized mobile application and the installation of container scanning machines at collection and distribution points (Baumann et al., 2018). However, in Germany, a closely-knit collaboration between gastronomic businesses and pool system companies focused on reusable packaging is prevalent. This collaborative arrangement allows gastronomic businesses to leverage the existing mobile apps and infrastructure provided by the pool systems, effectively obviating the need for them to incur upfront setup costs. Instead, they can leverage the infrastructure of pool systems on a pay-per-use basis (Relevo, 2023b; Vytal, 2022).

### 2.2.3. Market for Reusable Packaging Systems

The German market for RPSs is characterized by a notable degree of fragmentation. Kleinhüchelkotten et al. (2021) have identified three distinct types of RPSs, primarily differentiated based on network size. Some gastronomic businesses, such as McDonald's, have implemented their own proprietary RPSs. In contrast, others either participate in collaborative network systems or utilize pool systems provided by startups specializing in this field. Among these options, pool systems have emerged as the predominant form of RPS in Germany, owing to several advantageous features they offer. From an economic perspective, businesses can minimize both initial setup expenses and ongoing maintenance costs associated with such systems. From the consumer's standpoint, the size of the network significantly influences convenience, as a larger network leads to increased availability of collection and return points, positively impacting the ease and efficiency of utilizing RPSs.

At present, Recup, Vytal, and Relevo are the startups that have established the most extensive partner networks, encompassing restaurants, cafés, takeaways, and delivery platforms (reCup, 2023; Relevo, 2023a; Vytal, 2023). In southern Germany, the Swiss startup Recircle also holds a pres-

**Table 5:** Economic Advantages and Disadvantages of Deposit and Digitized Systems (Adapted from Baumann et al. (2018))

| System           | Advantages   | Disadvantages   |
|------------------|--|---|
| Deposit System   | <ul style="list-style-type: none"> <li>• Cheap and easy to set-up and administer</li> <li>• no system maintenance</li> </ul>   | <ul style="list-style-type: none"> <li>• no tracking or data collection</li> <li>• no accountability other than deposit cost</li> <li>• does not enable memberships unless combined with phone app</li> </ul> |
| Digitized System | <ul style="list-style-type: none"> <li>• tracking of containers to calculate usage and environmental savings</li> <li>• tracking of individuals' containers lessens risks of loss or theft, and allows for retention communications</li> <li>• extensive data collection</li> <li>• provide customers with sustainability information</li> </ul> | <ul style="list-style-type: none"> <li>• high set-up costs</li> <li>• ongoing system maintenance costs</li> <li>• requires all users to have smart phones</li> </ul>  |

**Figure 3:** Vytal Packaging Assortment**Figure 4:** ReCup Packaging Assortment

ence, albeit with a considerably smaller reach compared to its three German counterparts (ReCircle, 2023). Notably, Recup stands out with an impressive partner count of over 20,800 (reCup, 2023), solidifying its position as the largest network in Germany. It is noteworthy that Recup is regarded as a pioneer in this domain, commencing operations in 2016 with a specific focus on reducing waste from single-use coffee-to-go cups (reCup, 2022). In contrast, Vytal and Relevo were founded in 2019 and 2020, respectively, with their primary mission being to curb waste stemming from single-use food packaging (Relevo, 2023c; Vytal, 2022). Despite sharing the common objective of reducing packaging waste in the gastronomic industry, the three RPSs adopt slightly different approaches.

Table 6 provides a summary of their key attributes, with the most significant difference being the type of RPS employed. While Recup relies on a deposit system, Vytal and Relevo utilize digitized systems. Another distinction pertains to their product offerings. Given Vytal's and Relevo's pronounced focus on reducing food packaging waste, they provide a wider range of reusable packaging options, including cups, bowls, pizza and burger boxes, and sushi trays. In contrast, Recup solely offers cups and bowls. Additionally, the digitized network of Vytal and Relevo facilitates the collection of consumption data, leading the companies to assert an

impressively high container return rate of over 99%.

However, there are also some similarities between the different RPSs. Firstly, their packaging materials are largely consistent, predominantly composed of polypropylene (see figures 3 & 4). This material choice is common within the RPS realm due to its favorable environmental impact, durability, and lightweight properties. Secondly, all RPSs impose similar requirements on their partners. While the startups provide initial packaging supplies, partners are responsible for a nominal usage fee and the entire cleaning process. In return, partners benefit from enhanced visibility among potential customers within the network, cost savings associated with the elimination of new single-use packaging purchases, and an opportunity to bolster their brand image.

In summary, the German market for RPSs displays fragmentation, with pool systems provided by Recup, Vytal and Relevo, emerging as the prevailing form of RPSs. While these startups employ varying RPS types, they share common requirements for their partners. As sustainability becomes an increasingly prominent concern, the market and adoption of RPSs in Germany are anticipated to experience continued growth.



Table 6: Attributes of Reusable Packaging Systems in Germany (Source: See market research data collected in file "RPS\_StartUps" on external CD)

| Name  | RPS Type | Number of Partners | Days to Return | Packaging Assortment                                | Packaging Material   | Max. Rotation Number       | Description of Borrowing and Return Process   | Costs   | App Features |
|-------|----------|--------------------|----------------|---|--|----------------------------|---|---|--------------|
| Recup | Deposit  | >20.800            | n.a.           | bowls, cups   | polypropylen   | Recup: <1000, Rebowl: <500 | <p><i>Restaurant or Takeaway:</i></p> <ul style="list-style-type: none"> <li>consumer purchases food / beverage in RP and pays deposit</li> <li>consumer returns RP gets reimbursed</li> </ul> <p><i>Delivery service:</i></p> <ul style="list-style-type: none"> <li>consumer downloads Recup app to generate token</li> <li>consumer copies the token in the comment section during check out</li> <li>consumer receives order in RP</li> <li>consumer returns RP to a partner and gets reimbursed</li> </ul>   | <p>Recup = 1 € deposit, Rebowl = 5 € deposit</p> <p>n.a</p>   | n.a          |
| Vyral | Digital  | >3.500             | 14             | bowls, cups, pizza boxes, burger boxes, sushi trays | polypropylen, thermoplastic elastomere, stainless steel, trian | <200                       | <p><i>Restaurant or Takeaway:</i></p> <ul style="list-style-type: none"> <li>consumer downloads Vyral app and registers</li> <li>upon purchase, consumer scans the QR code of the RP to take ownership of RP which gets linked to user account</li> <li>consumer returns RP to partner who scans QR-code to transfer ownership back</li> </ul> <p><i>Delivery Service:</i></p> <ul style="list-style-type: none"> <li>consumer downloads Vyral app to generate token</li> <li>consumer selects Vyral RP during check out and copies the token</li> <li>consumer receives order in RP</li> <li>consumer returns RP to a partner and gets reimbursed</li> </ul> | <p>Loan extension (7 days) = 1 €, Financial penalty (in case of loss or failure to return) = 4-10 €</p> <p><i>From a business perspective:</i></p> <ul style="list-style-type: none"> <li>tracking of system usage / consumption patterns</li> </ul> <p><i>From a consumer perspective:</i></p> <ul style="list-style-type: none"> <li>interactive map with partners and return points including opening hours and pictures</li> <li>link to online delivery platform</li> <li>history of actions</li> <li>reward system including impact measurement based on usage</li> </ul> |              |

Table 6 — continued

| Name     | RPS Type | Number of Partners | Days to Return | Packaging Assortment                                | Packaging Material | Max. Rotation Number | Description of Borrowing and Return Process   | Costs   | App Features   |
|----------|----------|--------------------|----------------|---|--------------------|----------------------|---|---|--|
| Releve   | Digital  | >3.000             | 14             | bowls, cups, pizza boxes, burger boxes, sushi trays | SAN, PP, glass     | <1000                | <p><i>Restaurant or Takeaway:</i></p> <ul style="list-style-type: none"> <li>consumer registers via app / browser / QR-code (fast check-in)</li> <li>upon purchase, consumer scans the QR code of the RP to take ownership of RP which gets linked to user account</li> <li>consumer returns RP to partner who scans QR-code to transfer ownership back</li> </ul> <p><i>Delivery Service:</i></p> <ul style="list-style-type: none"> <li>consumer downloads Vytal app to generate token</li> <li>consumer selects Vytal RP during check out and copies the token</li> <li>consumer receives order in RP</li> <li>consumer returns RP to a partner and gets reimbursed</li> </ul> | <p>Loan extension (5 days) = 0 €</p> <p>Financial penalty in case of loss or failure to return = 5-10 €</p> | <p><i>From a business perspective:</i></p> <ul style="list-style-type: none"> <li>tracking of system usage / consumption patterns</li> </ul> <p><i>From a consumer perspective:</i></p> <ul style="list-style-type: none"> <li>interactive map with partners and return points including opening hours and pictures</li> <li>history of actions</li> <li>reward system including dashboard for individual impact measurement and community effort</li> </ul> |
| ReCircle | Deposit  | >550 Germany       | n.a.           | bowls, cups   | PBT, tritan        | n.a.                 | <ul style="list-style-type: none"> <li>consumer purchases food / beverage in RP and pays deposit</li> <li>consumer returns RP gets reimbursed</li> </ul>  | <p>Cup = 5 € deposit,<br/>Box = 10 € deposit</p>  | n.a.   |

### 3. Methodology

This section elucidates the data collection methodology, the profile of the acquired sample, the questionnaire design, and the data analysis techniques employed in this study.

#### 3.1. Data Collection

Similar to previous studies in this area (Allison et al., 2021; Cottafava et al., 2019; Ertz et al., 2017; Greenwood et al., 2021; Herbes et al., 2018; Jiang et al., 2020; Keller et al., 2021; Lofthouse et al., 2009; Long et al., 2022; Numata & Managi, 2012; Schuermann & Woo, 2022; Stadlthanner et al., 2020; Wang & Zhao, 2022), a comprehensive consumer survey was conducted to address the existing knowledge gap regarding consumer preferences and barriers to adopting RPSs in the gastronomic industry of Germany.

To ensure the survey's credibility and representativeness within German society, measures were taken to mitigate potential selection bias and optimize participant outreach. To counteract selection bias, the survey was distributed through the online panel Cint, while the EFS based Unipark platform was utilized for survey programming. Additionally, participants were provided compensation, thereby broadening the spectrum beyond environmentally conscious individuals who may have a higher interest in the study (Miao et al., 2022). Moreover, to achieve a well-balanced and diverse participant pool, specific quotas based on sex and age were established in alignment with current statistical data on the demographics of the German population (Bundeszentrale für politische Bildung (BPB), 2020; Destatis, 2023). This approach aimed to encompass a representative range of individuals (Evans & Mathur, 2005; Herbes et al., 2018). The survey itself was conducted solely in the German language to cater to the target audience effectively, and a built-in feature was employed to halt participation once the predetermined quotas were satisfactorily met.

The survey's methodological rigor was fortified by a comprehensive testing phase, during which various stakeholders evaluated the survey's framework and assessed the time required and ease of completion (Evans & Mathur, 2005). While the time for completion was approximately 12 minutes, their feedback encompassed technical refinements, clarifying ambiguous aspects, and fine-tuning the formulation to ensure clarity and precision. Based on this scrutiny, the survey underwent revisions and enhancements, ultimately enhancing its reliability and effectiveness before its deployment (Ball, 2019; Ertz et al., 2017; Evans & Mathur, 2005; Long et al., 2022).

To address potential disengagement and ensure data quality, two attention checks were incorporated within the survey (Gummer et al., 2021; Shamon & Berning, 2020). The initial check required participants to confirm that they were attentively reading the questions and providing responses to the best of their knowledge. The subsequent check involved asking participants to accurately identify the year in which the amendment of the German packaging law was introduced, despite the answer being explicitly provided

within the question itself. Additionally, participants who terminated the survey prematurely were filtered out from the dataset (Bosnjak & Tuten, 2001; Heerwegh & Loosveldt, 2002).

#### 3.2. Sample Profile

The survey was made available on the 19<sup>th</sup> of June 2023 and remained open for a single day (for comprehensive details on the sample profile and demographic and gender quotas, refer to Table A1). It was completed by 405 individuals of whom 208 (51.4%) were male, 195 (48.1%) were female and 2 (0.5%) identified as diverse.

The age distribution showcased a broad demographic range, with 20% falling within the 18 to 29 years category, 18.3% between 30 and 39 years, 19.3% between 40 and 49 years, 24% between 50 and 59 years, and 19% between 60 and 69 years. Notably, there was a slight emphasis on the older generation (50-59 years), which reflects the current largest proportion of the German population and could have implications for the adoption of RPSs.

The backgrounds of the respondents were diverse, covering different aspects such as education, employment status, and income. Educationally, participants had varied qualifications, ranging from secondary school diplomas (44.4%) to doctorate degrees (0.7%). In terms of employment status, the sample encompassed employees (51.6%), university students (4.7%), self-employed individuals (4.5%), and those actively seeking employment (3.7%).

Regarding monthly income, respondents reported a wide spectrum of earnings, with 25.9% earning between 1000 and 2000 EUR, 21.0% between 3000 and 5000 EUR, and 7.2% earning 5000 EUR and above. This diversity in income levels provided insights into the potential economic considerations influencing the adoption of RPSs.

Moreover, the survey took into account the participants' geographical locations, which represented a mix of urban and rural areas. Notably, 13.6% resided in cities with fewer than 5,000 inhabitants, 22.5% in cities with populations between 5,000 and 20,000, 29.9% in cities with populations ranging from 20,001 to 100,000, and 34.1% in cities with more than 100,000 inhabitants. This geographic diversity accounted for potential regional variations in attitudes towards and adoption of RPSs.

By considering a broad range of demographic factors, including gender, age, education, employment status, income, and city size, the survey's sample pool ensures a comprehensive and well-rounded perspective on consumer attitudes and behaviours towards RPSs in the gastronomic industry of Germany which enriches the study's findings and strengthens the reliability and validity of the research.

#### 3.3. Questionnaire Design

The formulation of questions primarily drew upon existing literature to ensure the generalizability and comparability of the results. By incorporating established research findings and methodologies into the survey design, the study aimed

to achieve a robust and comprehensive understanding of the subject matter, thereby enhancing the applicability of the outcomes to broader contexts. The survey followed a structured format, whereby considerable care was taken in the formulation and sequencing of questions to minimize potential biases (Evans & Mathur, 2005).

First, participants were queried concerning their purchasing behaviour and adoption of RPSs in the areas of coffee to go, takeaway food, and food delivery. To investigate the purchasing frequency, participants had to indicate how often they purchase coffee to go, takeaway food or delivery food and what type of food they frequently buy, utilizing a scale adapted from a prior study by Schuermann and Woo (2022) as well as recent consumer statistics (POSpulse, 2019). Subsequently, closed questions were employed to detect the adoption of reusable packaging in the respective contexts as well as multiple choice and open-ended questions to investigate how frequently they bought reusable packaging or how long they needed for return.

Second, participants' political awareness and market knowledge were examined through a series of questions. Initially, a closed question was employed to assess whether participants were aware of the recent amendment to the German packaging law. Subsequently, a 5-point scale, ranging from "very important" to "very unimportant," was employed to quantitatively assess the level of importance they ascribed to this new amendment. To delve further into participants' market knowledge, multiple-choice questions were derived from the market research on RPSs in Germany. These questions focused on aspects related to pool system providers and the participants' own utilization of such systems. Moreover, participants were given the opportunity to elucidate their preferences for a particular pool system and to demonstrate their understanding of the distinctions between various systems by utilizing optional text fields.

The third section of the research focused on examining the factors that influence and impede the adoption of reusable packaging, encompassing aspects related to its design, material, and attributes. Following a methodological approach akin to the work of Greenwood et al. (2021) and Miao et al. (2022), participants were presented with a series of images depicting different container designs. They were then requested to rate each design independently of its material on a 5-point scale, indicating their likelihood of adopting such packaging. Subsequently, participants were prompted to express their preference for a specific material used in reusable packaging, particularly in the context of its suitability for the transportation and storage of takeaway food. This preference was recorded using a 4-point scale, ranging from "not at all suitable" to "very suitable," aiming to elicit a more decisive response in comparison to the 5-point scale utilized earlier. Additionally, participants were provided with the opportunity to offer further insights into their ratings through the optional text field accompanying each question. To delve deeper into participants' perspectives, 5-point matrix scales, spanning from "very unimportant" to "very important," were employed to assess the importance they attributed to various

factors drawn from prior literature (Bradley & Corsini, 2023; Ertz et al., 2017; Greenwood et al., 2021; Jiang et al., 2020; Lofthouse et al., 2009; Long et al., 2022; Miao et al., 2022; Numata & Managi, 2012) when selecting takeaway food in reusable containers.

The fourth section of the study extended its focus to explore the drivers and barriers pertaining to the adoption of RPSs in their entirety. This section was divided into subsections, each addressing different aspects of these systems, including their general characteristics, the assessment of willingness to return and to pay, the perception of deposit-based systems versus digitized ones, and the factors that might impede the uptake of RPSs. At the outset, participants were prompted to indicate the level of importance they attribute to specific characteristics of RPSs using a 5-point matrix scale, spanning from "very unimportant" to "very important." These characteristics were drawn from factors previously identified as significant in relevant research studies. Subsequently, multiple-choice questions were utilized to investigate participants' preferred options for returns and the acceptable distance they would consider for return locations. Moreover, participants were presented with three successive images of generic maps, each illustrating a radius enclosing gastronomic businesses participating in an RPS. The first map displayed three partners within a 1km radius, the second depicted eight partners, and the third showcased 16 partners, all within the same radius. Participants were then asked to express, using a 4-point scale, their likelihood of adopting the RPS presented in each map and a multiple-choice question was utilized to query about an acceptable duration for the return period. Next, participants were requested to indicate the amount they would be willing to pay as a deposit or financial penalty. To facilitate this assessment, a slider with a range from 1€ to 20€ was provided. This approach aimed to glean insights into the pricing dynamics of deposit and digitized systems, while also offering hints regarding participants' preferences for a specific system type. The investigation into participants' preference for either a deposit-based or digitized system was continued with a subsequent question utilizing an extensive 5-point matrix scale (ranging from "completely disagree" to "strongly agree"). The scale encompassed various items that explored participants' perceptions of each system in terms of practicality, flexibility, and trust, as well as their willingness to pay a deposit or register for an app. Finally, the section on RPSs explored adoption barriers, which were derived from existing literature (Bradley & Corsini, 2023; Ertz et al., 2017; Greenwood et al., 2021; Jiang et al., 2020; Lofthouse et al., 2009; Long et al., 2022; Miao et al., 2022; Numata & Managi, 2012; Simoens et al., 2022). These barriers included factors related to the additional effort, time, and costs necessitated for the utilization of RPSs, as well as concerns regarding hygiene and privacy. The analysis of these barriers was carried out using a 5-point scale ranging from "completely disagree" to "strongly agree," allowing for a nuanced assessment of participants' perspectives.



Going more into detail on the adoption drivers, the fifth section first investigated what factors influence consumers' decisions when purchasing food in reusable packaging. Before asking more precisely what kind of incentives consumers find particularly motivating to switch from single use to reusable packaging. In both instances, potential adoption drivers were drawn from existing literature (Bradley & Corsini, 2023; Coelho et al., 2020; Cottafava et al., 2019; Ertz et al., 2017; Keller et al., 2021; Long et al., 2022; Miao et al., 2022; Muranko et al., 2021; Šuškevičė & Kruopienė, 2021), and participants were requested to express their opinions using 5-point scales, spanning from "completely disagree" to "strongly agree." In addition, to obtain a nuanced understanding of participants' inclinations towards sustainability in their purchasing behaviour, an environmentalism scale was adapted from the work of Haws et al. (2014). This scale utilized a seven-point Likert scale (ranging from "does not apply at all" to "applies completely") to capture the extent to which individuals express their endorsement for environmental protection through their purchasing choices and consumption patterns.

The final segment of the survey addressed the prospective adoption of RPSs by the participants. Specifically, they were queried about their packaging preferences when buying takeaway food, and whether they favoured single-use or reusable packaging. In cases where single-use packaging was preferred, participants were further asked whether they would consider buying takeaway food in reusable packaging in the future.

### 3.4. Data Analysis

The analysis of the acquired dataset encompassed a variety of methods. Initially, descriptive statistics were employed to provide an overall understanding of the responses obtained from the survey participants. Furthermore, textual comments collected through optional survey fields were subjected to clustering and encoding. This process aimed to identify prevalent opinions among participants, particularly focusing on aspects within the survey that underscored the significance of certain items or brought attention to emerging elements deserving consideration in the context of RPSs.

To investigate the factors influencing consumer adoption of RPSs, a binary logistic regression was performed. This specific regression model is well-suited for situations where the dependent variable is dichotomous (in this study, it represented whether consumers preferred reusable or single-use packaging), while the independent variables can be either categorical or continuous. Notably, the application of binary logistic regression in previous studies (Dorn & Stöckli, 2018; Escario et al., 2020; Jiang et al., 2020; Numata & Managi, 2012), albeit in different cultural contexts, has proven its usefulness. However, its adaptation to the German context allows for valuable insights into the adoption impacts within Germany.

In accordance with the regression model proposed by Jiang et al. (2020), the binary logistic regression model with

$k$  independent variables was formulated as follows:

$$P_i = \frac{e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k}}{1 + e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k}}$$

where  $P_i$  denotes the probability of consumers choosing a particular packaging mode. The regression coefficients  $\beta_0, \beta_1, \dots, \beta_k$  signify the impact of the corresponding independent variables  $x_1, x_2, \dots, x_k$  on the probability of choice. The logical probability distribution underlies the assumption for this model, considering the binary nature of the dependent variable. In this case, the error term of the logistic regression model adheres to a binomial distribution (Jiang et al., 2020).

Similar to Jiang et al. (2020) this research employed an inductive approach and used forward or backward and stepwise regression to objectively analyse the independent variables based on their significance to the overall model and their influence on the coefficient of determination ( $R^2$ ). Central to the analysis was the assessment of the significance of each model parameter. A significance level of less than 0.05 was established as the criterion to determine the relevance of each variable in influencing consumer preferences and adoption barriers. To refine the model and improve its accuracy, effective parameter modification techniques were employed based on likelihood and Hosmer-Lemeshow tests (Demaris, 1995; Hosmer & Lemeshow, 2000; Jiang et al., 2020; Smith & Mckenna, 2013).

By adhering to an unbiased and comprehensive exploration of the relationships between the independent variables and the dependent variable, this inductive approach allowed to discern the most influential factors driving consumers' preferences between reusable and single-use packaging options.

## 4. Results

This section presents the descriptive analysis and regression model application applied to the survey responses obtained from the participants. The descriptive analysis provides a comprehensive overview of the collected data, highlighting key trends and patterns in the responses. Subsequently, a regression model is employed to examine the relationships between the variables and explore the factors influencing the consumer's adoption of RPSs.

### 4.1. Descriptives

The subsequent sections comprise the comprehensive descriptive analysis of the survey responses pertaining to the prevailing adoption status of RPSs, political awareness, and market knowledge, as well as the determining factors and hindrances influencing the adoption of reusable packaging and RPSs. Furthermore, these sections expound upon the factors motivating consumers to switch from single-use to reusable packaging and provides insights into participants' attitudes regarding future adoption upon completing the survey.

#### 4.1.1. Current Adoption Status

The first part of the survey investigates current purchasing behaviours related to coffee to go, takeaway food, and delivery food, and examines the extent of reusable packaging adoption within these domains. The adoption of reusable packaging for coffee to go appears to be relatively higher compared to takeaway food and delivery food (please refer to Table A2 for a comprehensive overview of the results). As indicated by the survey results, approximately one third (39%) of the participants reported purchasing coffee to go at least once per week, while the majority (58%) had prior experience purchasing coffee to go in reusable packaging. However, it is important to acknowledge that the practice of buying coffee to go in reusable packaging has not yet become the prevailing norm. Even among those who are familiar with reusable cups, regular usage is not commonly observed. In terms of frequency, the data reveals that over the past half year, 49% of the participants purchased coffee in a reusable cup less than once a month. Additionally, 33% purchased it at least once a month and 18% at least once a week. It is noteworthy that there is a preference among consumers who opt for reusable cups to bring their own cup, emphasizing a proactive approach to reducing waste. However, there is also a tendency observed among participants to accumulate cups before returning them. The survey findings indicate that the majority of participants still had cups pending for return, with 81% needing to return between 1 to 5 cups. This suggests a certain level of cup accumulation among consumers, potentially attributed to factors such as convenience or logistical challenges in returning the cups promptly.

The adoption of reusable packaging for takeaway food appears to be relatively lower compared to coffee to go (please refer to Table A3 for a comprehensive overview of the results). Despite a considerable number of participants (41%) reporting purchasing takeaway food at least once a week, predominantly for dinner (50%) or lunch (44%), and primarily on weekdays (64%), this suggests that convenience and time constraints play a significant role in driving takeaway food consumption. However, it is noteworthy that the majority of participants (77%) had not yet engaged in purchasing takeaway food in reusable packaging. Merely one percent of participants reported regular usage of reusable packaging for takeaway food, ranging from 34 to 400 times over the past six months. The preference for fast food options among participants may contribute to the observed lower adoption of reusable packaging for takeaway food. Notably, 61% of participants expressed a preference for dishes such as Döner, pizza, or burgers as their preferred takeaway choices. Furthermore, participants highlighted their dissatisfaction with fast food served in regular takeaway containers, specifically mentioning that it negatively impacts the taste and texture of certain items, such as fries becoming sticky or slouchy.

The adoption of reusable packaging for delivery food is also relatively low (for a comprehensive overview of the results, please see Table A4). Participants indicated a relatively infrequent occurrence of ordering food online, with order-

ing frequencies ranging predominantly from once a month (29%) to less than once a month (25%). Merely 20% of participants reported having ever ordered their food in reusable packaging. Among those who did order in reusable packaging, their order frequency ranged from 1 to 10 times in the past six months, with only a few participants ordering food in reusable packaging on a frequent basis.

In summary, the findings demonstrate differing levels of adoption regarding reusable packaging across the categories of coffee to go, takeaway food, and delivery food. Reusable cups for coffee to go exhibit a relatively higher degree of adoption, although it has not become the prevailing norm. Conversely, the adoption of reusable packaging for takeaway and delivery food remains relatively low. Additionally, the results indicate that while consumers have shown occasional engagement in purchasing food or beverages with reusable packaging, such behaviour is not performed with frequency.

#### 4.1.2. Political Awareness and Market Knowledge

The second part of the survey focused on assessing participants' awareness and market knowledge regarding reusable packaging. Specifically, respondents were queried about their familiarity with the amendment of the packaging law, which mandates takeaways, restaurants, and delivery services to provide reusable packaging as an alternative to single-use packaging, and their attitude towards this regulation. Additionally, participants were asked about their awareness of pool systems such as Recup, Vytal, Relevo, or Recircle, their preferences, and whether they could distinguish the differences between these systems (please refer to Table A5 for a comprehensive overview of the results).

Regarding political awareness, a notable majority (61%) of participants confirmed their knowledge of the amendment to the packaging law and perceives it as important (77%). Regarding market knowledge concerning pool systems, the findings revealed a lack of familiarity among the participants. 60.2% of the respondents stated that they were unaware of any pool-systems providing reusable packaging. Among those with knowledge of pool systems, Recup emerged as the most recognized (30%), followed by Recircle (11%). Remarkably, participants who engaged with pool systems predominantly favoured Recup or Recircle and indicated Recup as their preferred system. Optional comments provided by participants further elucidated the reasons for Recup's popularity. Not only is Recup widely known among consumers, but it is also appreciated for its extensive partner network and straightforward approach. This preference for Recup aligns with its longer establishment, considering both Recup and Recircle were founded in 2016, whereas Vytal and Relevo were established in 2019 and 2020, respectively. Moreover, since both Recup and Recircle operate on a deposit-based model, the inclination towards deposit systems may indicate a general preference among consumers. This finding aligns with previous consumer behaviour studies that show individuals are more likely to engage in practices they are already familiar with (Greenwood et al., 2021), which, in this case,

includes deposit systems widely utilized for bottles in Germany (Simoens et al., 2022).

The lack of market knowledge becomes further evident when considering participants' familiarity with the individual pool systems. The majority of respondents (93% vs. 7%) were unable to distinguish the differences between the four RPSs.

#### 4.1.3. Drivers and Barriers for Reusable Packaging

In the third part of the survey, participants were presented with concrete questions concerning the design, material, and general attributes they perceive as significant for the adoption of reusable packaging (please refer to Table A6 for detailed results).

In terms of design preferences, no definitive consensus emerged among participants. While the box design is perceived as most suitable for a variety of dishes by 90% of the participants, it is closely followed by the bowl design (88%). Conversely, only 77% of the participants perceived the clamshell as suitable for a variety of dishes rendering it comparatively less favoured in the assessment. A more detailed analysis revealed that design preferences were contingent upon the type of dish. Specifically, participants perceived the box design as particularly suitable for noodle, rice, and potato dishes (86%), salads (84%), and bowls (80%). Meanwhile, the bowl design was considered especially suitable for salads (85%), noodle, rice, or potato dishes (81%), and bowls (79.3%). On the other hand, the clamshell design was perceived as particularly suitable for salads (80%), followed by noodle, rice, or potato dishes (86%), and fast food (63%). In light of previous survey results indicating fast food as the favoured choice for takeaway and the participant's inclination towards the clamshell design for such dishes, it is pertinent to consider its significance, despite its comparatively lower overall score in terms of suitability. Due to the contiguity between the type of dish and the design, businesses may enhance consumer receptiveness to reusable packaging options by selecting packaging designs that complement their takeaway dishes.

Regarding materials, polypropylene garnered the highest favourability, with 89% of all participants considering it particularly suitable for food transport and preservation. Stainless steel followed at 78%, then rice husk at 73%, and glass at 65%. A detailed analysis of participants' comments shed light on their evaluations and provided specific reasons for positive and negative attitudes toward the materials. Participants praised polypropylene containers for being lightweight, easy to clean, and practical, with some emphasizing economic advantages due to cost-efficiency and transportability. However, concerns were expressed regarding stains, hygiene, and sustainability, as polypropylene is a form of plastic, leading to fears of unsustainability and potential diffusion of microplastics into the food. For stainless steel, participants highlighted attributes such as durability, ease of cleaning, lightweight nature, insulation, and leak proofness. However, economic concerns were raised due to perceived high costs, and some participants opposed stainless steel containers due to potential

metallic taste transfer to the food. Rice husk was considered sustainable and lightweight by some participants, but the majority expressed limited familiarity with the material and believed it to be less durable and challenging to clean, leading to stains and aesthetic concerns. In contrast, participants who favoured glass containers highlighted attributes such as ease of cleaning, durability in terms of washing and reuse, leak proofness, sustainability, taste neutrality, and aesthetics. However, concerns were raised about glass fragility and weight, making them unsuitable for delivery services due to increased costs and higher fuel consumption.

In terms of general attributes of reusable packaging, participants placed greater importance on functionality than sustainability. Hygiene was considered the most crucial criterion by 92.3% of participants, followed by leak proofness (92%) and durability (81%). In contrast, the design aspect was perceived as the least critical, with a mere 24% of participants attributing importance to it. In light of these findings, it is imperative for businesses to accentuate the aspects of hygiene and transportability in their packaging solutions, thereby reassuring consumers of their safety and reliability. By doing so, they can cultivate consumer trust and enhance the adoption of reusable packaging.

In conclusion, the third part of the survey provided insights into participants' perceptions regarding the design, material, and general attributes influencing their adoption of reusable packaging in the gastronomic industry. While no distinct preferences emerged concerning the design and material of reusable packaging, factors such as hygiene, leak-proofness, and durability were found to play a crucial role in shaping participants' adoption decisions.

#### 4.1.4. Drivers and Barriers for Reusable Packaging Systems

The fourth segment of the survey stands as the most pivotal component of this study, as it delves into the drivers and barriers influencing the adoption of RPSs in its entirety. This section examines the general attributes that hold significance for consumers, encompassing their preferences concerning container returns, acceptable pricing considerations, as well as their inclinations towards deposit and digitized systems, alongside factors either inhibiting or encouraging the adoption of RPSs.

The investigation into the general attributes encompassed several key factors, namely the density and diversity of the partner network, the distance to the next return point, and the variance of return methods and payment options (please refer to Table A7 and Table A8 for detailed results). The results demonstrate that a low distance to the nearest return location and a high density of partner networks are indispensable for the widespread acceptance and utilization of RPSs. A substantial proportion of participants, 86%, considered distance, and 78% considered density as decisive factors, while only 2% and 5% of the participants, respectively, perceived them as unimportant. Furthermore, consumers expressed the importance of partner diversity within RPSs, encompassing various types of gastronomic businesses such as restaurants, takeaways, or delivery services offering

different cuisines, with 69% of participants emphasizing its significance. Additionally, 69% of participants indicated that the option for different payment methods was essential. The survey findings also revealed that 67% of participants value the availability of various return methods, including self-return or pick up from home. In further detail, participants were inquired about their preferred return method, the acceptable distance to the return location, and the perceived density of the partner network required for the adoption of RPSs. Regarding the return method, a significant majority of participants (88%) expressed a preference for personally returning their reusable packaging, while only 12% favoured collection by the operator. In terms of the acceptable return distance, most of the participants (38%) indicated that they find a 1km distance acceptable. However, a significant proportion (32%) expressed a preference for the return location to be no farther than 500 meters. Consequently, to optimize consumer adoption, the next return location should be within a 500-meter radius. To explore the correlation between willingness to adopt and partner network density, participants were presented with three generic maps, each depicting a circled area with a 1 km radius. Within these areas, marks were placed to indicate different partners of a network. The maps varied in partner density, with the first map showing the lowest density and subsequent maps exhibiting increased density. The results clearly demonstrate that the willingness to adopt is indeed linked to the density of the partner network. Specifically, 68% of participants were willing to adopt a system with only 3 partners within the given area, and the willingness increased by nearly 10% with each subsequent map. For instance, when 16 gastronomic businesses participated in the reusable packaging system within a 1 km radius, the willingness to adopt reached 88% of the participants. Regarding the return period for the packaging, 41% participants indicated that they find a return period of two weeks acceptable.

In terms of pricing considerations, participants were asked to indicate on a scale ranging from 1€ to 20€ what price they find acceptable for a deposit or financial penalty within a digitized system that operates with specified return periods. Surprisingly, the acceptable price for both deposit and digitized systems was quite similar. For the deposit system, most participants (25%) indicated that they would be willing only to pay the minimum of 1€. This aligns with additional comments provided by some participants, expressing concern about the potential extra costs associated with RPSs. While one participant indicated a maximum willingness to pay 20€, the arithmetic mean was 3.41€. Therefore, it can be inferred that the deposit should not exceed 3.4€ to achieve the highest level of consumer acceptance. For digitized system, the reluctance to pay more than the minimum fee, contingent on the condition that the packaging was not returned within the designated return period, was even higher. 41% of the respondents indicated their unwillingness to expend an amount exceeding 1€ for such circumstances. However, since some of the respondents were also willing to pay more, the arithmetic mean amounts to 3.36€. Conse-

quently, similarly to the deposit, the financial penalty should not surpass 3.4€ to attain the highest consumer acceptance.

Upon comparing consumer attitudes towards deposit and digitized systems, it becomes evident that consumers tend to favour deposit systems (please refer to Table A9 and Table A10 for an exhaustive summary of the results). A significant proportion of participants, 77%, expressed a positive sentiment towards deposit systems, finding them easy to comprehend (80%), practicable (70%), and flexible to use (59%). In contrast, only 38% of participants perceived digitized systems as easy to understand, 37% as practicable, and 34% as flexible in their utilization. This disparity may stem from consumers' perception that engaging with a digitized system requires committing to a single platform, resulting in systemic lock-ins and reduced flexibility. Furthermore, the survey responses shed light on the willingness of participants to pay a deposit on each reusable packaging item for takeaway food, with nearly 59% expressing no objections. In addition, 82% of participants expressed trust in receiving reimbursement for their deposits. Interestingly, 47% indicated a preference for foregoing reimbursement rather than facing financial penalties for failing to return the packaging within the specified period of a digitized system. The adoption barriers for digitized systems appear higher compared to deposit systems. While 39% of participants had no objections to downloading an app for the usage of RPSs, approximately 35% expressed reservations. Consequently, the willingness to embrace a digitized system is comparatively lower when juxtaposed with paying a deposit to engage with the system. This disparity is further evident in the responses provided by the participants when questioned about their inclination to either download an application or pay a deposit fee. Precisely, a majority of 61% expressed a preference for paying a deposit, while merely 14% indicated willingness to register for an application. Privacy concerns emerged as another relevant barrier to the usage of an app, with 36% of participants expressing reservations regarding app usage. In contrast, a mere 36% indicated having no privacy concerns. This aspect highlights the importance of addressing privacy considerations to facilitate the adoption of digitized systems. Despite the motivational aspect of digitized systems, which aims to engage consumers by showcasing the waste and energy savings resulting from the use of reusable packaging, the impact on consumer motivation appears limited. A significant majority of participants (47%) have expressed that the utilization of an application does not yield additional motivation for them to make food purchases in reusable packaging. This observation leads to the implication that the potential motivational advantages of employing an app in this context may be deemed negligible. Despite the benefits of avoiding upfront deposit fees and tracking environmental impacts, only 27% of participants believe that digitized systems offer significant advantages in comparison to deposit systems. A notable 34% of respondents do not perceive digitized systems as having many advantages, underscoring the general preference for deposit-based approaches. In response to a request for additional comments, some participants expressed reser-



vations towards digital systems due to factors such as lack of smartphone ownership or unwillingness to download another app. Besides privacy concerns, this raises the question of whether digitized systems are sufficiently accessible, particularly considering the demographic structure of Germany, where some older generations may face challenges in engaging with such technologies. In conclusion, the survey results strongly indicate a prevailing preference for deposit systems among consumers over digitized alternatives.

Regarding the drivers and barriers that influence the adoption of RPSs (please refer to Table A11 for a comprehensive overview of the results), convenience factors emerge as crucial determinants. Participants highlighted the time required to return the packaging and the ease of transport as the most critical aspects affecting their decision to engage with RPS. To encourage widespread adoption, it is essential to design RPSs that minimize the distance and time necessary for picking up and returning the containers. The higher the level of convenience, the greater the likelihood of consumer acceptance. Other factors that significantly impact the adoption of RPS include concerns related to additional costs and hygienic considerations. Participants also expressed reservations about committing to one specific RPS. On one hand, consumers expressed apprehensions about the possibility of not being fully reimbursed or facing penalties in case of loss or damage to the reusable packaging. To address these concerns, operators of RPSs may consider proactively informing consumers about the cleaning process and the specific circumstances that could lead to a denial of reimbursement, thus alleviating their concerns. On the other hand, participants availed themselves of the opportunity to provide comments, expressing a collective desire for a centralized RPS in Germany. They conveyed their preference for a system that does not necessitate choosing among various existing options. This indicates a desire for a more unified approach, similar to the deposit system for bottles, which could enhance consumer convenience and willingness to participate in reusable packaging practices. Conversely, certain factors, such as the willingness to pay a deposit, privacy concerns, and scepticism towards the sustainability of the RPS, did not yield significant results. In these cases, there was no substantial difference between the level of agreement and disagreement among participants, indicating a lack of consensus or a common opinion. In conclusion, addressing concerns related to additional costs, hygiene, and commitment to a particular system, along with exploring the potential for a centralized reusable packaging approach, may prove beneficial in encouraging broader acceptance and adoption of RPSs in the gastronomic industry.

Overall, the findings reveal a clear consumers preference for deposit systems over digitized systems. To achieve widespread adoption, several key attributes must be considered. These include minimizing the distance and time required for container returns to enhance consumer convenience. Additionally, addressing concerns related to additional costs and ensuring hygienic practices are crucial factors. The preference for a centralized system, expressed

by participants, suggests the importance of offering a unified approach that does not require consumers to choose among various systems. By incorporating these attributes into the design and implementation of RPS, a broader consumer acceptance and participation in reusable packaging practices can be achieved.

#### 4.1.5. Adoption Drivers

The fifth part of the survey focuses on consumer motivations for using RPSs. Participants were initially queried about their key considerations when purchasing food in reusable packaging, followed by an investigation into the factors that would encourage them to switch from single-use to reusable packaging, and their general attitude towards sustainability (please refer to Table A12 and Table A13 for detailed results).

Three crucial factors for consumers when purchasing reusable packaging are reducing plastic waste (83%), conserving resources (75%), and contributing positively to the environment (65%). Moreover, 57% of participants expressed the importance of being a role model in terms of sustainable behavior, and 54% stated their desire to reduce CO<sub>2</sub> emissions by using reusable packaging. These findings have implications for the design, material selection, and marketing strategies of RPSs. The packaging should be crafted from materials that minimize resource consumption, and marketing efforts should highlight the amount of resources saved and the positive environmental impact of RPSs to resonate with consumers.

When the participants were surveyed about the factors that would motivate them to switch from single use to reusable packaging, a majority (74%) expressed that financial incentives, such as discounts on food or beverage purchases, would serve as a motivating factor. Additionally, a considerable proportion of the participants (50%) found it motivating to track the amount of plastics saved, even if this necessitates the use of an additional application. Interestingly, the results indicate that tracking the amount of waste or CO<sub>2</sub> saved does not exert a significant impact on motivation. Specifically, only 37% of the participants find it motivating to monitor the amount of CO<sub>2</sub> they save through the adoption of reusable packaging. Consequently, to encourage the adoption of RPSs and taking the respondents sentiment towards digitized systems into account, it is most advisable to implement financial incentives, such as discounts on orders or increasing the price of single-use packaging.

In the context of assessing the level of support for environmental protection through purchasing and consumption behavior, a significant majority (73%) emphasized the importance of using products that do not contribute to environmental pollution. Similarly, 68% of the participants revealed concerns about the responsible utilization of the planet's finite resources. This concern for sustainability was further reflected in 62% of the participants describing themselves as environmentally conscious individuals. Moreover, many of the participants (61%) showed a conscious consideration of the potential environmental impact of their decisions, reporting that they actively consider the environmental consequences

of their actions in various aspects of their lives. This awareness highlights a willingness to make informed choices based on their environmental implications. Furthermore, the findings indicate that environmental concern influences participants' purchasing behavior. 60% reported that their environmental consciousness significantly influences their decision-making process when it comes to making purchases. Finally, a notable percentage of participants (54%) expressed a willingness to embrace inconvenience in favor of adopting more environmentally friendly measures.

In conclusion, the findings demonstrate that participants place great importance on sustainability with a focus on reducing waste and conserving resources when considering RPSs. Financial incentives, such as discounts on purchases, serve as effective motivators for consumers to switch from single-use to reusable packaging. Overall, these insights underscore the significance of incorporating sustainable practices and appealing incentives in the design and promotion of RPSs to foster broader consumer adoption and engagement.

#### 4.1.6. Future Adoption

The final segment of the survey aimed to provide insights into the future adoption of RPSs based on consumer attitudes upon the completion of the survey. For this purpose, participants were asked to express their preference for either single-use or reusable packaging when purchasing takeaway food (please refer to Table A14 for a comprehensive overview of the results). Surprisingly, a majority of 70% indicated a preference for reusable packaging, while 30% favored single-use packaging. Notably, among those who preferred single-use packaging, only 57% could envision purchasing takeaway food in reusable packaging in the future, with 43% remaining opposed to the idea. These results suggest an increased awareness of RPSs among participants during the survey, leading to a higher inclination towards engaging with such systems. Consequently, improved consumer education on the availability and benefits of purchasing in reusable packaging is crucial. Furthermore, a small but distinct portion of participants may still be resistant to switching to RPSs due to personal aversions. These insights underscore the importance of strategic approaches to foster wider acceptance and participation in reusable packaging practices.

#### 4.2. Regression Analysis

In order to examine the determinants impacting consumer adoption of RPSs, this study employed a binary logistic regression, with the preferred packaging choice (single-use or reusable) serving as the dependent variable. Following the methodology outlined by Jiang et al. (2020), SPSS was used to systematically evaluate the independent variables using forward or backward and stepwise regression techniques. The aim was to objectively assess the significance of these independent variables in relation to the overall model and their influence on the coefficient of determination ( $R^2$ ). As a result, six distinct independent variables were identified. The regression coefficients and significances of these variables are shown in Table 7.

As suggested by Jiang et al. (2020), the goodness-of-fit analysis was conducted using the likelihood ratio test and the Hosmer–Lemeshow test, with their results reported in Table 8.

The -2 log-likelihood value of 160.6, coupled with the Cox and Snell  $R^2$  of 0.4 and Nagelkerke's  $R^2$  of 0.581, indicate a moderately strong fit of the model (Albert & Anderson, 1984; Backhaus et al., 2006; Demaris, 1995; Smith & Mckenna, 2013). This suggests that the model effectively explain the variances regarding the outcome variable. Furthermore, the Hosmer-Lemeshow test, which assesses the calibration of the model, yielded a non-significant p-value of 0.437. This outcome implies that the predicted probabilities of the model align well with the observed outcomes across various groups, indicating a satisfactory calibration of the model (Hosmer & Lemeshow, 2000). Overall, the statistical model exhibits a significant fit with the data, explaining a substantial proportion of the variance in the dependent variable. Additionally, the model appears to be well-calibrated, further enhancing its reliability.

The six independent variables can be classified into three categories: awareness for sustainability, concerns related to RPSs design and preferred takeaway options. Within the awareness for sustainability category, "Law Importance" assesses the level of significance attributed to the recent amendment to the German packaging law, while "Sustainability Inclination" represents the average responses obtained from a scale developed by Haws et al. (2014). This scale measures the extent to which individuals demonstrate support for environmental protection through their purchasing and consumption behaviours.

The concerns related to the design of RPSs are captured by "Time Concerns," which reflects the additional time required when utilizing RPSs, and "Privacy Concerns," which pertain to anxieties arising from data collection associated with the use of RPSs. The third category, preferred takeaway options, encompasses "Bowls Preference" and "Burger Preference," which indicate the preferences for bowls or burgers as takeaway dishes respectively.

While Table 7 shows that all independent variables significantly influence the adoption of RPSs, Figure 5 visualizes the impact of the variables on the adoption of RPSs based on their correlation coefficients.

On one side, "Bowls Preference", "Sustainability Inclination" and "Law Importance" positively impact the adoption of RPSs.

"Bowls Preference" exerts the most substantial positive influence on the likelihood of consumer adoption of RPSs. Consumers who prefer takeaway dishes in the form of bowls are more likely to adopt reusable packaging compared to those who do not express a preference for bowls. The coefficient value of 1.195 suggests that the log odds of adoption increase by approximately 1.195 times for individuals with a preference for takeaway bowls.

Likewise, "Sustainability Inclination" demonstrates a highly significant and positive association with consumer adoption of RPSs. Consumers who possess a stronger incli-

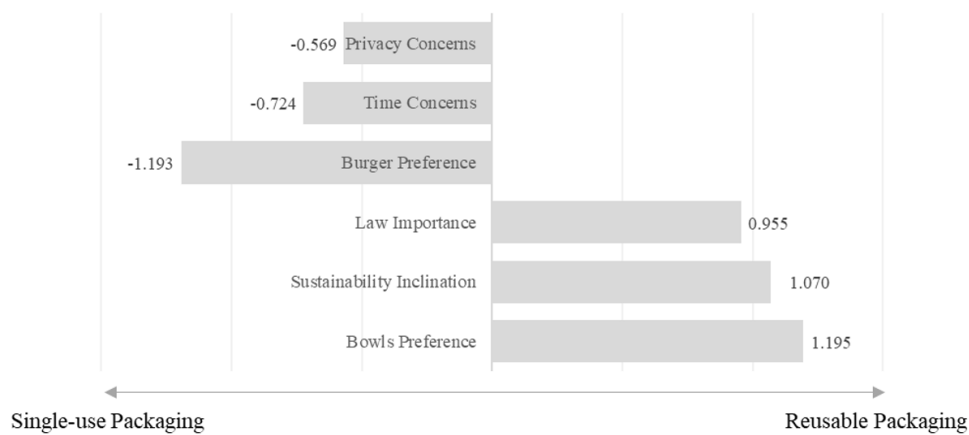
**Table 7:** Results of the Regression Analysis

| Variables                  | Regression Coefficient | Standard Error | Wald   | Degrees of Freedom | Significance |
|----------------------------|------------------------|----------------|--------|--------------------|--------------|
| Bowls Preference           | 1.195                  | 0.369          | 10.485 | 1                  | 0.001        |
| Sustainability Inclination | 1.070                  | 0.234          | 20.862 | 1                  | 0.000        |
| Law Importance             | 0.955                  | 0.287          | 11.065 | 1                  | 0.001        |
| Burger Preference          | -1.193                 | 0.368          | 10.534 | 1                  | 0.001        |
| Time Concerns              | -0.724                 | 0.257          | 7.933  | 1                  | 0.005        |
| Privacy Concerns           | -0.569                 | 0.186          | 9.391  | 1                  | 0.002        |

**Table 8:** Goodness-of-Fit Results (Adapted from Jiang et al. (2020))

| -2 Log likelihood | Cox & Snell R <sup>2</sup> | Nagelkerke R <sup>2</sup> | Chi-square | Degrees of Freedom | Significance |
|-------------------|----------------------------|---------------------------|------------|--------------------|--------------|
| 160,600           | 0.400                      | 0.581                     | 7.967      | 8                  | 0.437        |

Variable's Impact on RPSs Adoption based on Regression Coefficients



**Figure 5:** Impact of Independent Variables on RPS Adoption

nation towards sustainability, as evidenced by their support for environmental protection through their purchasing and consumption choices, are more likely to adopt reusable packaging. With each unit increase in Sustainability Inclination, the log odds of adopting reusable packaging rise by approximately 1.070 times.

Lastly, "Law Importance" exerts a relatively lower, albeit significant, positive impact on consumer adoption. This indicates that individuals who perceive the recent amendments to the German packaging law as more important are more inclined to adopt RPSs. For every unit increase in Law Importance, the log odds of adopting reusable packaging increase by approximately 0.955 times.

In contrast, burger preference and the concerns relating to time and negatively affect the adoption of RPSs.

The variable "Burger Preference" exhibits the most significant and negative association with consumer adoption of RPSs. Consumers who express a preference for takeaway dishes in the form of burgers are less likely to adopt reusable

packaging compared to those without such a preference. Each unit increase in Burger Preference corresponds to a decrease of approximately 1.193 times in the log odds of adopting reusable packaging. These findings align with the results from the descriptive statistics, where consumers evaluated various design options of reusable packaging based on their suitability for different takeaway choices. Interestingly, all designs were perceived as least suitable for fast food items, such as burgers or currywurst with fries. Participants further utilized the opportunity to provide comments along with their evaluation of the packaging material, expressing their aversion to reusable packaging for fast food, referring to its negative impact on the texture of fries.

The variables "Time Concerns" and "Privacy Concerns" demonstrate a relatively milder impact on the adoption of reusable packaging. Consumers who perceive additional time requirements when using RPSs and those who harbour concerns about data collection linked to the use of RPSs are less likely to adopt them. Each unit increase in Time Con-

cerns results in a decrease of approximately 0.724 times in the log odds of adopting reusable packaging, while each unit increase in Privacy Concerns leads to a decrease of approximately 0.569 times in the log odds of adoption.

Overall, the results of the regression analysis reveal that the preference for bowls, sustainability inclination and the level of significance attributed to the amendment of the German packaging law positively influence the adoption of RPSs. Conversely, the preference for burgers, the additional time required for the utilization of RPSs, and privacy concerns negatively affect the adoption of RPSs.

However, it is crucial to acknowledge the potential impact of multicollinearity, which arises when two or more independent variables are highly correlated with each other (Farrar & Glauber, 1967). In this case, multicollinearity can lead to unstable coefficient estimates and complicate the interpretation of individual variable contributions to the dependent variable. The presence of multicollinearity can be assessed using statistical measures such as tolerance and the variance inflation factor (VIF) for the independent variables (Oke et al., 2019; Shrestha, 2020).

The tolerance measures how much of the variation in one independent variable can be explained by the other independent variables in the model. While the values for tolerance range between 0 and 1, a tolerance value close to 1 indicates low multicollinearity (Oke et al., 2019). The VIF is the reciprocal of the Tolerance and provides a measure of how much the variance of an estimated regression coefficient is increased due to multicollinearity (Oke et al., 2019). A VIF value greater than 1 indicates the presence of multicollinearity. Typically, a VIF value exceeding 5 or 10 suggest that the regression coefficients are poorly estimated due to strong multicollinearity among the independent variables (Oke et al., 2019; Shrestha, 2020). The collinearity statistics for the regression model are summarized in Table 9.

In the present regression model, the tolerance values for most independent variables are close to 1 and the VIF are lower than 5, which suggests that there is no significant multicollinearity among the independent variables. In other words, these variable's variances are not substantially explained by the other variables in the model. However, special attention is warranted for the variables "Bowls Preference" and "Burger Preference." The Tolerance values for these variables are exceptionally low at 0.001, while their corresponding VIF values are extremely high at 1762.412 and 1763.458, respectively. Such extreme values suggest the existence of multicollinearity between these two variables.

As a result, sustainability inclination, the perceived significance of the amendment to the German packaging law, and concerns related to time requirements and privacy are identified as the most meaningful determinants associated with the adoption of RPSs. On the other hand, the preferences for bowls and burgers should be treated with caution when considering them as predictors for the choice between single-use and reusable packaging.

### 4.3. Discussion of Results

A representative consumer survey was carried out to assess the current level of adoption of RPSs in Germany and to identify the drivers and adoption barriers that either facilitate or hinder the widespread acceptance of these systems among consumers.

Overall, the study revealed that the adoption of RPSs in Germany remains relatively limited. Despite a majority of the participants having previously purchased coffee-to-go in reusable cups, such behaviour is not habitual. Furthermore, when it comes to RPSs for takeaway and delivery food, the current level of adoption is even lower, with only a minority of respondents reporting utilization of reusable packaging in this context. One plausible explanation for this discrepancy could be that the establishment of RPSs for beverages preceded those for food, leading consumers to be more aware of the availability of coffee-to-go options in reusable containers.

In response to the need for enhancing the adoption of RPSs for food, the German government has implemented an amendment to the national packaging law. This amendment mandates gastronomic establishments to offer reusable packaging as an alternative to single-use packaging (Bundesregierung, 2022). However, despite this political initiative, the findings from the survey suggest that there is still considerable room for improvement in RPSs to ensure they align with consumers' preferences and thus achieve widespread adoption. The results highlight the need to improve awareness and understanding among consumers regarding both the legislative mandate for reusable packaging and the pool systems available. Enhancing consumer knowledge in these areas can play a pivotal role in fostering greater adoption of sustainable practices and encouraging more informed choices for reusable packaging solutions.

Based on the empirical findings, individuals with heightened awareness of sustainability demonstrate a higher propensity to opt for reusable packaging. The regression analysis conducted revealed that inclinations toward sustainability and perceived significance of the amendment to the German packaging law are influential predictors of the decision to embrace reusable packaging. These outcomes are consistent with the responses obtained from the general survey, which indicated that participants' primary motivations for utilizing RPSs stem from the desire to curtail plastic waste and conserve resources (Coelho et al., 2020; Long et al., 2022; Miao et al., 2022). Furthermore, scrutinizing the interrelationships between the assessed factors and their motivational impact on packaging selection demonstrated that intrinsic motivations hold greater sway over extrinsic ones in driving the adoption of RPSs. Despite nearly all respondents acknowledging the potential influence of financial incentives, as evidenced in prior research (Bradley & Corsini, 2023; Ertz et al., 2017; Long et al., 2022; Miao et al., 2022; Šuškevičė & Kruopienė, 2021), solely the motivation derived from environmental stewardship demonstrated a substantial impact on adoption (please refer to Table A15). Remarkably, the regression analysis suggested that a preference for bowls as a takeaway option emerged as another robust predictor



**Table 9:** Collinearity Statistics

| Model             | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig.  | Collinearity Statistics |          |
|-------------------|-----------------------------|------------|---------------------------|--------|-------|-------------------------|----------|
|                   | B                           | Std. Error | Beta                      |        |       | Tolerance               | VIF      |
|                   |                             |            |                           |        |       |                         |          |
| Law Importance    | 0.121                       | 0.031      | 0.267                     | 3.960  | 0.000 | 0.539                   | 1.856    |
| Bowls Preference  | 0.119                       | 0.036      | 6.903                     | 3.319  | 0.001 | 0.001                   | 1762.412 |
| Burger Preference | -0.119                      | 0.036      | -6.896                    | -3.315 | 0.001 | 0.001                   | 1763.458 |
| Time Concerns     | -0.057                      | 0.024      | -0.118                    | -2.338 | 0.020 | 0.966                   | 1.035    |
| Privacy Concerns  | -0.045                      | 0.018      | -0.129                    | -2.587 | 0.010 | 0.982                   | 1.018    |

of selecting reusable packaging. Notably, bowls represented the healthiest option that survey participants could choose from with regards to their most preferred takeaway dish, suggesting a plausible correlation between health-consciousness and a preference for sustainable packaging alternatives. This correlation aligns with the contemporary emphasis on sustainability and heightened health awareness triggered by crises such as the pandemic and climate change, reflecting prevailing societal sentiments. Building upon these findings, it is recommended to raise consumer awareness of RPSs through targeted marketing campaigns, specifically educating them on the sustainability benefits associated with such systems. Emphasizing the positive environmental impact of engaging with RPSs can serve as a persuasive motivator for consumers to adopt these eco-friendly alternatives. Moreover, embedding the concept of reusable packaging within the context of a healthy lifestyle can further enhance its appeal to consumers. By combining these strategies, targeted marketing can foster greater acceptance and uptake of RPSs, contributing to a more sustainable and ecologically conscious society.

On the contrary, the regression analysis revealed that the preference for burgers is a strong predictor for choosing single-use packaging. This aligns with the overall outcomes of the survey, where respondents perceived all the presented reusable packaging alternatives as less favourable for fast food when compared to other food options. Building on the hypothesis that consumers seek to embody their healthy and sustainable lifestyle choices through daily activities, including the selection of reusable packaging, the reluctance toward using reusable options for fast food might suggest that individuals who place less emphasis on environmental concerns are also less inclined to opt for reusable packaging. However, it is important to acknowledge that the survey participants explicitly voiced concerns about potential changes in texture and taste when fast food is transported in reusable packaging. This is particularly due to the airtight nature of such packaging, which hinders the escape of hot food vapours, resulting in a negative impact on the crispness of items like fries. Therefore, for reusable packaging to gain acceptance, it is crucial to devise designs that preserve the distinctive characteristics of the food items. In general, considering the findings, it was evident that the choice of

packaging design is contingent upon the type of food being served. As a result, providers of RPSs may find it beneficial to offer a diverse assortment of packaging solutions tailored to suit the specific requirements of various food dishes. By doing so, they can enhance the appeal of RPSs and increase their overall adoption among consumers.

Regarding the prevalent types of RPSs in Germany, the study findings indicate a clear consumer preference for deposit systems over digitized systems. Several reasons contribute to this preference. Firstly, deposit systems are perceived as more practical and straightforward to comprehend. Secondly, consumers feel a greater sense of flexibility with deposit systems, which can be attributed to the convenience of borrowing and returning packaging at numerous locations, facilitated by the wider network of partners associated with these systems. Additionally, deposit systems do not engender lock-in effects, as consumers are not bound to a specific reusable packaging provider. Consequently, the survey responses reveal that consumers value deposit systems due to their unrestricted ability to engage in borrowing and returning packaging without the necessity of registering for a particular system.

Conversely, digitized systems encounter barriers to adoption. Consistent with the research conducted by Long et al. (2022), consumers express reluctance to expend extra effort in downloading applications and registering, while privacy concerns represent a critical factor impeding the adoption of RPSs. As a result, digitized systems may hinder the spontaneous decision-making process for selecting a reusable packaging system at the point of sale. Furthermore, digitized systems are less accessible compared to deposit systems. Notably, considering the demographic composition of Germany, the older generations currently constitute a significant proportion of the population (Bundeszentrale für politische Bildung (BfP), 2020). Given that many of them were raised in an era devoid of modern technologies like smartphones, their possession of such devices or familiarity with advanced technologies cannot be assumed.

Irrespective of the specific type of RPSs, this study underscores the necessity for political interventions to promote the widespread adoption of RPSs. Consumer habits and the prevailing convenience-oriented trend present obstacles to the uptake of reusable packaging (Greenwood et al., 2021;

Simoens et al., 2022), necessitating policy measures that render reusable packaging more appealing than single-use alternatives (Ertz et al., 2017). One viable measure could involve the imposition of taxes on single-use packaging (Accorsi et al., 2022; Cottafava et al., 2019; Schuermann & Woo, 2022; Wang & Zhao, 2022), thereby raising its cost relative to reusable alternatives. Such a pricing strategy could not only incentivize consumers to opt for reusable packaging on economic grounds but also provide an additional impetus for businesses to embrace reusable options, as they become more financially viable. Alternatively, the additional revenue generated through taxes could be allocated to marketing campaigns supporting RPSs (Schuermann & Woo, 2022). Another potent measure, proposed by Ertz et al. (2017) involves standardizing the sale of food and beverages in reusable packaging. Practically, this would entail providing consumers with their purchases in reusable packaging by default unless otherwise specified. By establishing this as the norm, consumers would be more likely to acclimate to the new packaging standard and may also observe fellow consumers engaging with the reusable packaging system. Notably, as elucidated by Dorn and Stöckli (2018), such social observation plays a significant motivational role in encouraging consumer participation with RPSs.

Furthermore, the survey respondents availed the opportunity to articulate their preference for a centralized system. Presently, the market for RPSs in Germany is characterized by fragmentation, with dominant players including ReCup, Vytal, Relevo, and ReCircle. However, consumers expressed a desire for a system that streamlines the process of returning packaging. Here, the convenience factor plays a pivotal role, as it both drives adoption when present and impedes adoption when lacking (Bradley & Corsini, 2023; Ertz et al., 2017; Jiang et al., 2020; Lofthouse et al., 2009; Miao et al., 2022; Simoens et al., 2022).

In the long term, the introduction of a RPS akin to the well-established bottle deposit system in Germany could prove beneficial on multiple fronts. Firstly, the implementation of one centralized system, complemented by effective measures such as taxes on single-use packaging, would significantly heighten consumer awareness regarding reusable packaging, thus standardizing engagement with such systems. Secondly, a centralized system would facilitate the establishment of a wider network of return locations, considerably reducing the time and effort associated with engaging with RPSs, thereby enhancing the overall consumer experience. Thirdly, insights from prior research underscore that individuals tend to adhere to their established habits when making decisions (Greenwood et al., 2021; Simoens et al., 2022). Given that a centralized deposit system for food would merely extend the already familiar bottle deposit system (Herbes et al., 2018; Simoens et al., 2022), the psychological barriers to adopting such systems would be reduced. This familiarity and continuity may serve as a compelling incentive for consumers to readily embrace the new system, as it aligns with their existing behavioural patterns.

Finally, the study revealed two noteworthy observations.

Firstly, consistent with previous research, the survey responses indicate that functional characteristics of reusable packaging such as hygiene, leak proofness and durability are critically important for consumers to accept reusable packaging (Bradley & Corsini, 2023; Ertz et al., 2017; Jiang et al., 2020; Lofthouse et al., 2009; Long et al., 2022; Miao et al., 2022; Numata & Managi, 2012). Although participants did not indicate a clear preference for a specific material, most of them highlighted that the packaging needs to appear and remain hygienic (free of stains or wear and tear), leak-proof and easy to transport. However, since these aspects did not emerge as significant predictors within the regression analysis, it can be derived, that such attributes are fundamental prerequisites for the acceptance of any packaging within the gastronomic industry.

Second, a significant proportion of consumers exhibit a tendency to postpone the return of their reusable cups following consumption. To fully realize the positive impacts of the circular economy concept, it becomes imperative for RPSs to be designed in a way that facilitates the direct return of packaging. To achieve this objective, an effective approach involves enhancing the density of the partner network, which entails optimizing the number and distribution of return locations. By reducing the distances to these locations, consumers will experience minimized effort and time required for the return process, thus incentivizing direct and prompt returns. In this context, the implementation of a centralized system presents a practical and viable solution. A centralized system can pave the way for an efficient and interconnected network of return locations, fostering seamless and convenient returns for consumers. By encouraging the direct and timely return of reusable packaging, such a design would enhance the efficacy of RPSs in aligning with the principles of a circular economy, ultimately fostering greater sustainability in the long run.

In conclusion, fostering the widespread adoption of RPSs in Germany necessitates a multifaceted approach. Key recommendations include augmenting consumer awareness and education on the sustainability advantages of RPSs, reducing the allure of single-use packaging, optimizing the network with a focus on centralization and a deposit system, and embracing a user-centric design. Additionally, it is crucial to ensure that the packaging meets high hygienic standards, possesses durability, leak-proofness, and ease of transport, as expected for any packaging within the gastronomic industry. By implementing these measures, the adoption of reusable packaging can be encouraged, leading to substantial contributions towards establishing a more sustainable future.

## 5. Conclusion

This section presents a comprehensive summary of the principal findings derived from the study. It also acknowledges the identified limitations of the research and offers an outlook for potential avenues of future investigation.

### 5.1. Summary of Results

The utilization of RPSs presents great promise as an effective approach to address the challenge of packaging waste, foster the establishment of a circular plastic economy, and contribute significantly towards achieving the sustainability goals set by both the European Union (EU) and Germany. Nevertheless, a crucial obstacle that demands attention for broader implementation is consumer adoption. Currently, there is a lack of literature concerning this matter, offering limited insights into the associated challenges and potential solutions. To shed light on this aspect, a comprehensive investigation was conducted in Germany, exploring consumers' adoption of RPSs. This study explored consumers' adoption of RPSs in Germany by identifying the consumer preferences and adoption barriers and presented design recommendations to address them.

This research makes three significant contributions to the field. Firstly, it offers a comprehensive overview of the state-of-the-art literature related to RPSs covering the concept's origin and evolution, an examination of the sustainability aspects of RPSs, and the drivers and barriers for the adoption of RPSs from both an economic and consumer perspective. Secondly, this study constitutes a pioneering effort in offering a thorough and all-encompassing analysis of the current status of RPSs in Germany, encompassing the political relevance, public sentiment, prevailing system typologies, and market configuration. Remarkably, the findings of this study reveal a disparity between the supportive stance of the German government towards the widespread integration of RPSs through legislative measures and the generally favourable societal sentiment towards these systems. Despite these encouraging factors, the actual adoption of RPSs by the public remains constrained. Moreover, the examination of the market for RPSs in Germany indicates a distinct fragmentation, characterized by the prominence of four major pool system providers. These providers employ either deposit or digitized system approaches, which contributes to the complexity and diversity of the RPS landscape in the country. Thirdly, this research investigates the drivers and barriers for the consumer's adoption of RPSs. It unveils that intrinsic motivations related to environmental consciousness are significant drivers for consumer adoption. Furthermore, financial incentives seem to motivate consumers to switch from single-use to reusable packaging. Conversely, concerns related to data collection, inflexibility or the inconvenience associated with the return process of the packaging hinder the seamless integration of RPSs into consumers' daily practices. Additionally, a prominent obstacle hindering widespread adoption is the general lack of awareness among consumers regarding the existence and benefits of RPSs. Drawing upon the findings, this study puts forth a series of design recommendations for RPSs that offer valuable applicability to various stakeholders. For small gastronomic businesses and pool system providers, these recommendations serve as a means to optimize and improve existing RPSs, aligning them with consumer preferences and enhancing their appeal in the market. In parallel, policymakers can incorporate these findings into future leg-

islative processes, with the aim of fostering a centralized system or standardizing RPSs. Furthermore, the recommendations highlight the significance of making single-use packaging less attractive to consumers to encourage the widespread adoption of RPSs.

### 5.2. Outlook and Limitations

The research is subject to three limitations. Firstly, the utilization of an online survey as a data collection method is advantageous in achieving high representativeness and a diverse sample profile. However, it lacks the depth of insight obtainable from in-person interviews due to limited probing opportunities and contextual understanding. To overcome this limitation, future research could employ a mixed-methods approach, combining online surveys with in-person interviews or focus groups, thus enabling a more comprehensive understanding of participants' perspectives and capturing both quantitative trends and qualitative nuances. Secondly, the survey focused solely on exploring the drivers and barriers for consumer adoption, neglecting the aspect of incorporating the business perspective for assessing the overall feasibility of the design recommendations. To address this limitation, researchers should integrate interviews or case studies with industry experts and stakeholders to obtain insights into the business-related factors influencing consumer adoption decisions, thus providing a more comprehensive understanding of the phenomenon. Thirdly, the regression analysis utilized in this research follows an inductive approach. While this method has its merits, it may overlook potential underlying relationships and patterns that could be better explored using complementary analytical methods. To improve the robustness of the findings, future studies should consider adopting a multi-method approach, combining regression analysis with techniques such as conjoint analysis. This will allow for a deeper exploration of consumer preferences and decision-making processes, thereby enhancing the overall rigor of the study.

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# Road to a Bioeconomy in the European Union: Mapping Drivers of Precision Fermentation Adoption

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## Abstract

The escalating crisis of climate change, biodiversity loss, and pollution necessitates urgent shifts in production and consumption patterns towards enhanced environmental efficiency (EE). Western governments, including the European Union (EU), advocate transitioning to a bioeconomy based on renewable resources and free from fossil fuels. A pivotal technology in this shift is precision fermentation (PF), which employs synthetic biology to transform microbes into 'cell factories' capable of producing diverse goods from renewable feedstocks. Despite its introduction in 1982, PF's impact on EU production processes has been limited. This paper, drawing on Geel's (2002) concept of technology transformations as sociotechnical phenomena, explores the drivers and barriers to PF adoption through interviews with eight biomanufacturing ecosystem experts. Findings reveal a dynamic niche propelled by advances in synthetic biology, environmental pressures, and global supply chain disruptions. However, substantial internal barriers at both niche and system levels hinder transformative progress, underlining critical areas for EU policy intervention. This paper provides strategic insights for policymakers, established companies, and entrepreneurs aiming to navigate the transition to a bioeconomy.

**Keywords:** biomanufacturing; EU bioeconomy strategy; multi-level perspective; precision fermentation

## 1. Introduction

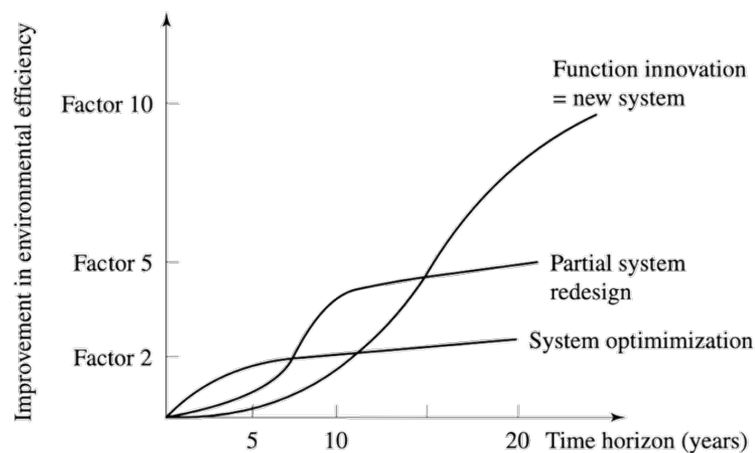
In 2023, humanity faces the triple planetary crises threatening the security and survival of numerous living beings on earth: climate change, loss of biodiversity, and pollution of water, soil, and air (IPCC, 2023; UNCCD, 2022; UNEP, 2022). These crises, primarily driven by human production and consumption patterns (Unruh, 2000), demand urgent action and a reevaluation of our economic systems (Elzen et al., 2004). With growing global populations and increasing demands for food, materials, and energy (World Bank, 2023), the pivotal question arises: How can humanity maintain or even enhance its quality of life without exacerbating its detrimental impact on planetary health?

At its core, this concern demands a dramatic improvement in environmental efficiency<sup>1</sup> (EE), – and although in-

cremental innovation and optimization can contribute to improvements, Weterings et al. (1997, as cited in Geels, 2006) suggest that system innovation may be necessary for a substantial leap forward (see Figure 1).

The bioeconomy, an economic model primarily based on renewable and biological resources, offers a potential pathway towards system innovation. Enabled by synthetic biology and industrial biotechnology, the bioeconomy aims to transform value chains for goods that contribute significantly to environmental destruction, such as consuming fossil fuels and raising animals for meat and dairy production. Precision Fermentation (PF), a technology that employs synthetic biology tools to transform microbes into "cell factories" for producing a wide array of known and novel molecules at industrial scales, holds great promise in transforming these sectors while addressing environmental challenges. As an example, the required whey protein for a liter of cow's milk produced via PF could require up to 99% less freshwater (EE factor 100) and emit up to 97% fewer greenhouse gas emissions

<sup>1</sup> Environmental efficiency refers to a system's ability to minimize its environmental impact while maximizing its output or productivity (Korhonen et al., 2018).



**Figure 1:** Environmental Efficiency and System Innovation  
(Source: Weterings et al. (1997) as cited in Geels (2006))

(GHG) (EE factor 33) than from the actual cow (Perfect Day & WSP USA, 2021; Poore & Nemecek, 2018). Consequently, environmental activist and columnist George Monbiot has touted it as potentially “the most important green technology ever” (Monbiot, 2022).

As one of the world’s most influential economies, the European Union (EU) is actively pursuing a more sustainable future, including the transition to a bioeconomy. This ambition is prominently demonstrated by its initiatives, such as *The European Green Deal* (European Commission, 2019) and *The EU’s bioeconomy strategy* (European Commission, 2018). However, the initiatives might not be sufficient in the given timeframe (IPCC, 2023), raising the research question: How can the transition to a bioeconomy that involves PF be accelerated? Therefore, this thesis examines the principal current drivers and barriers influencing the development of system innovation in the form of a technology transition.

Past technology transitions demonstrate that it is insufficient to limit the analysis of system transformation to technological drivers. These transitions are driven by a wide range of societal flows and stages, requiring an interdisciplinary approach and a socio-technical lens (Geels, 2006). By employing Frank Geels’ (2002) *Multi-Level-Perspective* framework, this thesis explores the potential technological transformation of animal-based protein, materials, and fuel production through the widespread adoption of PF. To gain a comprehensive understanding of these dynamics and to identify the key factors required to accelerate the process, eight experts who play a crucial role in this socio-technical transformation were interviewed.

The analysis presented in this thesis aims to help understand the barriers and driving forces behind the adoption of PF as a critical component of a sustainable bioeconomy in the European Union. The insights gained from this research can serve as a foundation for policy and industry decisions, setting the course for an epoch of robust environmental resilience.

The subsequent chapters are organized as follows: Chapter 2 provides a literature review on the bioeconomy; the technology and application methods of PF to shape a bioeconomy; and recent research. Chapter 3 presents the methodology and research design, Chapter 4 discusses the findings from the expert interviews, and Chapter 5 discusses recommendations for future research, industry, and policy action.

## 2. Literature Review

### 2.1. The Vision(s) of a Bioeconomy

Visions of a bioeconomy are as diverse as the problems they are expected to solve. Therefore, the term ‘*bioeconomy*’ is not universally defined and is widely diffused across various scientific fields and political strategies (Bugge et al., 2016). Around the globe, a wide range of actors, including governmental and non-governmental organizations, scientists, entrepreneurs, consultancies, and investors, are developing blueprints for what “the bioeconomy” will resemble (ibid.). These narratives consistently convey distinct perspectives on merging economy and ecology for economic development, with each vision having unique focuses and objectives (Vivien et al., 2019).

A literature review by Bugge et al. (2016) classified bioeconomy visions into three main types: *bio-resource*, *bio-technology*, and *bio-ecology*, as presented in Table 1. This classification was echoed by Vivien et al. (2019, Table 1) in their historical analysis of the bioeconomy term, which was first introduced in the 1920s. They particularly highlighted an emerging vision focused on industrial biotechnology as the driving force of the transition to a bioeconomy. The narrative around this vision was inspired by the progression of “traditional fermentation biotechnology to include genetic manipulation” (Bud, 1991 cited in Vivien et al., 2019) – a process known today as precision fermentation.



As this thesis examines the use of industrial biotechnology to achieve a bioeconomy, visions related to the bio-ecology vision can be set aside for the purpose of defining the bioeconomy within this context. Simultaneously, there is a clear focus on averting the exacerbation of our ecological crises and increasing EE. Consequently, sectors that cannot make a significant contribution to this goal are excluded from the scope of this thesis. Both the *bio-technology* and *bio-resource* visions place a strong emphasis on technology, natural sciences, and economic growth and thus overlap in parts (Bugge et al., 2016). Therefore, the focus of this thesis sits directly at the intersection: The vision of a bioeconomy being investigated here deals with the commercialization of advancements in industrial biotechnology (biomanufacturing), in this case, PF, to transformatively increase EE without compromising economic growth.

## 2.2. The (Microbial) Cell as the Factory of the Bioeconomy

Fermentation is one of the oldest technologies known to humankind (Ross et al., 2002). The term describes the process of the intentional use of microorganisms to metabolize organic matter into desired, simpler molecules (Ross et al., 2002). This fundamental technology has been a reliable companion to humans across the globe for thousands of years, and throughout history, technological advancements have enabled humans to develop increasingly diverse applications and products in food, beverages, pharmaceuticals, and beyond.

### 2.2.1. Microbial Fermentation: Humanity's Oldest Biotechnological Tool

The origins of fermentation can be traced back to early human civilizations. Fermented beverages have been found in the Henan province (today's China) dating back 9,000 years ago (McGovern et al., 2004), and initial cheese production dates back approximately 8,000 years to Mesopotamia (modern-day Iraq) (Ross et al., 2002). Even without understanding the underlying mechanisms, humans have harnessed the metabolic capabilities of microorganisms for various purposes, coinciding with the first domestication of plants and animals (Ross et al., 2002).

In 1676, Antoni van Leeuwenhoek made a groundbreaking discovery when he observed microorganisms under a microscope, revealing an unseen world of microscopic life (Dobell, 1932; Lane, 2015). This laid the foundation for future developments in fermentation and the understanding of the role of microorganisms in various biological processes. By 1857, Louis Pasteur revealed the role of microorganisms in fermentation, demonstrating that they were responsible for converting sugars into alcohol, carbon-dioxide (CO<sub>2</sub>), and other byproducts. This finding led to the germ theory of fermentation and established microbiology as a distinct field (Barnett, 2003).

From the late 19th to the mid-20th century, industrial fermentation and biotechnology emerged as scientists and engineers harnessed microorganisms for large-scale applications

(Demain & Adrio, 2008). This period saw innovations in the cultivation and optimization of microbial growth, which enabled the large-scale production of fermented products such as beer, wine, and other foods. Additionally, the discovery of aerobic fermentation during this time facilitated the production of compounds like citric acid (Papagianni, 2007) and antibiotics such as penicillin, discovered by Alexander Fleming in 1928 (Fleming, 1929).

Between the 1970s and 1990s, advancements in molecular biology, including the discovery of DNA's structure by James Watson and Francis Crick in 1953 and the development of genetic engineering techniques, revolutionized the manipulation of microorganisms for improved fermentation processes (Cohen et al., 1973). In 1973, Stanley Cohen, Herbert Boyer, and their colleagues developed recombinant DNA technology, which enabled the insertion of foreign genes into microorganisms, resulting in strains capable of synthesizing proteins not naturally produced by the host organism (Goedel et al., 1979). This led to the commercial production of recombinant proteins, such as insulin and somatostatin (human growth hormone), using genetically engineered bacteria and yeasts (Walsh, 2005).

From the 1990s to the early 21st century, advances in molecular biology, genomics, and bioinformatics facilitated the development of metabolic and genetic engineering. Researchers began to modify and optimize entire metabolic pathways, rather than single genes, to enhance the production of desired compounds (Cameron et al., 2014). This marks the emergence of synthetic biology, which is paving the way for further advances in fermentation technology and enables humans to utilize microbes as 'cell factories' (Cameron et al., 2014). Subsequent chapters will provide a more detailed examination of *synthetic biology* and its influence on the development of fermentation processes.

### 2.2.2. Synthetic Biology: Unleashing New Potential for Fermentation

Synthetic biology is an umbrella term encompassing the application of engineering principles to the design and creation of novel biological systems using an interdisciplinary array of technological tools (Cheng & Lu, 2012; Flores Bueso & Tangney, 2017). These tools include the ever-evolving capabilities of metabolic engineering, which is facilitated by the advancements in genetic engineering, the understanding of metabolic pathways, and bioinformatics (Ko et al., 2020) – an interdisciplinary field that combines elements of biology with computer science and information technology (Luscombe et al., 2001).

Genetic engineering involves modifying an organism's existing characteristics or introducing new ones by directly manipulating its genetic material (Mutalik et al., 2013) and enables the conduct of metabolic engineering, the intentional redesign of a cell's metabolism to advance the production of native metabolites or enable the cell to produce novel products (Nielsen & Kiasling, 2016).

**Table 1:** Visions and Narratives Around the Term “Bioeconomy”  
(Source: Excerpt from Bugge et al. (2016) and Vivien et al. (2019))

| Narratives according to (Vivien et al., 2019) |  |   |  |
|---|--|---|--|
| Name  | Type I bioeconomy  | Type II bioeconomy  | Type III bioeconomy  |
| <b>Definition</b>                             | An ecological economy, that is compatible with the biosphere   | A science-based economy driven by industrial biotechnology                    | A biomass-based economy  |
| <b>Nature &amp; Economy Relations</b>         | Struggle against entropy and co-evolution with the biosphere. Economic development in line with biological evolution | The cell is a factory<br>Technology has the power to “correct God’s mistakes” | Biomass replaces fossil fuels and mining to produce energy and materials |
| Visions according to Bugge et al. (2016)      |  |   |  |
| Name  | bio-ecology vision   | bio-technology vision   | bio-resource vision  |
| <b>Aims &amp; Objectives</b>                  | Sustainability, biodiversity, conservation of ecosystems, avoiding soil degradation                                  | Economic growth & job creation  | Economic growth & sustainability   |
| <b>Value Creation</b>                         | Development of integrated production systems and high-quality products with territorial identity                     | Application of biotechnology, commercialization of research & technology      | Conversion and upgrading of bio-resources (process oriented)             |

To achieve this, different methods such as recombinant gene expression, substrate<sup>2</sup> engineering, and protein engineering, can be used and combined (Ko et al., 2020). For the purpose of this thesis, it is not necessary to delve deeper into these methods, but to recognize that all these tools can be applied to modify, in the case of PF, the metabolism of microbes such as bacteria, filamentous fungi and yeasts, and algae (a) so that they produce desired products using desired substrates, and (b) to optimize this process in terms of scale and (economic) efficiency (Chai et al., 2022).

### 2.2.3. Precision Fermentation: Amplifying Synthetic Biology to Industrial Scale

According to Chai et al. (2022), the term ‘*precision fermentation*’ emerged outside academia to describe the process of leveraging the synthetic biology toolkit for genetic and metabolic engineering of microbes, transforming them into ‘*microbial cell factories*’ with the aim of efficiently producing desired molecules in an industrial setting. The term arose around the emergence of using metabolically engineered microorganisms to produce alternative proteins in food (The Good Food Institute, 2023), but is used more broadly in this thesis to describe engineered microorganisms that are used as factories in various contexts to convert carbon substrate (feedstocks) into desired (bio-)chemicals.

<sup>2</sup> A substrate, also known as a feedstock, is a molecule that is transformed by a chemical or biological reaction. In the context of fermentation by metabolically engineered microbes, it refers to carbon based raw materials (Lips, 2022).

PF brings the use of synthetic biology on microorganisms into an industrial setting. Consequently, to comprehend the commercial adoption of PF, it is essential to consider the entire production procedure, which goes beyond the mere utilization of synthetic biology tools in a lab setting. Hence, the initial configuration of the metabolic pathway is succeeded by strain optimizations aimed at enhancing the strain’s economic efficiency and operational capabilities at larger scales:

At the beginning of the value chain is the selection of the target molecule and a strain that possesses the necessary characteristics for efficient production (Ko et al., 2020). Simultaneously, an appropriate feedstock is selected based on its availability, cost, and compatibility with the chosen microorganism - referred to as the strain (Ko et al., 2020). In constructing a scalable fermentation process for targeted molecule production, the utilization of the Design-Build-Test-Learn (DBTL) cycle, a core process of system design in synthetic biology, is a pivotal aspect. This cycle, characterized by its iterative feedback loop, facilitates strain optimization. The DBTL cycle is integral not only for the initial introduction of the capability to metabolize alternative substrates and to produce novel target molecules at a laboratory scale, but also for subsequent optimization of scale in terms of TRY – titer (end concentration of the targeted compound in the fermentation medium), rate (output per unit of time), and yield (quantity of the targeted synthesized per unit of raw material used) (Carbonell et al., 2018; Nielsen & Keasling, 2016).

The cycle involves four key steps:

1. **Design:** A blueprint for the metabolic pathway through which the target molecule will be produced is de-

veloped, commonly involving the modification or introduction of genes into the strain that produce enzymes that facilitate the metabolic processes (Nielsen & Keasling, 2016).

2. **Build:** This designed metabolic pathway is integrated into the strain. Applied here are advanced synthetic biology tools, including genetic engineering and bioinformatics, to improve the way the strain uses the starting material to produce the target molecule (Carbonell et al., 2018).
3. **Test:** The process performance is assessed. This examines the final concentration of the product in the fermentation environment, the quantity produced in a given time, and the efficiency of product generation per unit of feedstock used (TRY) (Carbonell et al., 2018).
4. **Learn:** The performance results of the test phase are incorporated into subsequent design improvements. If the performance is satisfactory, the process moves to the next stage. If not, the insights obtained from testing are used to modify the design (Carbonell et al., 2018).

The development of the initial strain variants takes place on a small scale within a laboratory setting. These are subsequently fine-tuned via iterations of the DBTL cycle, based on their anticipated performance metrics until they are ready to be transitioned to a larger fermentation unit. This process of scale-up involves an iterative optimization of the fermentation conditions, which is performed in conjunction with modifications to the metabolic pathways of the strains (Carbonell et al., 2018). The process takes place in progressively larger bioreactors, as per the model depicted in Figure 2 (Ko et al., 2020). Once the fermentation process concludes, target products are isolated from the rest of the fermentation broth through appropriate downstream processing techniques (Ko et al., 2020). With this approach, scientists, product developers, and engineers try to lift findings from the laboratory to an industrial scale with constant optimization on TRY.

### 2.3. Ways to Harness PF for Creating a Circular Bioeconomy

Chapter 2.1 presents a blueprint for a bioeconomy, wherein the EE of producing goods traditionally sourced from fossil fuels and animal origins is substantially enhanced via the deployment of biomanufacturing processes hinged on the metabolization of renewable feedstocks. As delineated in section 2.2, the application of metabolic engineering to microorganisms enables to turn them into 'microbial cell factories', utilizable to convert selected feedstocks into desired molecules such as chemicals, fuels, materials, and organic products (Ko et al., 2020, Figure 3). Therefore, this chapter aims to specify the potential role of PF, namely the large-scale utilization of 'microbial cell factories', in realizing the envisioned bioeconomy.

To produce the desired target molecules, microorganisms require a carbon-based substrate, often referred to as feedstock (Lips, 2022). In line with the defined vision of a bioeconomy, this discussion solely focuses on non-fossil-based

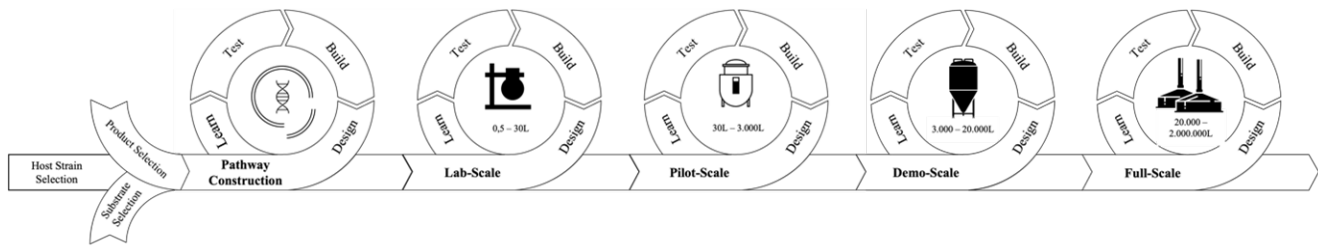
feedstocks, which are categorized into three generations according to the chronology of their development and use:

1. First-generation feedstocks are derived from food crops that produce fermentable sugars. However, their usage has been associated with several undesirable environmental effects such as deforestation and competition for food supply, prompting the need for alternatives (Lips, 2022).
2. Second-generation feedstocks are sourced from lignocellulosic biomass, which includes energy crops and non-edible residues. As the most abundant renewable biomass, these feedstocks have the potential to reduce land usage and environmental impact. However, various forms of pre-treatment are required to convert them into a fermentable state (Lips, 2022; Morales et al., 2015; Soleymani Angili et al., 2021).
3. Third-generation feedstocks include brown macroalgae (Lips, 2022), and short-chain carbon-based molecules, including industrial waste gases like CO<sub>2</sub> and methane (Liu et al., 2020; Ruiz et al., 2023). Macroalgae, unlike first and second-generation biomass, grow in coastal waters, thus preserving arable land and freshwater, and do not require extensive pre-treatment for fermentation (Lips, 2022). The use of CO<sub>2</sub>, the most widely available carbon source on Earth and methane, both GHG, would either prevent the emission of these gases into the atmosphere or bind them from the atmosphere (Venkata Mohan et al., 2016).

Currently, first-generation feedstocks form the backbone of resources used in these processes (Lips, 2022). However, developments in metabolic engineering and synthetic biology have significantly boosted the efficiency of microbial usage of feedstocks from the second and third generations, which are associated with wider availability, lower costs, and less negative impact on cropland use and the environment than the first generation (Lips, 2022; Pandey et al., 2021; Ruiz et al., 2023; Zhang et al., 2022). Notably, the use of industrial waste gases pivots the paradigm from a bioeconomy based on renewable feedstocks towards a circular bioeconomy (Venkata Mohan et al., 2016). In this model, emissions that would otherwise end up in the atmosphere are repurposed for the synthesis of food, cement, polymers, and chemicals (Ruiz et al., 2023).

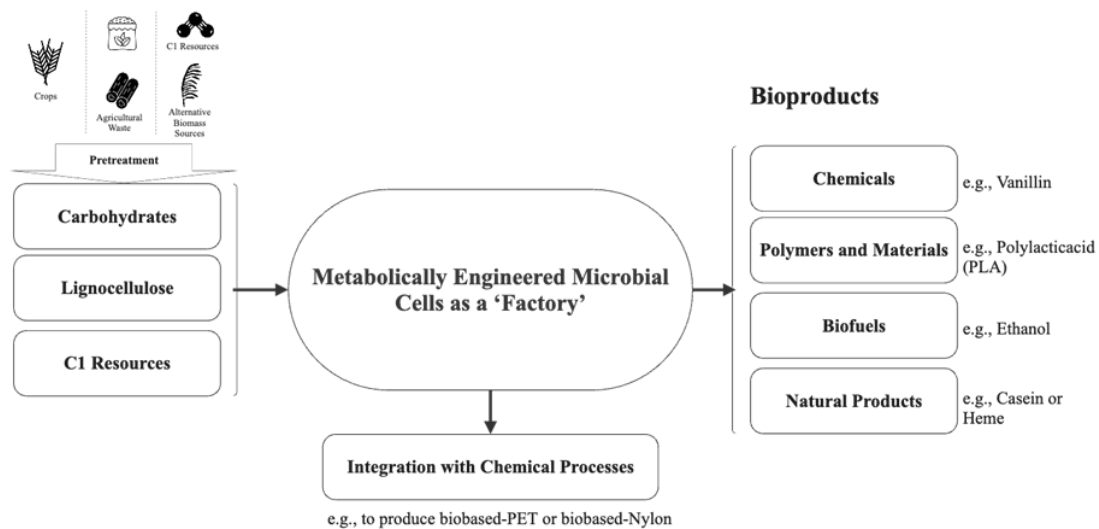
In addition, synthetic biology offers significant potential for enhancing the sustainability of manufacturing processes not only at the input level, but also in improving the environmental impact of the resultant products. This can be accomplished through the integration of metabolic engineering with existing chemical processes (Ko et al., 2020) to yield bio-based products, or through the novel design and synthesis of entirely new molecules – *de novo* - with desirable characteristics (Keasling, 2010).

It is crucial to understand that many of the processes described here do not yet occur on a large scale but are an ag-



**Figure 2:** Employing the DBTL Cycle for Iterative Strain Optimization when Scaling Production (Source: Own illustration based on Carbonell et al. (2018) and Ko et al. (2020))

### Carbon Substrates (Feedstocks)



**Figure 3:** Using Metabolically Engineered Microbes as a Factory to Produce (Bio-) Chemicals from Various Carbon Substrates (Source: Adapted from Ko et al. (2020) and based on Liu et al. (2020))

gregation of successful laboratory experiments demonstrating the potential of the technology. For the envisioned bioeconomy to materialize, there's a need to raise these processes to commercial scales, optimizing both processes and strains to ensure market readiness. However, to facilitate this transition and successfully implement PF on a broad scale, understanding the various drivers and barriers influencing its adoption becomes a key factor. Consequently, the next segment of this thesis focuses on exploring these drivers and barriers, setting the stage for a detailed investigation into the dynamics that will shape the future of precision fermentation in the EU bioeconomy.

## 3. Methodology

### 3.1. Research Approach

This thesis aims to investigate strategies to accelerate the transition to a bioeconomy in the European Union, enabled by biomanufacturing, specifically PF. The research objective is the identification of principal drivers and challenges shaping current dynamics to then explore potential levers to accelerate the transition. Given the potential benefits of a bioeconomy driven by biomanufacturing, this thesis seeks to

provide recommendations for policymakers and influential stakeholders to facilitate a potential transformation.

To address these objectives, the *Multi-Level-Perspective* framework, as conceptualized by Frank Geels (2002), is employed as an integrative conceptual lens for examining interactions between *macro-*, *meso-*, and *micro-*level processes within the EU that shape this transition. The MLP framework highlights the role of three interconnected analytical levels—landscape, regime, and niche—in understanding and shaping transitions. This framework is chosen for its ability to capture the complexity and dynamics of socio-technical transitions. The comprehensive scope of the framework to address the research question is further elaborated in Section 3.2.

Given the complex, broad research question, the scarcity of existing scientific literature, and the necessity for getting real-time insights into the potential ongoing transition, this study has chosen to utilize qualitative interviews as its principal data collection method. As part of this approach, eight carefully selected experts, each providing unique perspectives on the multi-faceted dynamics, were interviewed. The rationale behind choosing those experts is elaborated in Section 3.3, while the exploratory semi-structured questionnaire



employed for the interviews is outlined in Section 3.4. Section 3.5 discusses the limitations of choosing this approach.

### 3.2. Taking a Multi-Level-Perspective on Technology Transitions

The potential adoption of PF as a transformative platform technology in the EU's main production sectors would imply a profound change in the way societal functions are fulfilled technologically, i.e., it implies a *technological transition* (TT) (Geels, 2002). According to Geels (2002), the trajectory of transformation research has shown that understanding these transitions requires a *socio-technical* perspective; an analytical lens that recognizes the intertwining of social and technical elements during the design, development, adoption, and use of technology. This perspective underscores that technology does not exist in a vacuum but is deeply embedded within its social context. It mirrors the values, interests, and power dynamics within the society in which it evolves Geels (2002). Using this lens also acknowledges the array of actors involved in technological transformations. These include not only the designers and developers of the technology, but also the customers and users, policymakers, and various other stakeholders. The interactions, negotiations, and dynamics among these diverse actors influence the direction and outcomes of the technological transformation (Geels, 2002).

Building upon this understanding of TTs as socio-technical phenomena, Frank Geels (2002) conceptualized the MLP framework. This framework has gained substantial prominence in elucidating technological societal transformations, particularly with respect to sustainability concerns (see Raven (2004) and Verbong and Geels (2007)). As it pertains to the exploration of drivers and barriers affecting the adoption of PF, employing the MLP framework provides a structured avenue for analyzing the complex dynamics influencing the potential transition within the European Union's manufacturing sectors.

The MLP framework distinguishes between three inter-related conceptual levels to analyze dynamics between actors: At the micro-level, *niches* act as incubators for radical innovation, protecting them in underperforming stadium from mainstream market selection (Kemp et al. (1998) as cited in Geels and Schot 2007). There, small networks of committed individuals interact to create momentum for their respective emerging technologies and practices that challenge the norms established at the meso level (Geels & Schot, 2007). This meso level, often referred to as the *socio-technical regime*, solidifies existing systems and outlines the path for dominant technological developments. It consists of a constellation of actors – among them corporations, policymakers, consumers, and markets – who manage and sustain the current socio-technical systems (Geels & Schot, 2007).

Micro and meso levels are subject to changes on the macro level, the *socio-technical landscape*. The macro level describes a broad sphere of exogenous influences that can be found, for example, in societal, macroeconomic, political, or environmental developments. These developments can influence the course and intensity of interactions between niche

and regime by putting pressure on the established norms of the regime and thus creating spaces, so-called *windows of opportunity*, into which the niche can fall within the regime (Geels & Schot, 2007). The three levels form a nested hierarchy in which niches are embedded in regimes and regimes are embedded in the landscape (Figure 4).

Understanding the interplay between the different levels of the MLP framework is crucial for examining the drivers and barriers of a transformation process. Geels and Schot (2007) outline three core processes that facilitate the breakthrough of niche innovations into mainstream markets, where they compete with the existing regime:

- (i) **Niche Accumulation:** Niche innovations gather internal momentum through learning processes, improvements in price/performance, and backing from influential groups.
- (ii) **Landscape-Level Pressure:** Changes at the macro, or landscape, level exert pressure on the established regime.
- (iii) **Regime Destabilization:** Destabilization of the regime creates windows of opportunity for niche innovations.

These processes, depicted in Figure 4, provide a foundation for examining the drivers and barriers of a potential technological transformation of the EU industry towards biomanufacturing via PF.

### 3.3. Interviewee Selection

For data collection, a meticulous selection of experts was carried out, and interviews were conducted with each of them, lasting between 30 and 70 minutes. Bearing the MLP framework in mind, these experts were chosen to represent different key pivot points within the framework, which allowed them to interact with various actors from the socio-technical regime or niche. A person is an expert, if she or he „has any responsibility for the design, implementation or control of a solution to a problem or [...] has privileged access to information about groups of people or decision-making processes“ (Meuser & Nagel, 1991, p.443 (translated)). Currently, each interviewee possesses their own domain expertise and approaches the research question from their unique perspective. Table 2 offers an overview of the interviewees, including a brief introduction to the MLP framework. For a detailed list, please refer to Appendix A. Additionally, it was crucial to include experts with a life science background that bring an in-depth understanding of the technological aspects. Four of the interview partners have an academic life science background, with three of them holding a PhD.

In total, eight interviews were conducted. The interview partners were contacted via email. However, not all of the considered essential interviewees responded – primarily engineers and members of the established socio-technical regime, such as policymakers and representatives of industrial companies. Further details on this issue can be found in the limitations section.

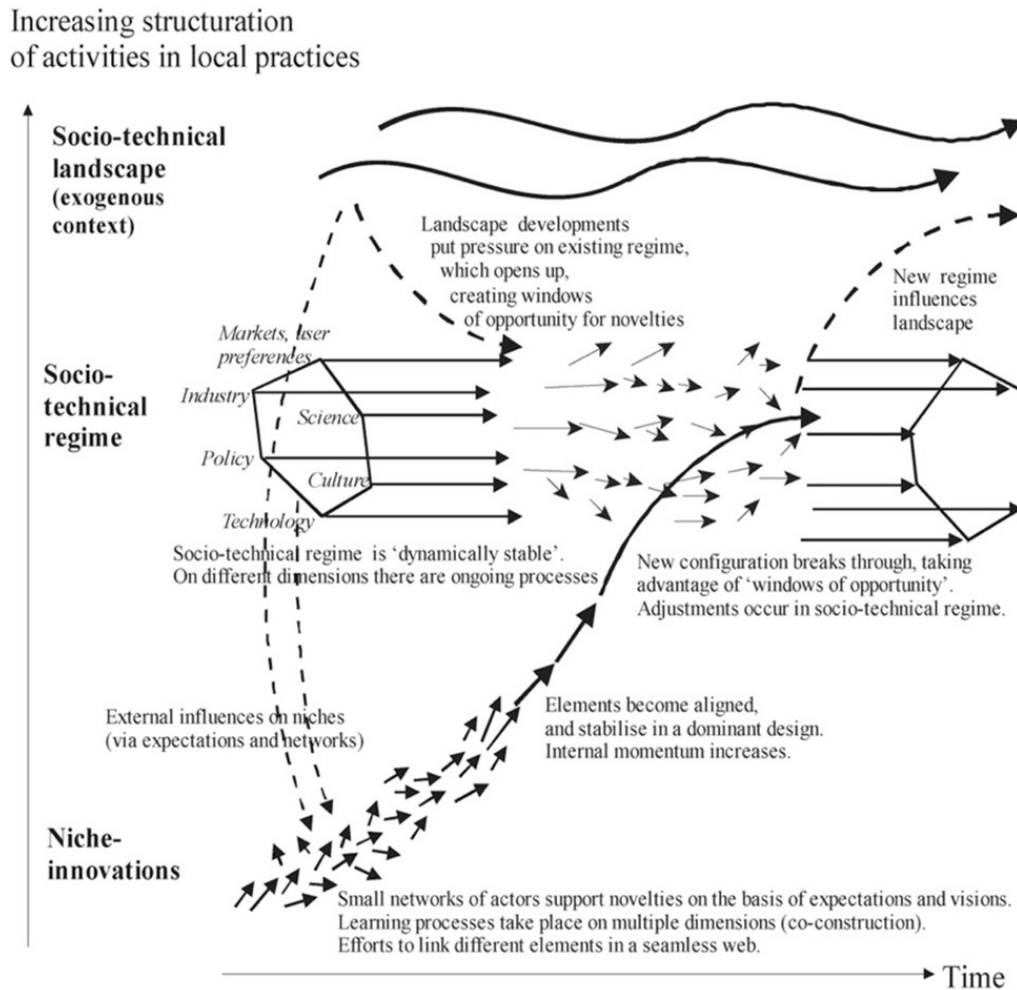


Figure 4: The Multi-Level Perspective on Transitions (Source: Geels and Schot (2007))

### 3.4. Questionnaire Structure

To maintain a balance between structure and flexibility in exploring the research questions, the interviews were conducted using a semi-structured, exploratory approach. This methodology allowed respondents to freely express their individual perspectives, impressions, and priorities within a clearly defined framework. The questionnaire was organized into five pre-formulated topical areas (see Table 3), which were shared with respondents several days ahead of the interview to allow for thoughtful preparation. The exploratory nature of this approach was designed to address the existing limitations in the researcher's knowledge and the scarce academic literature concerning metabolically engineered microbes as transformative societal technologies. It also provided the requisite flexibility to maintain an open perspective, facilitating the acquisition of new insights and the formulation of deeper probing questions.

### 3.5. Method of Analysis

The majority of interviews were conducted in English, although a few were carried out in German when interviewees felt more comfortable answering in their native language.

The interview recordings were transcribed using the web tool *Trint*<sup>3</sup>, and confidential company and personal information were anonymized. The transcripts may be provided upon request.

In the qualitative analysis, the thematic analysis method by Braun and Clarke (2012) was utilized. The MLP framework functioned as the overarching theoretical foundation, while specific themes and sub-themes emerged from the interview data, fitting within this framework for coding purposes. This approach, following Braun and Clarke (2012), enables the integration of both deductive and inductive reasoning. The ensuing flexibility allows for a systematic organization and assignment of themes and patterns throughout the interviews, thereby fostering the development of valuable insights within the structured context of the MLP framework while maintaining rigor and transparency. The analysis of the interviews was conducted in their respective spoken language using the analysis software *MAXQDA 2022*<sup>4</sup>.

<sup>3</sup> www.trint.com is a web-based transcription software that can automatically convert video and audio files into transcripts.

<sup>4</sup> MAXQDA 2022 is a software for computer-assisted qualitative data and text analysis.

**Table 2:** Interview Partner Selection (Source: Own illustration)

| No. | Function                                      | Organization Type  | Rationale for Inclusion  |
|-----|---|--|--|
| 1   | Management Consultant                         | Management Consultancy   | Works with the niche and the socio-technical regime; unique perspective on landscape pressure on regime; and interactions between niche and (industry) regime.   |
| 2   | Investment Manager                            | Venture Capitalist   | Works from the niche with several PF companies, has a short- and long-term view on drivers and challenges of potential niche development.  |
| 3   | Doctoral Student in Law, Consultant           | University: Faculty of Life Sciences: Food, Nutrition and Health; Faculty of Law and Economics | Works with the established regime on interactions with the niche, especially from a regulatory perspective.  |
| 4   | Scientist and Entrepreneur                    | Biotechnology Start-Up   | As a core niche actor, the expert offers a micro-level perspective on developing and commercializing innovations from PF.  |
| 5   | Policy Affairs Manager                        | Non-Governmental Organization  | Regularly collaborates with start-ups (niche), corporations, research institutions, and government bodies (socio-technical regime) to promote interactions.  |
| 6   | Scientific Director and Investment Director   | (Impact) Venture Capitalist  | Takes a short-term and long-term perspective on the challenges and drivers of the niche's potential development, grounded by a deep technical and economic understanding. Facilitates interactions between the niche and the established regime. |
| 7   | Professor of Communication Studies and Author | University: Department of Communication Studies  | Provides unique insights into the status, challenges, and opportunities faced by niche actors in communicating their vision to the regime; how the landscape pressures the socio-technical regime.   |
| 8   | Researcher and Consultant                     | Private and Independent Research Institute on Renewable Carbon and Bio-Based Materials         | Works with government institutions and industrial companies (socio-technical regime), start-ups and research and development (R&D) labs (niche); acts as observer and facilitator of multi-level interactions.                                   |

In accordance with the guidelines for thematic analysis provided by Braun and Clarke (2012) the first step after conducting and transcribing the interviews was to familiarize oneself with the data. This process entailed thoroughly reading and re-listening to the interviews, accompanied by note-taking on paper to highlight particularly insightful statements, patterns and commonalities across interviews.

In the following phase, an in-depth review of the theoretical foundations underlying the MLP framework was conducted. This review aimed to identify the drivers and barriers identified within the theory. In conjunction with this, both the recent updates to the framework and the foundational scientific research upon which the framework is based were examined. Notably, key literature from Kemp et al. (1998) and Geels and Schot (2007) provided significant insights. These explorations facilitated the creation of a deductive conceptual theme formation, which was used for the initial coding in the software.

Subsequently, bearing in mind the theoretical framework of the MLP and the derived codes, sub-themes were generated to which the identified categories could be assigned within the theoretical framework. This stage involved an iterative process of theme refinement, during which themes were discarded, added, merged, subdivided, or renamed as they emerged, ensuring a comprehensive and robust analysis under constant reflection with regard to conciseness and relation to the question. The final coding can be found in Appendix B.

#### 4. Results

By their very nature, explanations of socio-technological transition reflect the interrelation and complexity of the dynamics within the conceptual levels. In order to account for this complexity and simultaneously present structured analysis findings, the following chapters are formulated around

**Table 3:** Brief Interview Guideline (Source: Own Illustration)

| No. | Subject   | Rationale   |
|-----|---|---|
| 1   | Diving deeper into the expert's background and touchpoints with bioeconomy and PF | Discovering further information and touchpoints with the research question that are not publicly available.   |
| 2   | Vision of a realized bioeconomy   | Gaining insights into the interviewee's unique perspective on the vision of a bioeconomy; the role PF may play in it; opinion on the feasibility of a transition and the status quo.  |
| 3   | Mapping challenges and obstacles of PF  | Exploring the obstacles and challenges that are concretely relevant to the domain of the expert or from the perspective of the expert for a widespread adoption of PF, i.e., the challenges faced by the niche when attempting to (broadly) participate in the socio-technical regime.                |
| 4   | Mapping catalysts and facilitators of PF  | Exploring the catalysts and facilitators the expert perceives concretely in their domain or from their expert or from the perspective of the expert for a widespread adoption of PF, i.e. (potential) dynamics that spur the niche-actors to strengthen their position in the socio-technical regime. |
| 5   | Deriving an action plan   | Initiating a constructive discussion on the possible actions that influential actors in the EU can implement to accelerate the transition to a bioeconomy by driving the adoption of PF.  |

the three core processes of a socio-technical transition according to (Geels & Schot, 2007): (i) niche accumulation, (ii) landscape-level pressure on the regime, and (iii) destabilization of the regime. These processes are supplemented with barriers and drivers delineated by (Geels, 2002), which build upon the foundational research in strategic niche management by (Kemp et al., 1998) and the challenges of niche-regime interactions due to lock-in effects, as described by (Unruh, 2000).

The interviews reveal that the niche mainly consists of start-up companies conducting their own R&D and striving to commercialize their technology. Universities and research institutions also play a role, but often there is a lack of practical transfer. Occasionally, large corporations also initiate and establish business units that can be associated with the niche. However, the majority form part of the socio-technological regime that maintains current industrial structures and responds to existing market and user preferences, while simultaneously shaping them.

Furthermore, in the case of PF, the regulatory, political, and legal dimensions emerge as one of the key actors in the socio-technical regime. The European Commission (EC), along with the regulatory body and governments of individual nations, set the stage for innovation, approval, and market distortions. They are all subject to the changes and influences on the landscape, which in the context of PF adoption, particularly manifest when they threaten the current structures and norms of the regulators and industry, as well as influence market and user preferences.

Section 4.1 of the results focuses on niche progression in terms of (i) niche accumulation. It discusses the drivers of this accumulation, including learning effects, improvements in cost-efficiency, and the involvement of influential stakeholders such as venture capitalists, corporate venture capitalists, partnerships between incumbent companies and niche players, and new business units dedicated to the niche. Concurrently, it explores barriers, as per Kemp et al. (1998) and Geels (2005), such as technological challenges, infrastructural gaps, and difficulties in integrating relevant factors into a cohesive European entrepreneurial ecosystem.

Section 4.2 delves deeper into the challenges faced by the niche when interacting with the socio-technical regime. It explores the impact of regulatory frameworks, cultural and psychological factors, price lock-in, mismatches and other external impediments to niche growth.

Section 4.3 turns its attention to how landscape shifts – both long-term sustainability issues and short-term factors like the need for resilient supply chains in light of pandemics, European military conflicts, and escalating geopolitical tensions – exert additional pressure on the existing socio-technical regime. Consequently, parts of the previously closed regime, discussed in 4.2, begin to open up, offering opportunities for the niche.

Thus, the structure of the results section uses the concepts and dynamics of a technology camouflage of the MLP framework to describe drivers and barriers. At the same time, however, it is not intended to present the entire framework or the concrete processes, but rather to use them to help an-



swer the research question, namely the question of the most influential drivers and barriers on the path to PF. According to the methodology and the research question, not every actual driver and barrier is named or described in detail. Only a selected part emerges from the interviews, but at the same time one or more of the experts consider them to be the most relevant.

#### 4.1. Niche-Accumulation

Geels and Schot (2007) propose a theoretical model where niche accumulation gains momentum through three key components: learning processes, improvements in the price-to-performance ratio, and the involvement of influential entities supporting the process. In the case of PF adoption, these processes turn out to be interlinked: Technological advancements are notably driving improvements in the price-performance ratio in research and development, and in scaling up processes. These enhancements raise the likelihood of successful penetration into new niches. Consequently, this progress piques the interest of influential stakeholders, including investors and established industry players. Such entities, anticipating transformative shifts or eyeing new market entry, are inclined to invest further in research and development to align the technology more closely with market demands.

The interplay of these factors has so far contributed to significant progress in the realization of envisioned applications of the technology, so that a variety of novel processes have been presented and tested at lab-scale. At the same time, the interviews reveal that although significant strides have been made, there is still much ground to cover to overcome niche internal barriers to close the gap between lab-scale research and commercialization, manifested in the need for further scientific knowledge, funding and entrepreneurial talent, and availability of fermentation capacity and feedstocks.

##### 4.1.1. Learning Curve Effects in Technology and Commerce

###### *Driver I: DBTL-Acceleration Driving Innovation Capabilities*

Based on the interviews conducted, it's evident that significant strides in synthetic biology have greatly driven the advancement and commercial viability of PF technology. As described in Chapter 2.2, the progression of PF is intrinsically tied to the enhancements in synthetic biology and biomanufacturing, which have made it possible to scale these synthetic biology processes industrially. The resources, speed, and capabilities required for the initial processing and optimization of strains within the DBTL cycle heavily depend on the knowledge available and the performance of the tools at hand.

The interviews identified four central technological advancements contributing to the niche accumulation we see today:

1. the continued improvement of synthetic biology tools (Expert 1, Pos. 7, Expert 4, Pos. 5);
2. the standardization and operationalization of these tools, extending their use beyond the initial inventors (Expert 1, Pos. 13);
3. a deeper understanding of the refinements necessary for process scaling (Expert 2, Pos. 11; Expert 4, Pos. 5);
4. the development of cost-effective strategies for R&D, upstream and downstream processing (Expert 2, Pos. 11; Expert 4, Pos. 5; Expert 8, Pos. 25).

The impact of these technological advancements has broadened the technology's applicability, enabling more individuals to conduct an increasing number of experiments with less resource requirement. This advancement has also multiplied the possibilities of strain optimization, increasing the speed and effectiveness of experiments.

These technological advancements enabled a wide array of research initiatives undertaken by universities, start-ups, and industrial research departments. The progress achieved through these projects underscores the potential of medium-scale biomanufacturing, drawing attention to the trajectory of this technology within its niche. This trajectory is attracting an increasing number of entrepreneurs, scientists, investors, and members from established industry regimes. (Expert 2, Pos. 33; 39) They anticipate that the ongoing improvements in these areas will continue to propel PF forward, extending its range of applications (Expert 2, Pos. 19). As such, the interviews make it clear that this expanding technological trajectory, now accessible to a broader audience, is a major driver of niche accumulation and is expected to remain so in the future.

###### *Driver II: Entrepreneurs Evolving Through Commercial Acumen*

For the commercialization of the technological advances, it is crucial to recognize that the development of business acumen by entrepreneurs in the niche is essential. Even when windows of opportunity arise through landscape changes, as described in the forthcoming chapters, it does not mean that niche technology simply falls into place. Niche actors must a) be technologically capable, and b) recognize the possibility of seizing those windows. This overlaps with the core ideas of strategic niche management, in which it is asserted that markets do not merely exist but are actively created and shaped by the strategic actions of niche actors, reflecting their visions, learning processes, and networks (Kemp et al., 1998).

Taking the example of *LanzaTech*, Expert 8 (Pos. 25) describes how the company initially struggled against the price lock-in (Chapter 4.2.3) of the commodity markets for fuels and plastics. Only after the predominantly scientific team hired a commercial executive did they expand their focus to markets where the CO<sub>2</sub> recycled ethanol from PF already found acceptance today due to its sustainability aspects, despite a price premium. (Expert 8, Pos. 25). They then began collaborating with Unilever, L'Oreal, and other direct-to-consumer brands whose customers were willing to pay

the necessary price premium for perceived increased environmental friendliness (Expert 8, Pos. 25).

Furthermore, Expert 4 describes how niche actors have learned to navigate the challenges of internal resistance within established companies when introducing innovative products that could potentially cannibalize existing business (Expert 4, Pos. 29). They have found success in partnering with companies without current market access that can benefit from the niche actor's technology to enter new markets (Expert 4, Pos. 29). The windows of opportunity that therefore potentially open for niche entrepreneurs are discussed in Chapter 4.3.1.

Niche actors have recognized the importance of conducting market research early on and identifying the parameters for the product that will break the market (Expert 4, Pos. 5). They have also learned to choose markets with fast innovation cycles, enabling them to gain credibility and scale quickly (Expert 4, Pos. 5). Additionally, niche actors have focused on selecting product classes with sufficient knowledge, interest, and product-market fit from the outset (Expert 4, Pos. 5). All this contributes to the fact that niche technologies manage to conquer markets and thus drives niche accumulation, and ultimately the adoption of PF.

#### *Barrier I: Technological Limitations*

However, PFs have only been able to establish themselves in a few very high-priced niches that entered because they solved problems internal to the established regime (Expert 2, Pos. 33). Although technological advancements are recognized as one of the primary drivers of the niche, the interviews also underscore that the current limitations of the technology represent significant barriers to further penetration of the niche into additional markets.

As Expert 2 (Pos. 23) emphasizes, performance on the TRY indicators is key for economic viability. For this, further optimization of the price-performance metrics of the large-scale production processes is necessary in many niches, the implementation of which is primarily hindered by previously impossible strain optimization along process scale-up.

Currently, the implementation of these improvements is largely hindered by insufficient strain optimization, largely due to a lack of understanding of the causal relationships between specific genetic mutations and their effects on yields (Expert 1, Pos. 7). The vast number of potential permutations of genetic modifications adds to this complexity, making it challenging to identify combinations leading to optimal results (Expert 1, Pos. 9) and translating progress in the lab into larger scales (Expert 8, Pos. 11).

The large-scale production mainly utilizes a few well-studied, 'brute-force' legacy strains (Expert 6, Pos. 11), whose optimization potential has largely been exhausted (Expert 2, Pos. 11). However, expanding to other organisms is also faced by several challenges, as genetic tooling for non-model organisms, such as fungi and algae, is a slow process that can take 5-10 years (Expert 1, Pos. 7). And even when a novel organism has been prepared for the first

large-scale productions, these often do not take place because the Contract Manufacturing Organizations (CMOs) to which start-ups outsource their fermentations are not used to them, or they have not yet gained the trust of authorities or customers (Expert 4, Pos. 5).

#### 4.1.2. Driver III: Ecosystem Emergence Around the Niche

As detailed in the preceding chapter, technological advancements have increasingly brought potential applications into focus. This enhanced visibility has piqued the interest of venture capitalists and well-established industry players, identifiable in the MLP as the involvement of influential actors (Geels, 2002). These entities now engage with the niche, aiming to participate in the potential commercial success and threat to current value chains it represents. In addition to their vested interest, they offer essential support to the niche through financing, infrastructure and distribution networks, and a comprehensive understanding of the market dynamics to niche actors.

#### *Venture Capitalists*

VC involvement is a critical driver contributing to niche accumulation at multiple levels (Expert 2, Pos. 19; Expert 5, Pos. 28; Expert 6, Pos. 19). Through their early-stage, high-risk investments in start-ups, VCs help bridge the gap between basic research and commercialization by providing the funding and support necessary in hope to turn scientific discoveries into viable and scalable businesses (Expert 2, Pos. 19).

By nature, VCs focus on funding promising young companies that display high growth potential and a chance to become important players within the industry regime, motivated by securing substantial returns on their investments. Therefore, their contribution to niche momentum extends beyond financial support, as such investments form well-established VC funds have significant signaling effects on the potential trajectory of PF to actors outside the regime – especially in the case of PF where the experts highlight that the total invested capital increases, and the number of funds interested in the application of the technology grows (Expert 2, Pos. 21; Expert 5, Pos. 28). This is further accelerated by the trend of increased VC investor awareness regarding sustainability metrics (Expert 6, Pos. 19; Expert 4, Pos. 7). This validation attracts further young scientists and entrepreneurs to explore venture building opportunities in the space (Expert 2, Pos. 19).

Furthermore, the intersection of biology and information systems has further broadened the investor pool, attracting those beyond traditional industry boundaries as showcased by the entrepreneurial journey of Expert 4 (Pos. 3), whose start-up emerged from an artificial intelligence venture studio<sup>5</sup>.

<sup>5</sup> A venture studio is a company that systemically builds start-ups by incubating own ideas (Blank, 2022).

### Corporate Engagement

Additionally, the involvement of established companies from the industry regime drives niche accumulation through joint ventures, product collaborations, investments via Corporate Venture Capital (CVC) (Expert 5, Pos. 46), or the creation of their own R&D units focused on PF. The participation of the established regime actors enables the niche access to market understanding, infrastructure, resources, and distribution structures that were previously not as accessible. This interaction not only increases the visibility and legitimacy of the niche but also enhances its capacity to penetrate and transform the prevailing socio-technical regime.

An example of how established companies proactively anticipate and facilitate change within their value streams is the German company *InFamily Foods Holding GmbH & Co. KG*. Following the 2020 merger of two traditional German butchers, *H. & E. Reinert Westfälische Privat-Fleischerei GmbH* (founded 1931) and *H. Kemper GmbH & Co. KG* (founded 1888), the company has restructured its operations. It now sees a future for protein production based on three pillars, incorporated in three subsidiaries: conventional animal production (*The Family Butchers GmbH*), plant-based imitates of animal protein sources (*The Plantly Butchers GmbH*), and cellular precision agriculture including PF (*The Cultivated B GmbH*) (Expert 5, Pos. 46; *InFamily Foods (n.d.)*).

In this context, it is evident that some incumbent companies have started to counterbalance the incremental innovation of the entrenched socio-technical regime by fostering niches. This action signifies a degree of openness towards the niche, and consequently towards alternatives to the patterns of the established regime. Nevertheless, the interviews revealed a number of barriers within the EU entrepreneurial ecosystem that contribute to the fact that niche innovations often fail to make the leap to commercialization.

#### 4.1.3. Market Transition Hurdles for Niche Innovations

Despite the strong momentum in the niche, only a fraction of laboratory innovations makes their way into commercial applications. The barriers to this transition are numerous: beginning with the challenge of bridging the gap between research and practice, niche actors striving to translate their technology into a market-ready state encounter obstacles related to financing, availability of infrastructure, product approval processes, and the difficulty of achieving a suitable product-market fit.

#### *Barrier II: Lack of Guidance in Spinning-Out University Research*

Expert 1 (Pos. 17) underlines the lack of entrepreneurial mandates of many universities within the EU. Many research institutions within the EU conduct relevant research that could advance the technology trajectory of PF and increase market viability, but with few exceptions, they have no relation to the transfer of this into practice. Expert 6 (Pos. 15)

and Expert 4 (Pos. 41) share the same opinion and praise the research efforts of the EU, but equally point out that those laboratory innovations are not shown a way into application.

Furthermore, it is shown that even if technology ventures into the niche in the form of a spin-out<sup>6</sup>, scaling up PF technologies and building infrastructure requires operational and manufacturing expertise, which is often not found in young university founders (Expert 6, Pos. 15). This results in a further reason PF start-ups may struggle to close the gap between initial research and commercial application.

#### *The Valley of Death<sup>7</sup> on the Horizon*

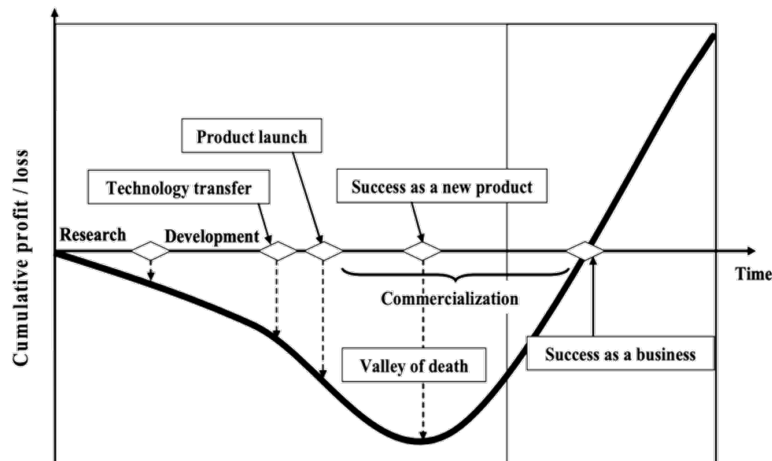
However, actual lack of guidance in value creation is not a problem exclusive to university founder. Expert 5 describes the current situation of entrepreneurial niche players, especially start-ups that are dependent on VCs backing, run the risk of sinking into the so-called *Valley of Death* in the current market environment, i.e., failing as a result of failing to successfully commercialize (Expert 5, Pos. 34; see Figure 5).

The threat of a fall into the *Valley of Death* for entrepreneurial niche players is an interplay of several unfavorable factors, and differs slightly from start-up to start-up by segment and product type:

- a) A significant proportion of start-ups struggle with the limitations inherent in optimizing traditional strains and incorporating novel strains when scaling up their fermentation process (as detailed in 4.1.1).
- b) Many start-ups face a volatile investment environment, reliance on US investors, and a conservative stance from EU investors when attempting to secure follow-on investments for the scaling and commercialization of their technology (as discussed in 4.1.2).
- c) Those start-ups focused on designing specialty molecules to solve existing material and chemical manufacturing issues often miss the mark in terms of product-market fit. They struggle to identify the real pain points of their potential customers, which could guide their resource use (as outlined in 4.1.2).
- d) Companies using PF to produce novel foods have to navigate a costly, and uncertain approval process in the EU before they can market their product. So far, no company has successfully received approval for a novel food produced by PF in the EU (as described in 4.2.1).
- e) Particularly for companies aiming at large-scale production, such as those in the food, chemicals, and ma-

<sup>6</sup> A spin-out is a newly founded company that is co-founded by a university or research laboratory, which owns the licensed technology and applies it to the market with the aim to leverage available academic knowledge for commercialization (Clarysse et al., 2011).

<sup>7</sup> The Valley of Death is a metaphor used to describe the gap that exists between the research and development of new technologies or products, and their successful commercialization or implementation (Auerswald & Branscomb, 2003).



**Figure 5:** The Failure of Start-Ups Due to Inadequate Value Creation from their First Products is often referred to as the 'Valley of Death' (Source: Osawa and Miyazaki (2006))

materials sectors, there is a perceived lack of sufficient fermentation capacity to carry out their production within the EU (explained further in 4.1.2).

The interrelationships between the factors that lead to commercialization challenges and thus to the potential demise of PF start-ups in the EU differ from company to company but are often intertwined. Start-ups whose product approval is uncertain or who do not know which use case to put their current and future resources into are also more difficult to obtain funding in an already volatile investment environment. Start-ups that do not receive funding also do not find opportunities to expand their technical and infrastructural capabilities.

#### *Barrier III: Lack of Commercial Insights to Create Value from Technological Novelty*

Expert 4 describes the difficulties he and his peers, other biotechnology entrepreneurs, face when trying to develop suitable products with potential customers from large corporate chemistry: Many of these customers cannot or will not disclose their problems.

*"[one would think], the question [...]: 'Hey, have you got any problems that I can help you solve [...]'? would be a pretty open-ended question and that you get answers pretty quickly. It's probably one of the worst questions you can ask in innovation because those problems are almost more valuable than potential solutions. [The potential industry customers], they know the problems that their end customers have and they're trying to solve them with their internal technology and that information is more valuable than anything else. Because again, the main problem of biotech companies [...] seems to be they're trying to solve problems, but they don't have good access to the prob-*

*lems because they don't have the market positioning" (Expert 4, Pos. 29).*

Expert 1 (Pos. 17) confirms this problem, telling from his consulting work with some of the largest material corporations in the world: *"there's a big knowledge gap. Obviously, industries and big players, they keep the secrets about their formulations, they don't reveal everything. And so [...] as a start-up, [you] don't actually know what's the pain point."*

The viewpoints of the entrepreneur operating within the niche and the strategy consultant working with large corporations provide intriguing perspectives on a shared issue: A communication gap exists between major customers attempting to address regime intrinsic problems and niche actors seeking guidance to identify pain-points and establish product-market fit. This gap constitutes a barrier to the adoption of PF as it curtails the niche's momentum and preserves the socio-technical regime.

#### *Barrier IV: Volatile Funding Environment*

As touched upon earlier in the discussion of factors contributing to a potential valley of death for PF start-ups, several experts interviewed make it clear that the VC funding environment is difficult to secure for subsequent investment rounds (Expert 4, Pos. 41; Expert 6, Pos. 15). These investments, typically a Series A round, are characterized by capital to be used for market entry. As the listed difficulties show, many start-ups are not clear on how to venture to commercialize their technology and thus enter the market (Expert 1, Pos. 17).

Raising a follow-on investment round generally appears to be more difficult for VC funds within the EU due to their reputation for being more risk-averse than their U.S. counterparts (Expert 4, Pos. 41; Expert 6, Pos. 15). This creates a dependence on U.S. investors among European companies, whose presence can never be relied upon due to exogenous



factors (Expert 4, Pos. 41). Moreover, economic volatility exacerbates these financing problems, as Expert 6 (Pos. 15) points out. EU Investors' risk aversion will become all the more relevant, especially in the coming sub-chapter with regard to financing fermentation plants.

#### *Barrier V: Lack of Infrastructure for Commercial Scaling*

The lack of availability of fermentation capacity, particularly in the form of bioreactors for production beyond the lab-scale, is further contributing to this bundle of challenges (Expert 1, Pos. 7; Expert 5, Pos. 32; Expert 8, Pos. 31). Start-ups, primarily those pre-revenue and backed by venture capital, oftentimes lack the financial means to build their own capacity for large-scale fermentation. Simultaneously, the experts raise the concern about the lack of CMOs within the EU to facilitate large-scale production for these start-ups (Expert 6, Expert 2, Source).

This infrastructure bottleneck hinders start-ups, particularly those that a) lack their own fermentation facilities and b) need to achieve economies of scale to compete with inexpensive commodity products (Expert 8, Pos. 25). Having no fermentation capacity available prevents them from replicating lab results at larger scales, illustrated by the experiences of start-ups producing staple foods or chemicals for fuels and plastics using PF (Expert 6, Pos. 5; Expert 8, Pos. 11; Expert 1, Pos. 9). On the other hand, Expert 4, who operates in the premium cosmetic ingredients sector, does not view this as an immediate concern but recognizes the limitations imposed by CMOs regarding the use of specific strains (Pos. 5).

Securing financing for such infrastructural investments presents a significant challenge as neither equity investors nor lenders are ready to provide capital. Experts 1 (Pos. 7), 2 (Pos. 7), 4 (Pos. 23), and 5 (Pos. 34) clarify that neither VCs nor traditional banking institutions are eager to bear the risk associated with financing a fermentation plant (Source). For VCs, the investment required, often in the high million Euro range, far exceeds their typical investment thresholds. Banks, on the other hand, view the risk of financing infrastructures for start-ups as carrying an unacceptably high risk of default.

As a result, many start-ups remain trapped in the lab-scale test phases of their strain optimization processes, unable to either refine their production processes or demonstrate their potential to prospective partners and customers (Expert 1, Pos. 7). Expert 1 (Pos. 9) provides an apt illustration of this issue, noting,

*„So, a lot of, let's say, the good ideas of start-ups, they don't even make it to commercial scale. And then if they make it, if they have proven it, then basically a big international player still can't do anything with them because there's no manufacturing capacity available[...].”*

The infrastructure and financing gap outlined above thus poses significant challenges that need to be overcome to en-

able these start-ups to produce on a large scale, slows down niches from expanding and professionalizing, and thus poses a barrier to niche accumulation and thus adoption of precision fermentation, especially in the commodity manufacturing sector.

#### 4.2. Ways of Regime Lock-In – Barriers to Niche Momentum

After examining niche internal drivers and barriers in 4.1, this chapter focuses exclusively on the barriers that cause niche impulses to fail at the gates of the established regime.

##### 4.2.1. Barrier VI: Regulatory Framework for Novel Foods<sup>8</sup>

The regulatory framework in the EU, as well as the decision-making structure, is a hurdle frequently mentioned by the experts for the market entry of novel foods from PF (Expert 2, Pos. 13; Expert 3, Pos. 21; Expert 5, Pos. 34; Expert 6, Pos. 29). These barriers are characterized by the duration, complexity, and lack of guidance in the approval process for novel foods, the uncertainty surrounding final authorization outcomes, and coordination challenges among EU Decision-making institutions.

The European Food Safety Authority (EFSA) has been identified as a key player in the slow and inefficient authorization processes for novel foods using PF technologies, embedded in the bureaucratic and unpredictable construct of the EC (Expert 2, Pos. 13; Expert 3, Pos. 21). The approval process usually takes around two years. However, the actual duration can differ significantly depending on the level of detail required, additional data requests, and the bureaucracy surrounding the EFSA's guidelines and decision-making procedures (Expert 3, Pos. 21). Furthermore, the EFSA's divergence from its guidelines has created regulatory uncertainty, complicating the regulatory landscape for PF companies (Expert 3, Pos. 21).

The uncertainty surrounding the appropriate regulatory classification of PF products has added to the challenges faced by companies in this sector (Expert 3, Pos. 27). PF companies trying to enter the EU market have chosen to register their products as Novel Foods or as foods containing genetically modified organisms (GMO)<sup>9</sup>. Expert 3 (Pos. 27), a legal scholar surveying these processes, cannot say either which process should be the preferred choice of niche actors; the EU does not provide any guidelines, and so far none of the companies has successfully obtained approval. This ambiguity and lack of guidance leads to uncertainty, high

<sup>8</sup> A novel food is defined as a food that had not been consumed to a significant degree by humans in the EU before 15 May 1997. This can include foods that are newly developed, innovative food, food produced using new technologies and production processes, as well as food which is or has been traditionally consumed outside the EU. (European Commission, n.d.-b)

<sup>9</sup> Metabolically engineered microbes fall under GMOs in the EU because their genetic material has been actively modified. Products made from GMOs or produced by GMOs, as in the case of PF, are labeled as “genetically modified (GM) food or feed”. They cannot be marketed in the EU without approval. (European Commission, n.d.-a)

costs, and lengthy approval processes, making market entry success slower and less likely (Expert 3, Pos. 27).

The complex decision-making structure of the EU entails coordination among multiple director generals and significant bureaucracy (Expert 3, Pos. 54, 55, 57). This bureaucratic structure impedes the progression of legislative proposals related to the sustainable food system package that could potentially benefit the PF industry (Expert 3, Pos. 31).

Despite the EU's aim to maintain both high consumer protection levels and foster innovation, striking the right balance has proven difficult (Expert 3, Pos. 55). Seeking the approval of the Commission and a majority of member states, even after products have been deemed safe by the EFSA, lends an added layer of uncertainty to the process (Expert 5, Pos. 34). Political landscapes further influence the final authorization outcomes (Expert 5, Pos. 34).

Given these regulatory challenges, start-ups in the PF sector have expressed concerns about operating within the EU (Expert 5, Pos. 34). The lengthy, bureaucratic, and uncertain approval process has led companies to consider other jurisdictions, such as the USA and Singapore, where regulatory environments are perceived as more supportive and efficient (Expert 5, Pos. 34). Consequently, investors are more likely to fund companies targeting markets with streamlined approval processes (Expert 5, Pos. 34).

Expert perspectives highlight that the present configuration of the EFSA and the broader framework of regulatory decisions at the EC level pose substantial barriers to market entry for niche food products in the EU. There is further concern about the potential exodus of companies, talent, and investors to foreign markets where these entities receive active government funding, regulatory guidance, and support for market entry (Expert 5, Pos. 34).

#### 4.2.2. Barrier VII: Psychological and Cultural Factors

Even products are able to enter the market, the question after acceptance by decision-makers and consumers remains. The experts point out that the PF technology and products have received little attention so far. When decision-makers and consumers are confronted with them, there is skepticism about the use of genetic engineering.

#### *Negative Perception of Genetically Modified Organisms*

Negative perception and public distrust in GMOs were identified as a driver against consumer adoption of genetically modified products (Experts 1, 2, 3 & 7). Expert 1 (Pos. 15) and Expert 2 (Pos. 13) indicate that the public misunderstands GMO products, especially when they are presented in food products. GMOs that are used regularly for medicine, are "demonized" by media, and this is harmful to mostly unproblematic products.

Politicians reflect the negative perception of GMOs, as they are refusing to pass bills on the topic. According to Expert 3, Germany, for instance, chooses to abstain from voting when discussed in the European Commission. Germany's

role may lead to the abstinence of other countries as well (Expert 3, Pos. 61).

Experts acknowledge that concerns regarding safety and the use of GMOs are fundamentally valid, demonstrating an understanding for possible apprehensions among individuals unfamiliar with the topic (Expert 7, Pos. 50). However, the extent to which these questioning transitions into excessive polemics and becomes a tool for groups aiming to disadvantage PF in favor of established processes, could pose a barrier to the establishment of an objective debate. This could further impede the advancement of PF products at both consumer and governmental levels in the food sector. (Expert 7, Pos. 50) This barrier is particularly relevant in the context of novel foods derived from PF, since, for instance, established food-technical products such as rennet, pharmaceutical products like insulin from PF, ethanol from PF, or human-skin identical collagen from PF face no significant consumer rejection or concerns. (Expert 2, Pos. 13; Expert 4; Pos. 9)

#### *Cultural Aspects*

Expert 3 underscores potential socio-political barriers to the advancement of foods produced through precision fermentation, citing Italy and France as representative cases (Pos. 57). Both countries symbolize societies deeply intertwined with their cultural heritage and identity through food and its origins. Experts 3 (Pos. 57) and 5 (Pos. 34) describe how Italy's government recently preemptively prohibited the marketing of cell-cultured meat, a product belonging to the cellular agriculture sector, allegedly to safeguard traditional food production and the agricultural sector.

Even if the ultimate products sold to consumers share the same molecular structure, Expert 5 emphasizes (Pos. 40) that the method of production plays a significant role:

"The milk does not come from the cow. That is already the problem. [translated]".

As nations heavily rooted in agriculture, most EU countries maintain a different relationship with the agricultural sector compared to import nations like Singapore and Israel, which are further advanced in the authorization of PF products (Expert 5, Pos. 40).

A shift toward food from bioreactors may be perceived as unsolidary with small-scale farmers. A fallacy, according to Expert 7 (Pos. 64), a Professor of Communication Studies specializing in agricultural systems, comparing the developments in the EU to observations from the US. Consumers tend to avoid confronting the origins of their animal proteins to avoid cognitive dissonance related to animal suffering in large-scale factory farming entities from enterprises, preferring a "romantic vision" of the agricultural sector outlined as follows (Expert 7, Pos. 64):

„[Consumers] prefer [...] to construct this narrative in their head [...] of this lovely little farm where they're happy cows. And so, I think that that is used by the incumbent industry, too, as a form of protectionism to say: '[...] anybody who's criticiz-

ing [...] dairy is criticizing your neighbor. You're [...] good small scale local farmer.“; and points out, “When really the biggest enemy to the small scale local daily dairy farmer for the last 30, 50 years has been large scale animal food production. [...]”

As briefly mentioned in the preceding subsection, despite the EFSA's approval, the nations of the EU retain the power to vote on final market approval (Expert 5, Pos. 34). Concluding, the experts indicate that the ultimate market entry of novel foods derived from PF may still face socio-political resistance, regardless of verified safety and EE increases. Consequently, the decision to deny market entry to PF-derived products, influenced by misleading narratives about the agricultural sector as suggested by Experts 5 (Pos. 34; 38) and 7 (Pos. 50), represents a potential barrier.

#### Lack of Awareness

However, even when the products do reach the market, it is not clear how consumers will react. As described by Expert 7, who conducted expert studies on the question of consumer acceptance of PF-derived dairy products, products are still in a “pre-pre-consumer acceptance”, even “pre-consumer understanding” phase (Pos. 48). A clear lack of awareness around the technology, its benefits, but also the presence of the problems it solves (e.g., lack of media coverage around agriculture's contribution to climate change (Expert 5, Pos. 40)) could lead to a lack of demand when entering the market, which would be an example of how the niche fails due to the market and user preferences of the established sociologist-technical regime.

This challenge extends beyond the food sector, touching other industries that interact with consumers. According to Expert 8 (Pos. 19), a large proportion of consumers lack the educational background required to comprehend complex issues related to chemistry, sustainability, and material performance. In combination with a lack of awareness around PF as a technology, this knowledge deficit leads to limited demand for PF-derived products.

The experts primarily criticize that despite the ambitions of establishing a bioeconomy within the EU, communication from politicians regarding measures to achieve this goal remains restrained (Expert 1, Pos. 17; Expert 5, Pos. 56). The use of industrial biotechnology as a potential climate technology receives disproportionately little attention compared to the contribution it can make to climate protection, especially when comparing it to political narratives surrounding other climate technologies, such as electric vehicles and alternative heating systems (Expert 1, Pos. 17).

As revealed from the interviews, one of the most significant barriers to the adoption of PF within the EU is the acceptance of products derived from this technology. Primarily, there's a lack of awareness about the technology's existence and potential, as well as an underestimation of the magnitude of the problems it aims to solve. There is currently no

prevailing narrative highlighting how PF could contribute to solving environmental challenges and opening economic opportunities. Moreover, misunderstandings and uncertainties regarding the use of GMOs could lead to failures at critical points, such as obtaining final approval for novel foods from the European National Council, and more broadly, gaining consumer acceptance. If consumers fail to understand the benefits of PF products, they are unlikely to prefer and pay for them, a topic that is further explored in the following chapter.

#### 4.2.3. Barrier VII: Price Lock-In

A *price lock-in* refers to a scenario where incumbent technologies persist due to their infrastructural, institutional, and economic advantages. Conversely, new, potentially more efficient, or sustainable technologies may face hurdles to gain market acceptance due to the price benefits of these established technologies (Geels, 2005; Unruh, 2000).

This scenario is particularly applicable to PF products in the commodity sector where they compete from a price-performance perspective with their traditional counterparts. While high-priced specialty molecules, like insulin, are almost entirely derived from PF, commodity molecules from PF often fail as they are too expensive to compete effectively (Expert 8, Pos. 25; Expert 4, Pos. 5). An additional cost for environmental benefits in the form of a green premium lacks willingness-to-pay on the market side as Expert 1 (Pos. 7; also, Expert 4, Pos 9) explains:

„[Molecules from PF] compete against chemistry [...] that has been optimized for scale and speed for decades or nearly a century. So, it's very tough to get to cost-parity. And [you can] rely on the green premium. So, you charge, let's say, 10%, 20 % or 100% more in terms of price to make up for the higher production costs. However, obviously, who's paying that as a downstream customer, if you still have the other option available, even if it is petrol chemistry based?“

The experts note that these prices are significantly distorted. A contributing factor to the price lock-in is the skewed markets, especially in the agriculture sector and in the production of materials and fuels based on fossil fuels. Expert 5 (Pos. 52) criticizes the high level of subsidies in the agriculture sector, which ultimately benefits the selling prices of animal products. Expert 8 points out that the negative externalities of fossil fuel consumption are not adequately priced in, which further restricts the convergence of prices of material and fuel commodities from PF with their fossil-based counterparts Expert 8 (Pos. 39).

Hence, the phenomenon of price lock-in currently presents a barrier to the adoption of PF in commodity value chains of the EU economy, specifically in the sectors that are most significant for the transition to a bioeconomy.

#### 4.3. Landscape Changes Open Up ‘Windows of Opportunity’

For a careful analysis, it is important to separate changes on the landscape from the pressure they trigger and how this

translates into changes in the socio-technical regime. Consequently, the structure of this work will present fundamental pressure points as 'Regime Destabilizations' in distinct sub-chapters, followed by the identification of clear 'Windows of Opportunity' that manifest for the niche, following the conceptual framework proposed by Geels (2002).

#### 4.3.1. Driver IV: The Triple Planetary Crisis

The confluence of climate change, biodiversity loss, and pollution is driving a transformation in the socio-technical system. This shift exposes a series of potential windows of opportunity that innovative niches could tap into.

As the ecological and ethical consequences of contemporary production modalities become increasingly measurable and visible, a surge in scrutiny of these looming threats to planetary life in forthcoming decades is witnessed in both media and scholarly circles. This process is visible in media coverage and academic discourse, significantly advancing conversations about sustainability within societies of the European Union (Expert 1, Pos. 15; Expert 7; Pos. 60).

This movement, as per Expert 7, results in a "cultural discursive change" (Pos. 60), which subsequently shapes the objectives of influential organizations and stakeholders. In response, decision-makers and corporations within the EU recognize the need to recalibrate their operations towards sustainability (Expert 7, Pos. 60; Expert 1, Pos. 3).

This change also precipitates a shift in the environmental landscape, altering user and market preferences. The demand for products is increasingly tied to their perceived ecological sustainability (Expert 1, Pos. 15; Expert 7, Pos. 44; Expert 6, Pos. 19). This puts further pressure on manufacturing companies to adapt their value chain towards sustainability - and at the same time opens up opportunities for those who pay attention to it (Expert 1; Pos. 7).

#### *Window of Opportunity I: Sustainability as a Performance Criterion*

In light of landscape changes, incumbent businesses in the EU are now pressured to incorporate sustainability measures into their corporate strategies (Expert 6, Pos. 23; Expert 1, Pos. 3). Expert 1, as a strategy consultant, observes this particularly with companies whose business models are based on petrochemicals (fossil-based). He notices a strong demand for strategies on "how to get away from that" (Pos. 3). Expert 8 (Pos. 27) also emphasizes that a defossilization of the EU manufacturing sector is necessary to meet committed GHG reductions.

Consequently, companies based in the EU are pushing a range of sustainability initiatives (Expert 1, Pos. 3; Expert 6; Pos. 19). This shift opens up a window of opportunity for niche actors, especially for companies seeking to reduce negative environmental impact within their supply chains (Expert 1; Pos. 23). The challenge for many of these companies is balancing the economic imperatives of growth and profitability with implementing ecological sustainability, a windows of opportunity niche innovations could tap into and

trigger a paradigm shift, as Expert 1 (Pos. 3) describes from his experience consulting these companies on future strategies:

*„Precision fermentation is obviously one [...] of the key workhorses that allow [...] clients to switch to synthesize their products more sustainably“ (Expert 1, Pos. 3) as it would deliver the “[...] promise to break the trade-off between sustainability and profitability” (Expert 1, Pos. 15).*

As detailed in 4.1.1, it has become evident to a number of niche actors over recent years that their market entry strategies should be centered around consumer-driven, premium markets to leverage sustainability benefits despite a price premium (Expert 8; Pos. 25). Insights gathered from the diverse array of experts, including those from niche actors and incumbents, illustrate that the introduction of niche technologies, such as human-skin identical collagen in the cosmetics segment (see Expert 4), hinges on two intersecting dynamics. The first is the emergence of 'windows of opportunity' propelled by evolving user preferences and corporate aims in line with the shift towards sustainability (Expert 6, Pos. 19). The second element is the entrepreneurial acumen of PF niche actors, who, spurred by the developing dynamics, are proficient in capitalizing on these opportunities (see 4.1.1).

The potential for EE increases through the use of PF as a substitute for current production processes and ingredients paves the way for niche innovations to make successful market entries. This has been particularly effective in high-priced, consumer-centric markets where the advantage of EE and performance increase is evident, particularly when animal products are replaced with superior PF products (Expert 4, Pos. 7).

However, for commodities, it's challenging to justify the price premium needed in relation to the EE benefits. Here, experts see the need for regulators to provide additional support to these niches, a strategy which has proven effective, as detailed in the next chapter.

#### *Window of Opportunity II: Regulators Push*

The shift towards a stronger focus on sustainability at the landscape level is creating a multitude of windows of opportunity within the regulatory context. Policies have already been enacted to ban certain chemicals due to their toxicity, and the introduction of quotas is promoting demand of products from PF despite a price premium, as the example of biofuels shows. Legislators, as constituents of the current regulatory regime, are urged to craft policies within the manufacturing sector geared towards sustainability and environmental friendliness, and to tighten existing regulations. In response to these changes and in anticipation of further regulation, manufacturing companies are demonstrating an increased demand for products derived from PF.

Expert 8 (Pos. 25) describes how the introduction of regulations that impose sustainability criteria on products and



industries, with a focus on CO<sub>2</sub> emissions, toxicity, and environmental impact, has opened positive windows of opportunity for niche players. This expert predicts that this will continue as these regulations are planned to be tightened. The company *LanzaTech*, for example, has found significantly better buyers for its fuels from PF since the introduction of biofuel quotas (Pos. 25). This could result in the transition from research to commercialization appearing more approachable for niches, despite the regime's price lock-in, and could prompt these niches to invest more pointedly and securely in strain optimization R&D and production, thereby strongly boosting niche accumulation.

Expert 1 underlines this, describing further regulations in the form of increased taxes on environmentally unfriendly production processes or products, as well as the introduction of quotas and subsidies for their bio-based counterparts, as necessary measures to “*level the playing field from a price point of view*” (Pos. 9).

Expert 8 (Pos. 15; 17) anticipates that current legislation, which already offers windows of opportunity for PF products, will be supplemented, and further enhanced by additional beneficial laws. Expert 3 (Pos. 57; 67) confirms this, stating that the decision-makers in EFSA are slowly yielding to the pressure on the landscape, described as an increasing “noise” in the regulatory environment, noticeable through public discourse, including internet forums. This is amplified as the legislative bodies of other governments, such as Singapore, Israel, and the USA, are advancing much more rapidly (Expert 3, Pos. 27). Also, niche entrepreneurs are trying to exert pressure on regulators, attempting to influence at the political level (Expert 8, Pos. 25).

In addition to the described change in consumer preferences and already occurring regulations, Expert 4 (Pos. 11) describes that companies are already looking for products with sustainability-optimized life-cycle-assessments in anticipation of further regulations:

*“... [many large companies] now have their own teams focusing on GHG and with European regulation, they will be responsible for all those things. And that is changing now and wasn't relevant when we started but may be relevant in five years. [...] and I think regulation will push the other players in the same direction.”*

In conclusion, the changes on the landscape triggered by ecological crises associated with human production and consumption are a significant driving force of niche accumulation. They fracture existing structures in the socio-technical regime at multiple points, creating an intertwined dynamic that opens spaces for niches. Based on expert interviews, it is anticipated that these spaces will only continue to widen as the situation intensifies.

#### 4.3.2. Driver V: Need for Supply Chain Security & Diversification

The experts further describe that questions regarding food security for markets and populations are increasingly

gaining relevance, provoking a scrutiny of the current socio-technical regime, and thereby fostering the exploration of potential alternatives (Expert 1, Pos. 15; Expert 2, Pos. 3; Expert 6, Pos. 23).

This pressure is expressed through both non-governmental global organizations like the United Nations (UN) with its World Food Programme, and governmental institutions including the EU, who seek to establish a food system that can sustainably provide adequate nourishment for all the earth's inhabitants, considering the challenges of hunger crises and a growing global population. This objective is embodied in the second Sustainable Development Goal of the UN, which aims to boost the productivity of global food supply and secure its long-term basis (Expert 1, Pos. 15; Expert 2, Pos. 3).

In addition, the EU has experienced multiple disruptions to supply chains in recent years, notably due to the COVID-19 pandemic and the war in Ukraine, highlighting the fragility and dependency of businesses that source products from abroad. Expert 6 (Pos. 23) describes the response of the affected incumbents as follows:

*“Some of [EU manufacturing corporations] are in fact already looking to address it within their own supply chains. So, they are the ones asking for change because they are the ones realizing that, well, if all of my products contain sunflower oil and then there's a war in Ukraine, suddenly I have a big issue. So, I want to diversify where I'm getting my inputs from, and I want to make sure that that's a more resilient source.”*

This observation provides a clear indication of geopolitical developments now leading to destabilizations in the regime, resulting in a quest for reducing supply chain dependencies and striving for more resilient value chains (Expert 2, Pos. 3).

#### *Window of Opportunity III: Resilient Supply Chains & Independence*

Expert 6 uses the example of the war in Ukraine to describe the disruption of food manufacturers' supply chains in the EU, illustrating how this opened up new opportunities for his portfolio companies using PF for food production (Pos. 25):

*“So, some of the portfolio companies that we work with have had a good time during the Ukraine crisis, mostly because this was the first time that big food corporates actually opened up the ingredient list and actually started thinking about changing their recipe. Usually, they have a quite high bar for this. If all of a sudden price of sunflower and coconut oil goes up two or three times, then yes, now we can talk about, you know, a solution that might be able to replace these ingredients. So, for some of them, it creates opportunities [...]”*

This statement clearly suggests that established trade and thought patterns of the established industry regime are breaking up, and opportunities are arising that the niche, given sufficient momentum, can tap into. Particularly, the situation now opens up the possibility for start-ups to gain access to the pain points of incumbents, something that was previously denied to many due to ignorance of problems in processes and ingredients lists (Expert 4, Pos.29; c.f. 4.1.2).

Thus, exogenous factors such as geopolitical conflicts and other unforeseeable disruptions are clear drivers of the adoption of precision fermentation, as they break established sourcing practices of EU companies. Especially in times of uncertainty and price volatility, they highlight the benefits that precision fermentation can bring for the independence, resilience, and stability of manufacturing value chains.

#### *Window of Opportunity IV: Competitive Moves Among Firms*

As previously discussed, PF can serve as a competitive advantage for entrepreneurs, thanks to the shifting perception of sustainability as a performance criterion for consumers, enduring availability through resilient supply chains, and its status as non-subject to taxes and prohibitions or as the subject of subsidies. However, the potential performance benefits of products derived from PF extend beyond this. The capabilities of synthetic biology now allow us to engineer microbes that can produce familiar products of all kinds based on inexpensive substrates, possibly even waste or emissions. (Expert 8, Pos. 31).

Moreover, it is now possible to create previously unknown, novel molecules with unprecedented properties that outperform existing products. Expert 1 highlights the significant strides made in the field due to contributions from *DeepMind* and *Meta* and their *Generative AI*<sup>10</sup> algorithms such as *AlphaFold 2*<sup>11</sup>. These entities have provided a vast number of predicted protein structures that, despite not being proven, are expected to be highly accurate. This development has facilitated a stronger connection between sequence information and function, accelerating the discovery of molecules with novel functions and the genetic sequence necessary to synthesize them (Expert 1, Pos. 13).

Even companies not primarily concerned with sustainability aspects associated with the transition to PF can leverage this technology to their advantage. This becomes particularly relevant when industry external players use the technological means to conduct PF, opening a new market and challenging incumbents with superior versions of the product. Expert 4 (Pos. 29) describes their business development learnings:

*“So, if I work with a traditional [target molecule] employer, I probably won’t open a new market for*

*them. They have all the distribution networks; they have all the partners and so on. But in a sense I’m competing internally, whereas if I go to another company who’s running familiar with my kind of technology, but they don’t have any current market access right now and they’re kind of a prime partner, [...]. And also, you know, I’m helping them enter a new market in that way.”*

Hence, the introduction of PF technology has the potential to not only counter the effects of unsustainable practices but also to provide competitive advantages for both established players and newcomers. This creates a multitude of windows of opportunity across various segments for niche actors, either through collaboration with existing incumbents or by establishing markets for new entrants.

## 5. Discussion

Building upon Frank Geels’ (2002) theoretical framework, which contextualizes system innovation adoption, it is apparent that TTs are not isolated events in a technological vacuum. They are deeply embedded within societal fabric, reflecting the values, interests, and power dynamics of the society in which they develop (Geels, 2002). This necessitates a comprehensive understanding among all actors within the established socio-technical system—including policymakers, established industry, users, and markets within the EU—the potential role of PF in realizing the economic and ecological targets stipulated in The European Green New Deal (2019) and EU’s Bioeconomy Strategy (2018).

However, the interview findings suggest that despite PF’s potential, a robust awareness and understanding of it have yet to penetrate the socio-technical establishment (Chapter 4.2.2). Concurrently, other global economies are advancing their biomanufacturing strategies and reaping their associated benefits.

For instance, the Biden-Harris administration in the United States (USA) introduced the “New Bold Goals and Priorities to Advance American Biotechnology and Biomanufacturing” on March 22, 2023. This initiative, following an Executive Order signed in September 2022, underscores the importance of biomanufacturing, including PF, in addressing significant societal objectives (The White House Office of Science and Technology Policy, 2023). These objectives comprise: 1) *climate change solutions*, 2) *food and agricultural innovation*, 3) *supply chain resilience*, 4) *human health*, and 5) *cross-cutting advances*.

In response to this recognition, the USA has implemented, or plans to implement, a series of policy measures designed to elevate biomanufacturing as a key pillar of the US economy. Such measures include collaborations between the state and private enterprises, and the investment and promotion of biomanufacturing capabilities and innovation. A review of these goals suggests a striking resemblance to the objectives outlined by the EU in the aforementioned reports.

<sup>10</sup> Generative artificial intelligence refers to an algorithmic system that is capable of creating new content (Yang et al., 2017).

<sup>11</sup> AlphaFold 2 is an artificial intelligence network developed by DeepMind that uses deep learning algorithms to predict the 3D structure of proteins from their amino acid sequences (Jumper et al., 2021).

However, a key distinction arises in the approach. While the USA views biomanufacturing as a central driver in achieving these goals and is actively working to accelerate its uptake, the EU's approach appears to lack sufficient understanding of the potential, needs, drivers, and challenges of niche technologies, as indicated in the interviews. This gap in understanding suggests that recognizing the role of biomanufacturing in meeting a range of critical goals is a prerequisite for effective policy action. This understanding appears to be growing within the EU, especially as other economies make strategic advances, as indicated by Expert 3 (Pos. 27). However, this growing awareness is yet to translate into concrete policies.

In this context, the ensuing discussion will endeavor to highlight potential levers for the acceleration of a bioeconomy powered by biomanufacturing. Drawing from the drivers and barriers identified in Chapter 4, it will also offer actionable recommendations for the most influential stakeholders, primarily policymakers, but also industry incumbents and niche actors.

### 5.1. Deriving Policy Recommendations

Drawing on Geels' (2006), an effective transition policy strategy must exhibit two key attributes. First, it should apply increased pressure on the existing regime, potentially by employing financial tools and regulations. Second, it should foster the development of groundbreaking innovations within niches.

The implementation and effectiveness of measures depend fundamentally on the prevailing narrative that embeds the vision of a bioeconomy, its benefits, and the necessary steps for its realization into the minds of the regime's stakeholders. Only then will policy recommendations be discussed, implemented, and resonate with the actors within the regime. Thus, it is considered essential that any introduced policy recommendations, whether they aim to promote niches or regulate existing processes, are surrounded by a narrative that emphasizes their relevance and value.

On this basis, measures can be suggested and initiated, aligning socio-technical regime incumbents, users, markets, and niche actors towards the same vision of a bioeconomy in the EU. This alignment will ensure that ecological and economic objectives are jointly pursued and achieved. This unity in direction and purpose not only enhances the efficiency of initiatives but also increases the likelihood of their acceptance and success.

#### *Technological Barriers*

The interviews reveal that advancements in synthetic biology have substantially contributed to niche momentum, enabling some niches to even take over entire markets, while others have managed to at least gain market entry. To further cultivate a) an industry based on biomanufacturing for economic growth and improved performance of the deployed molecules, and b) a circular economy that achieves ecolog-

ical goals through the use of cost-effective, renewable feedstocks, targeted R&D efforts should be initiated and funded. These R&D efforts should primarily conduct basic research to expand the capabilities of synthetic biology. This includes increasing the flexibility of inputs and outputs in fermentation processes, optimizing strains for market viability of drop-in molecules, exploring the feasibility of producing new molecules with better properties, and considering the use of next-generation feedstocks from industrial waste streams. The technology developed from this research should then be made broadly accessible to a range of stakeholders in both universities and industry to enhance niche market growth.

It's important to note that these R&D activities need not be limited to universities or research institutions. The European Institute of Innovation and Technology already puts out tenders that businesses, including technology-focused startups, can apply for. Besides traditional research grants, tenders in synthetic biology could initiate relevant R&D efforts in the EU and provide guidance to niche players on the most pressing issues for governments and corporations, a current major barrier as described in Chapter 4.1.3. As Expert 4 (Pos. 39) lines out, this could encourage companies to focus on solving real-world problems and generating revenue through their innovations.

The potential use of next-generation feedstocks, especially in line with advancements in substrate engineering, is closely tied to their availability and suitability. Therefore, policymakers should also focus on identifying future supply sources, establishing storage facilities, and developing treatment plants within the EU. If these infrastructures do not currently exist, it is up to policymakers to facilitate their creation.

#### *Commercialization Barriers*

Chapter 4.1.3 highlights the lack of transition from research activities to commercial practice. Fostering collaboration between universities and established industry players could help bridge this gap. Universities should be considered not only as centers of knowledge creation but also as engines for technological advancement and innovation, including the creation of spin-offs. This implies fostering an ecosystem that enables academics to engage in entrepreneurial ventures. Also, incentives for academics to collaborate with industry partners can be a promising approach, as well as equipping universities with resources to develop programs and support structures that nurture entrepreneurship.

Furthermore, while public funding programs often provide the financial means necessary for research and development, they frequently lack the guidance and mentorship that researchers need to convert their scientific ideas into viable businesses. Therefore, funding programs and tenders could contemplate incorporating components of mentorship and guidance alongside financial support. This holistic approach could enhance the effectiveness of the funding, accelerating the journey from laboratory discoveries to marketable solutions.

### *Infrastructure Barriers*

As discussed in Chapter 4.1.3, start-ups, particularly niche actors, grapple with a lack of fermentation capacity in the EU. An essential research question arising from this concerns the development of solutions to bridge this gap. According to Experts 1 and 5, the role of EU nations or the EU itself is instrumental as a financier and creator of infrastructure to facilitate scale-up attempts within strain optimization loops and commercialization efforts, contingent on rental payments. It should be in the EU's interest to provide adequate infrastructure for both R&D and commercialization - either by direct intervention or through fostering innovations and private market partnerships that enable this. The construction of fermentation facilities by niche actors could also be further promoted with grants or favorable loans.

### *Regulatory Barriers*

The hurdles described in 4.2.1, particularly for PF niche actors in the food sector regarding the approval process, pose a significant barrier to market entry for novel food niche technologies in the EU. To prevent a drain of Novel Food companies along with their talents, proprietary knowledge, and economic potential, the EFSA must fundamentally clarify the process of novel food approval. The first step involves drafting clear guidelines for various types of food innovations, indicating what is required for navigation through the process. There also needs to be clarity, especially in the context of GMOs on which process is most suitable for the respective product. Through clear milestones with predefined submissions and timelines, uncertainty should be reduced, time-to-market accelerated, and credibility boosted with potential investors and partners. As exemplified by Expert 5 (Pos. 34) in Singapore's approach, dedicated teams that actively guide niche technology actors through the approval process and promote R&D as well as infrastructure projects with grants, are needed to attract the best talents, companies, and products. While the EU should continue prioritizing the health of its citizens by only approving safe foods, GMO or non-GMO, faster, cooperative processes can still achieve this balance between safety and innovation.

### *Price Lock-in Barrier*

The promotion of bioethanol uptake through quotas, as described by Expert 8 (Pos. 25), has been a significant measure to provide more certainty to producers of such products for the further development of their companies and platforms. To further encourage the adoption of PF products, such quotas should be expanded, giving the niche more assurance of product uptake, momentum, and credibility. At the same time, it would be necessary to properly price the actual externalities of fossil-based and animal-derived products, meaning the damages caused primarily by GHG emissions and environmental pollution. This would counteract

the market distortions currently described. The same applies to the partially reduced taxation of milk and meat products, as well as substantial agricultural subsidies. While these are connected to considerations of promoting and maintaining the current societal and economic system, a gradual convergence of the prices of traditionally manufactured products with potentially subsidized PF ones is recommended until price parity is achieved without disrupting economic and societal systems.

### *Cultural and Psychological Factors*

As discussed in Chapter 4.2.2, current cultural and psychological factors pose relevant barriers to the adoption of PF. Appropriate public education and awareness campaigns should be implemented to address these concerns.

The application of GMOs in food and feed is a complex and often misunderstood topic, capable of arousing apprehension among consumers, voters, and policymakers alike. Historical misuse of GMOs has led to undesirable outcomes, contributing to skepticism about this technology. However, like any powerful technology, it requires a secure framework for sensible application. Accordingly, the narrative around GMOs needs to be reframed to emphasize that, in the context of PF, they are subject to the same regulatory criteria as other food products. This would assure their safe use while harnessing the benefits of this production method.

The interviews with Experts 7 and 8 also highlighted a fundamental lack of understanding of the technology behind PF. As a result, novel products that are, for example, neither plant-based milk alternatives nor animal milk can cause confusion among consumers. Complex chemicals and materials, whose production processes and environmental implications are not easily understood, may deter consumers from recognizing the environmental benefits of PF alternatives. This lack of understanding could prevent demand, despite a potential willingness to pay a green price premium.

Legislation could support in this regard by promoting awareness and narratives around the bioeconomy, biomanufacturing, and PF. Furthermore, clear regulations regarding the labeling of products with respect to their environmental impact could be made mandatory, thereby making the processes behind the products more visible. Such initiatives could facilitate better consumer understanding, leading to more informed decision-making, and ultimately contributing to the wider acceptance and adoption of PF technologies.

In collaboration with citizens, communities, and businesses of all sizes, the European Union should explore the extent to which goods and food production in the bioeconomy should be centralized. Socio-political factors, such as concerns about the displacement of small businesses, can become an obstacle if products from PF are rejected by markets, consumers, and also within the European Council. These concerns should be taken seriously and should be accompanied by a positive narrative about creating a more ecologically, economically, and socially sustainable form of economy.



## 5.2. Considerations for Industry Incumbents

For incumbent companies within the regime, the technological and entrepreneurial momentum of the niche represents both an opportunity and a threat. Companies made aware of the fragility of their supply chains in the wake of the Covid pandemic and the Russian invasion of Ukraine have a chance to become more independent from global supply chains through metabolic engineering. At the same time, synthetic biology offers companies that seek to give their products new properties, the opportunity to develop a competitive edge by designing *de novo* molecules.

As Expert 6 (Pos. 7) puts it: “[...] corporations obviously have a hand on the steering wheel. They can either in-source these technologies and centralize the way biomanufacturing happens, or they can choose to ignore it and be disrupted” - not necessarily by start-ups, but by neighboring regime incumbents partnering with niche actors. The technology paves the way for the entry of new competitors, not only from the niche but also from neighboring regimes - companies that have the infrastructure and talent to carry out large-scale biomanufacturing processes could today produce their current core product, and tomorrow that of a foreign industry - possibly even harnessing potential advantages of synthetic biology along price-performance dimensions.

For incumbents, the consideration is therefore to interact more intensively with the niche in order to identify potentially threatening trends and harness possible opportunities. Key levers for this could be the following:

- Establishing confidential partnerships with niche actors, showcasing the current pain points are clearly and explicitly linked with possible improvement objectives. This gives niche actors guidance on how best to use their technology to solve internal problems of the regime and resolves communication mismatches. At the same time, it reduces market risk for them and makes them appear more credible to VC and focus only on technology challenges.
- Providing an interdisciplinary team that has the know-how, infrastructure, time, and resources to scale up laboratory innovations, but also to market them appropriately and actively work on collaboration projects in the niche and with other niche actors.
- Actively embracing the possibilities of biomanufacturing by anticipating further regulations and the EU bioeconomy strategy, and actively co-shaping policies and structures. Furthermore, observing international movements towards bioeconomy and biomanufacturing and thus utilizing windows to become a significant player as an exporter of intellectual property and infrastructure in the future.

## 5.3. Considerations for Entrepreneurial Niche Actors

Entrepreneurs in the niche face many challenges in navigating through the aforementioned barriers. Essential for

navigating towards commercialization and overcoming the so-called ‘Valley of Death’ is building credibility with investors, corporate partners, and potential regulatory authorities that may promote selected companies within the context of possible policies. Establishing this credibility requires a delicate balancing act between aligning with the needs of the current regime while maintaining one’s own vision. As some of the described entrepreneurs have learned, companies risk failure with their efforts if they push products into the market without corresponding demand. Alongside technical development, a commercial acumen is necessary, that guide business development towards customer segments that can be captured given current price-performance possibilities of the technology. Potential market entry opportunities to prove the potential of one’s technology and build credibility are not necessarily in the initially targeted market – however they can be great showcases to build trusted partnerships upon, may it be to customers, corporate partners, or CMOs.

In the context of MLP, it is essential for niche actors to actively leverage the pressures of the landscape. While there are numerous opportunities for market entry among both consumers and corporate customers, it often appears that there is a lack of awareness of the benefits of synthetic biology across dimensions such as sustainability, ethical consumption, resilience, and performance improvements – leading to a lack of understanding and demand. Niche actors should strive to actively raise awareness for a narrative of their technology within the framework of an inclusive bioeconomy, in order to further open cracks in the regime into windows of opportunity.

## 5.4. Limitations and Suggestions for Further Research

This thesis focuses specifically on one major technology of biomanufacturing: PF. Its potential to transform value chains across sectors and contribute significantly to the transition to a bioeconomy warrants particular attention. However, the diverse sub-technologies of synthetic biomanufacturing differ substantially in their drivers and barriers, necessitating separate analyses despite their collective contribution to the bioeconomy transition. Consequently, a major limitation of this thesis is the exclusion of other technologies that could contribute to the transition within the EU. This extends beyond synthetic biology-based technologies to those rooted in thermochemical, chemical, and mechanical processes. It is crucial to recognize that PF is only one of several technological forces driving the creation of a bioeconomy, and therefore conducting research on the adoption of its peers is of high relevance.

The author has a limited understanding of the nuances and complexities involved in actual policy-making processes. Policymaking is a multifaceted field, influenced by intricate stakeholder relationships, power dynamics, historical contexts, and unique national or regional characteristics. The proposals put forward in this study largely center around the development and implementation of precision fermentation as a platform technology, thereby neglecting to address

the broader spectrum of EU and global politics. These politics encompass aspects such as trade agreements, geopolitical relations, and multilateral regulations. This focus, while narrow, could potentially neglect certain factors that may emerge in real-world policy-making scenarios, such as possible trade-offs, wider systemic impacts, or socio-political consequences. To address these limitations, future research and policy measures should ideally involve collaboration with experts in policy-making and political science, to ensure a comprehensive understanding of the wider political context when discussing precision fermentation and similar platform technologies.

Additionally, the selection of interview partners is limited to eight individuals in interviews often lasting no more than an hour. While unique insights can be gained by comparing experts' answers, these interviews only provide a brief glimpse into the dynamics of the processes. A more holistic approach would require further in-depth conversations with various stakeholders within the regime and niche, including those from different sectors and regions. A key aspect of this was the intention to interview an expert who is a practicing engineer in the field. Regrettably, none of the potential interviewees identified for this purpose responded to the outreach emails.

Moreover, the MLP framework may place excessive emphasis on technological aspects of transitions, downplaying the role of social, cultural, and political dimensions in shaping PF adoption. This is especially relevant considering the considerable differences among EU member states in these dimensions. By focusing on the EU with the EC, national-level differences within the EU may be neglected. It is important to examine how these differences might impact the adoption of PF technologies across Europe and therefore raises relevant windows for future research. Further research could aim to explore the perspectives and experiences of a broader array of stakeholders within both the regime and niche sectors.

The MLP framework does not explicitly address the role of power dynamics in shaping socio-technical transitions. In the context of this thesis, the varying degrees of influence stakeholders have over the adoption of PF technologies is particularly significant. On the one hand, the framework inadequately considers power dynamics; on the other, reliable information and expert knowledge are lacking regarding which drivers and challenges ultimately shape the transition and to what extent. Some aspects and unanswered questions remain among the experts. Furthermore, conceptualizing the MLP can be challenging, particularly when measuring and quantifying interactions across levels, which may limit the comparability and applicability of the findings. A deeper exploration of power dynamics and their influence on the transition process could strengthen the analysis.

Conceptualizing the MLP can be challenging, particularly in terms of measuring and quantifying interactions across levels. This complexity may hinder the comparability and applicability of the findings, as it requires a nuanced understanding of the interplay between various system components.

Consequently, future research may benefit from developing more refined methodologies to capture these interactions, ensuring a more robust analysis and facilitating comparisons across different studies. Also, to derive concrete policy recommendations, actions, and their concrete effects should be quantified.

The subject matter of this thesis is inherently complex, multi-layered, and detailed, spanning several industry sectors influenced by the same technology. Attempting to develop a comprehensive perspective within this context is a demanding task, and each issue examined raises additional questions. While these questions are highly relevant to the acceleration of the transition, addressing them is beyond the scope of this thesis. Further research is essential to explore these intricacies and contribute to a deeper understanding of the factors driving the transition to a bioeconomy powered by PF.

## 6. Conclusion

The EU finds itself at a critical crossroads in shaping the trajectory of its economy in the face of the triple planetary crisis. Driven by the technological trajectory of synthetic biology, a vibrant ecosystem has developed within the biomanufacturing niche, working assiduously to influence EU markets with noteworthy momentum. Sustainability pressures and unexpected global supply chain disruptions are fracturing entrenched structures, thereby creating opportunities to stimulate niche momentum. However, a multitude of internal barriers at the niche and socio-technical regime levels obstruct the initiation of a comprehensive transformation process. Given the identified barriers concerning infrastructure, regulation, market interventions, and lack of awareness, it appears imperative for policymakers to facilitate a transformative process. It is now up to EU decision-makers to consider the extent to which biomanufacturing can be part of a vision for a European bioeconomy and to deliberate, in consultation with communities and incumbents, how this can be structured. Utilizing the MLP, this study has been able to highlight the most influential interdisciplinary drivers and barriers. While the proposed policy recommendations provide broad directions for potential actions, they are subject to limitations. Future research should delve into these barriers and drivers in detail, examining how they must be addressed to accelerate the transition to a bioeconomy.

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## In the Eye of the Beholder: Examining the Role of Dynamic Capabilities, Industry Dynamics, and Internal Knowledge Sharing in Strategists' Entry Decisions

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### Abstract

Dynamic capabilities are a major driver of strategic entry into new industries. Building on the dynamic capabilities approach and on strategy literature, I develop a model for strategists' assessment of entry. I examine two specific dynamic capabilities, namely absorptive capacity and new product development capability and argue that both positively influence strategists' perceived attractiveness of entering a new industry. Further, I aim to respond to the call to consider the moderating effects of both external and internal conditions, by integrating environmental dynamism and internal knowledge sharing as moderators in my model. I test my hypotheses via a conjoint experiment and data on 1,664 entry assessments embedded within 52 strategists. As expected, I find that both high levels of perceived absorptive capacity and new product development capability increase entry attractiveness. Moreover, those effects are particularly strong when the environmental dynamism in the new industry is expected to be low. Internal knowledge sharing strengthens the relationship between perceived new product development and entry attractiveness. Regarding perceived absorptive capacity, I do not find significant interactions.

**Keywords:** absorptive capacity; dynamic capabilities; entry assessment; new product development; strategic entry

### 1. Introduction

The question of what organizational capabilities lead decision makers to pursue certain strategic directions such as strategic entry and why they do so has long been featured in organizational, strategic, and behavioural research (e.g., Baía and Ferreira 2019; Gavetti and Levinthal 2000; Lavie 2006). The dynamic capabilities concept, which has attracted increasing attention among scholars, aims to provide answers to this essential question. Originally rooted in the resource-based-view (RBV) of the firm, such capabilities can be defined as a firm's potential to solve problems in a systematic manner, which results from its ability to recognize opportunities and hazards, to ensure efficient and market-driven decision-making, and to quickly modify its

existing resource base accordingly (Barreto, 2010). As business environments become ever more dynamic in the wake of globalization, digitization and steady technological progress, dynamic capabilities play a major role in securing competitive advantage and superior firm performance (e.g., Brettel et al., 2011; Drnevich and Kriauciunas, 2011; Teece, 2007). Particularly regarding successful entry into new industries, such capabilities can be a highly valuable asset to the firm since they significantly reduce costs associated with such a move (Argyres et al., 2019).

Although very influential, literature on dynamic capabilities suffers from several deficiencies. One important source of concern is that overall, empirical research has paid insufficient attention to mediators and moderators (Schilke et al., 2018). Dynamic capabilities are context-dependent and therefore, environmental features cannot be excluded when analysing their impact on, for example, strategic decision-making or firm performance. In particular, there is a call for the inclusion of both external as well as internal specific moderators and for potential interactions (Baía & Ferreira,

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2019). Second, with regard to methodologies, many scholars in the field of strategic decision-making, have focused on post-hoc approaches to examine the role of dynamic capabilities. While highly important for advancements in this research domain, such approaches incorporate the risk of survey data errors as a result of biased decision-making or lack of relevant information (Zacharakis & Shepherd, 2018). Third, the majority of research has explored the role of generic dynamic capabilities rather than focusing on more specific ones. Focusing on specific and well-defined dynamic capabilities would make it easier to derive practical implications that are more tangible. Finally, although scholars have acknowledged the importance of those capabilities in entry decisions, there is comparably little literature available on this relationship (Argyres et al., 2019).

To address the above-mentioned gaps, I empirically investigate the link between two specific dynamic capabilities (i.e., absorptive capacity and new product development capability) and firms' strategists' assessment of strategic entry. Further, since the entry assessment is dependent not only on firms perceived dynamic capabilities but also on how the strategists perceive additional external as well as internal factors, I develop a model that includes the moderating effects of environmental dynamism and internal knowledge sharing on the relationship of dynamic capabilities on entry assessment. I test my model based on a metric conjoint experiment and data on 1,664 evaluation points that are nested within 52 strategists. I suggest a positive relationship between the perceived dynamic capabilities and strategic entry assessment (hypotheses 1a and 1b). Both hypotheses are supported by my results. In terms of moderators, I assume the positive effect of perceived absorptive capacity on entry attractiveness to be moderated by environmental dynamism in such a way that the perceived absorptive capacity encourages strategists to enter new industries, especially when anticipated environmental dynamism is high (hypothesis 2a). For perceived new product development capability, I assume the moderating effect to go in the opposite direction (hypothesis 2b). While hypothesis 2a is not consistent with my results, I find proof for hypothesis 2b. Finally, I assume anticipated internal knowledge sharing to strengthen the positive relationships between both perceived absorptive capacity (hypothesis 3a) and perceived new product development capability (hypothesis 3b) and entry attractiveness. I find support only for hypothesis 3b. Figure 1 briefly illustrates the model tested in my study.

My paper adds value to existing literature in the following ways. First, I respond to the call for specific dynamic capabilities to be studied. Specifically, I react to an analysis of Schilke et al. (2018), who found that an impressive number of scholars ask for an additional examination of new product development capability. By examining two specific dynamic capabilities, I find that both perceived absorptive capacity and new product development capability play an essential role in strategists' assessment of strategic entry. This could also help managers in their future decision-making processes. Second, I am able to identify factors that influence the relationship between dynamic capabilities and decision-making which jus-

tifies the statement of Baía and Ferreira (2019) who have argued that the examination of context-dependent dynamic capabilities requires the inclusion of external and internal moderators. Both, environmental dynamism, and internal knowledge sharing mechanisms are considered by strategists in their entry decisions. Finally, by using an experimental real-time conjoint approach, I reduced the risks of biased self-reporting of decision makers and failure to consider that decision-making is an evolving and dynamic process (e.g., Sandberg, 1986; Shepherd and Zacharakis, 2018).

## 2. Theoretical background and hypotheses

Dynamic capabilities can provide firms with critical tools required for strategic entry. To better understand their characteristics, the next section first provides a brief definition of dynamic capabilities, in particular of absorptive capacity and new product development capability. Second, I develop my hypotheses on the relationship between the two capabilities and strategic entry, and finally, I introduce my moderators, i.e., environmental dynamism and internal knowledge sharing.

### 2.1. Defining dynamic capabilities

How firms achieve and maintain competitive advantage and long-term growth in environments characterized by rapid technological change remain at the heart of strategy research (e.g., Baía and Ferreira, 2019; Protogerou et al., 2011; Schilke et al., 2018). By taking into account purposeful modifications of firms' resources and capabilities, the dynamic capabilities approach builds upon the basic assumption of the RBV of the firm which indicates that a firm's competitive advantage depends primarily on its unique resources and capabilities (Barney, 1986, 1991), and thus adds a less static but more dynamic component to the RBV framework (Baía & Ferreira, 2019). Initially developed by Penrose (1959) and subsequently extended and popularized, the RBV assumes that firms' bundles of resources and capabilities are heterogeneously distributed across competing firms (Barreto, 2010). Since such bundles' of resources are valuable, rare, inimitable, and non-substitutable (VRIN), they may either enable or limit firms' choices of market entries and profit levels firms may generate (Wernerfelt, 1989). However, valuable resources alone, do not necessarily ensure superior firm performance. To leverage the full potential of their resources, firms additionally need to possess distinctive organizational capabilities (Penrose, 1959).

In the face of an increasingly dynamic business environment, initial propositions of the RBV were questioned and considered too static as they ignored the inevitable influence of market dynamism (e.g., Eisenhardt and Martin, 2000; Priem and Butler, 2001), leading to the development of the concept of dynamic capabilities. In their seminal contribution, Teece et al. (1997, p. 516) define dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing

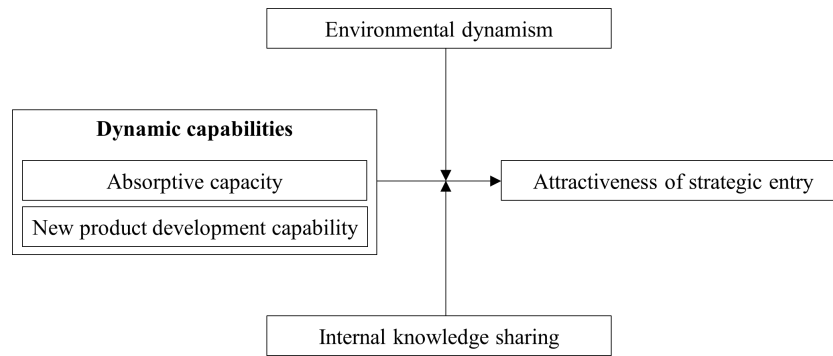


Figure 1: Proposed model

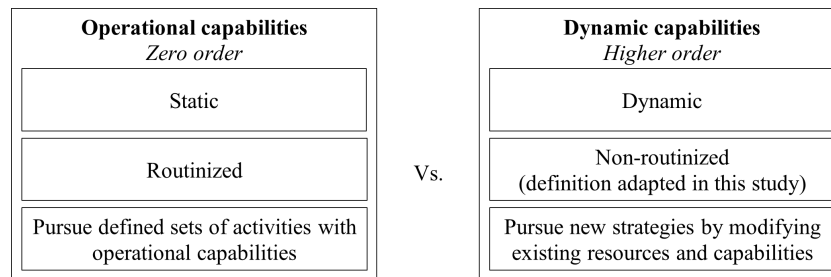
environments”. Their approach is based on multiple main elements that support its major theoretical foundations (Barreto, 2010). First, they underpinned the essential role of strategic management and categorized the nature of the framework as being an “ability”, thus extending the RBV by proposing a special kind of capability. Second, a specific role of this capability was defined, i.e., the ability to integrate, build, and reconfigure internal as well as external competences. Third, since they considered the dynamic capabilities approach as an extension of the RBV to turbulent environments, the external context was given by the dominant focus on markets characterized by dynamism and change which indicates a direction towards a more entrepreneurial perspective (Barreto, 2010; Schumpeter, 1983). Fifth, in line with the RBV and its VRIN resources, an underlying assumption is capability heterogeneity across competing firms. Finally, competitive advantage and value creation are the main outcomes of dynamic capabilities, which is yet another indication that this concept is an extension of the RBV, as it retains its core objectives.

Since dynamic capabilities can give firms competitive advantage, the approach has attracted increasing attention among strategy and management scholars and the notion and conceptualization of dynamic capabilities have subsequently been expanded and refined (e.g., Denford, 2013; Eisenhardt and Martin, 2000; Teece, 2007; Zollo and Winter, 2002). However, a distinct and uniform definition has not been reached yet. Literature reviews summarize the impressive body of published dynamic capabilities research as somewhat scattered and disparate (e.g., Pavlou and El Sawy, 2011; Peteraf et al., 2013). Although existing literature is partially complementary, it lacks a common and clear theoretical basis (Burisch & Wohlgemuth, 2016). There is consensus that the dynamic capabilities concept has been significantly influenced by two main contributions – i.e., Teece et al. (1997) and Eisenhardt and Martin (2000) – that have largely steered research into two somewhat diverging streams which are based on different assumptions, theoretical reasoning and perspectives regarding outcomes (e.g., Di Stefano et al., 2014; Ringov, 2017). Teece et al. (1997) originally characterized dynamic capabilities as abilities that are unique to the firm, logically implying they cannot be

examined and studied by comparing their quantity between competing firms (Laaksonen & Peltoniemi, 2018). Following Teece et al. (1997) approach, numerous scholars have classified dynamic capabilities as skills, capabilities, or capacities (e.g., Winter, 2003; Zahra et al., 2006; Zollo and Winter, 2002). Contrary to Teece et al. (1997), Eisenhardt and Martin (2000) stated that – although idiosyncratic in their details – dynamic capabilities share considerable similarities across firms and hence can be seen as “best practices”. Teece (2007) argued that since best practices cannot be the source of competitive advantage, they are highly unlikely to constitute dynamic capabilities. This is in line with the work of Zollo and Winter (2002) and Winter (2003) who found that dynamic capabilities enable firms to constantly reconfigure their operational capabilities and thus, to achieve long-term competitive advantage.

Regardless of the theoretical underpinnings, to understand the nature of dynamic capabilities, a strict distinction must be made between these capabilities and operational capabilities (also called “zero order” capabilities) (Albort-Morant et al., 2018). “Zero order” capabilities operate independently, are more static and enable firms to pursue specifically defined sets of activities (Sunder M et al., 2019; Teece, 2007). Dynamic capabilities (also called “higher order” capabilities), in contrast, represent a firm’s ability to modify its existing operational capabilities by sensing and seizing new valuable business opportunities and integrating them to develop superior strategies and thus achieve competitive advantage (e.g., Ambrosini and Bowman, 2009; Baía and Ferreira, 2019; Teece, 2007). *Dynamic* stands for the part they play in change and *capabilities* classifies them as a strategic move or as a response to a new business context (Barrales-Molina et al., 2014). Making an empirical distinction between operational capabilities and dynamic capabilities that drive this change is crucial since otherwise firms’ superior performance may be falsely attributed to a firms’ dynamic capabilities (Laaksonen & Peltoniemi, 2018). The most essential differences between operational and dynamic capabilities are summarized in figure 2.

In their systematic literature review on dynamic capabilities and firm performance, Baía and Ferreira (2019) denoted conceptual heterogeneity of the dynamic capabilities



**Figure 2:** Distinction between operational and dynamic capabilities

construct and its related variables, and overlapping as the most essential challenges with regard to comparability of empirical papers and advancement of our understanding of the concept of dynamic capabilities. Their suggestions are in line with those of Eriksson (2014) who has identified two main tendencies in the study of dynamic capabilities, i.e., a focus on generic vs. a focus on more specific dynamic capabilities.

In this article, I follow Teece's (2007) line of reasoning and do not conceive dynamic capabilities as easily replicable best practices but much rather as a firm's potential to adapt to constantly changing environments by e.g., building, and reconfiguring internal and external competences. Dynamic capabilities refer to the reconfiguration and transformation of ordinary operation capabilities (Protogerou et al., 2011). Further, in my investigation of dynamic capabilities and strategic entry decisions, I focus on two specific dynamic capabilities, i.e., *absorptive capacity* and *new product development capability*. I chose these two dynamic capabilities for the following reasons: First, absorptive capacity and new product development capability are both essential instruments for reshaping a firm's resource base. Second, established definitions of both capabilities adequately match with the construct of dynamic capabilities adapted in this study. Such definitions are further explained in the following subsections. Third, absorptive capacity and new product development capability are two of the most frequently cited dynamic capability types in existing literature (Baía & Ferreira, 2019; Barreto, 2010; Helfat et al., 2007). In combination, these two capabilities are particularly representative of the dynamic capabilities approach which qualifies them a good fit for this article.

#### 2.1.1. Defining absorptive capacity

As firms constantly face competitive, innovative and globalization pressures, absorptive capacity is considered one of the most essential factors for sustainable competitive advantage and firm survival (e.g., Lane et al., 2006; Roberts, 2015). Although the idea that externally acquiring knowledge is a spinoff of a firm's own R&D efforts was also developed and proposed by other scholars (e.g., Evenson et al., 1975; Tilton, 1971), the most prominent definition of absorptive capacity (based on citations) was offered by W. M. Cohen and Levinthal (1990, p. 128) who defined it as "a firm's ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends, which supports

its innovative capabilities". Building on the propositions of W. M. Cohen and Levinthal (1990), Zahra and George (2002) reconceptualized absorptive capacity as a multidimensional dynamic capability construct and proposed four underlying component factors which refer to related terms in the literature on dynamic capabilities (Pavlou & El Sawy, 2011). First, knowledge acquisition refers to obtaining new (and external) knowledge (W. M. Cohen & Levinthal, 1990). Second, knowledge assimilation refers to knowledge articulation and knowledge transfer (e.g., Eisenhardt and Martin, 2000; Zander and Kogut, 1995). Third, knowledge transformation refers to creative thinking, efficient decision-making, and innovative problem-solving (Henderson & Cockburn, 1994; Teece et al., 1997). Finally, knowledge exploitation refers to seizing opportunities and reconfiguring existing capabilities (Grant, 1996; Teece, 2007). These four factors build upon each other and naturally combine to result in a dynamic capability (Camisón & Forés, 2010).

Multiple scholars have examined absorptive capacity and its outcomes and have found that firms that possess high levels of absorptive capacity demonstrate considerably stronger abilities of learning from strategic partners, sensing and integrating external information, and finally transforming the input into valuable firm-embedded knowledge (Domurath & Patzelt, 2016; C. L. Wang & Ahmed, 2007). Further, studies that focus on firm performance as an outcome of absorptive capacity, suggest a positive relationship between absorptive and firm performance (e.g., Bergh and Lim, 2008; Brettel et al., 2011; Yeoh, 2009). Hence, absorptive capacity plays an essential role in ensuring long-term competitive advantage.

Following Zahra and George's (2002) line of reasoning, I classify absorptive capacity as a firm's dynamic capability and adapt the definition proposed by W. M. Cohen and Levinthal (1990, p. 128), i.e., "a firm's ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends".

#### 2.1.2. Defining new product development capability

In everchanging and growing industries, success is not only dependent on firms' competencies related to external knowledge exploitation, but also on firms' innovation efforts and on the rapid development of new products (e.g., Baía and Ferreira, 2019; Deeds et al., 2000). Empirical research in the field of innovation is longstanding and over time, different dimensions of innovative capability, which are cru-



cial for measuring a firm's overall innovative capability as part of the dynamic capabilities concept, have been conceptualized (C. L. Wang & Ahmed, 2004). Innovative capability refers to "a firm's ability to develop new products and/or markets, through aligning strategic innovative orientation with innovative behaviours and processes" (C. L. Wang & Ahmed, 2007, p. 38). As this definition indicates, numerous dimensions are embedded in the innovative capability construct and previous research has focused on different combinations of these dimensions. For instance, Schumpeter (1983) named the development of new products or services, new production methods, and organizational forms and the discovery of new sources of supply as innovative capabilities. Miller and Friesen (1983) further included the risk orientation of key executives and the tendency to seek novel and unconventional solutions and Capon et al. (1992) suggested that the tendency to pioneer and to be at the cutting edge of technology in its new product and service introductions plays another essential part regarding new product development capability and organizational innovativeness.

Although numerous combinations of innovative capability dimensions have been examined, the majority of studies on the topic of dynamic capabilities has focused on new product development as an enabler for a firm's change and renewal (e.g., Helfat and Winter, 2011; Schilke, 2014). This may be due to the fact that new development capability positively influences a firm's competitive performance making it a key determinant of success in dynamic and unfamiliar industries (e.g., Deeds et al., 2000; D'Este, 2002). To achieve superior performance, firms must be able and willing to generate new products and services, which in turn is dependent on the firm's technological and scientific capabilities (Helfat & Raubitschek, 2000). In the context of dynamic capabilities, this also means a firm's new product development capability must be as dynamic as the industry the firm operates in.

Since new product development as a dynamic capability aims at updating and reconfiguring a firm's product portfolio by e.g., adapting underlying processes to changing conditions, it should also play a crucial role for strategists when considering strategic entry. In my paper, I draw on the article by Capon et al. (1992) and suggest that new product development capability is dependent on the innovativeness of the market, the innovativeness of the organization, and especially on the strategic tendency of a firm and its employees to pioneer. Hence, I define new product development capability as a firm's ability to constantly attempt to pioneer and to be at the cutting edge of technology in its new product and service introductions. Further, it should be noted that I agree with Zahra et al. (2006) who emphasized that the qualifier *dynamic* differentiates the ability to develop new products from the dynamic capability to reconfigure and modify the way a firm develops new products. Therefore, I define a new routine for developing products as an operational capability and the ability to adapt such capabilities as a dynamic capability.

Although several dynamic capabilities share similar characteristics and even overlap in their definitions, I differentiate

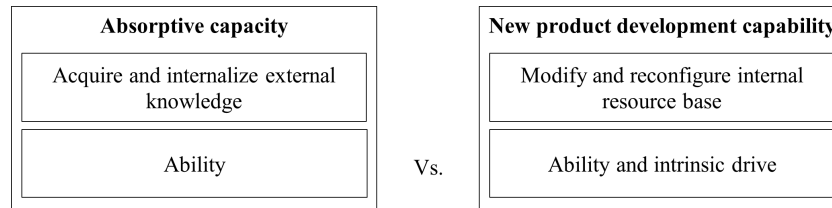
between absorptive capacity and new product development capability based on the following factors:

1. While my definition of absorptive capacity emphasizes the firm's ability to acquire and internalize external knowledge (i.e., knowledge outside the firm) in a value-adding manner, the major focus of new product development capability focus is on the firm's ability to benefit from internal resources, processes, and courses of action.
2. The absorptive capacity of a firm enables the firm to capture value from external sources – however, it does not describe the firm's intrinsic drive to do so. My definition of new product development capability does include this thrive by assuming that firms proactively aim to be pioneers in their new products and services.

Figure 3 briefly summarizes the differences between the two dynamic capabilities.

## 2.2. Dynamic capabilities and strategic entry

How firms respond to innovative actions taken by (potential) rivals and which capabilities lead firms' strategists to pursue a specific strategic direction are two central questions in management and strategy research (e.g., Argyres et al., 2019; Roy and Sarkar, 2016). Contrary to prior literature which is based mainly on Utterback and Abernathy's (1975) theory about industry dynamics, Argyres et al. (2015, p. 216) introduce the innovation shock approach and suggest that it is not the dominant design or an external shock but the "introduction of a pioneering new product design by a single firm" that forces incumbents to take strategic actions (i.e., repositioning, imitating, exiting) and that leads potential rivals to consider market entry. Further, the question arises of which capabilities enable a firm and its managers to pursue a specific strategic direction. Literature on innovations and dynamic industries has often investigated firms' capabilities and resources when seeking answers for their difficulties in responding to innovation shocks and change and suggests that the ability to respond to new industries is part of a firm's dynamic capabilities (e.g., King and Tucci, 2002). As ordinary operational capabilities (*zero-order capabilities*) are defined as a "high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type" (Winter, 2003, p. 991), they may not necessarily enable a firm to enter into related or entirely new industries and to integrate new technologies to generate value (Lavie, 2006). Much rather, decisions of whether and how to enter new industries are dependent on the reconfiguration of internal resources and capabilities and on the acquisition of required external knowledge (e.g., Leonard-Barton, 1992; Tripsas and Gavetti, 2000). As opposed to operational capabilities, dynamic capabilities (higher order capabilities) incorporate changing environments and are thus crucial when entering



**Figure 3:** Distinction between absorptive capacity and new product development capability

new fields and responding to disruptive shifts (Damanpour & Wischnevsky, 2006; Rosenbloom & Christensen, 1994). Argyres et al. (2015) argued that an innovation shock provides knowledge about product features required to profit from the newly detected revenue pool and may lead other firms to consider entry based on their perceived resources and capabilities.

Therefore, my theoretical model investigates the effects of perceived dynamic capabilities on the assessment of strategic entry to an industry that has recently experienced an innovation shock. Following the work of Merikle and Joordens (1997) on cognitive psychology, it should be noted that the emphasis must be on perceived rather than objective dynamic capabilities to understand how corporate absorptive capacity shapes strategists' valuation approaches.

Further, I build on the behavioural theory of the firm and in particular on the findings of Gavetti and Levinthal (2000) according to which decision makers, although boundedly rational, can anticipate the broad consequences of broadly formulated actions as a result of crude and simplified representations of the environment in which they operate. Gavetti (2005) expanded this concept by including the role of cognitive representations. The way a senior strategist or top management team portrays a competitive environment has a strong impact on the strategic actions and positioning of the firm. This perspective is described in more detail in the methods section.

### 2.2.1. Perceived absorptive capacity and strategic entry

The assessment of strategic entry is determined by multiple factors which may either be of external or internal nature. Absorptive capacity constitutes one of the most essential internal elements and thus, I assume the perceived level of absorptive capacity of a firm to be of high relevance for strategists' evaluation of entry opportunities.

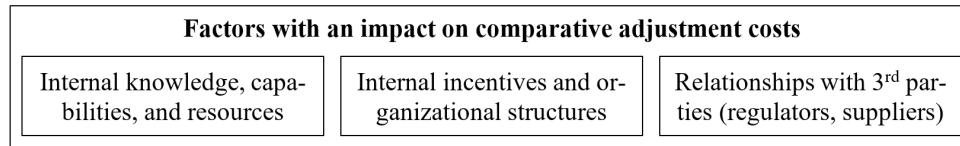
While the uncertainty following an innovation shock leaves some rival firms vulnerable (e.g., Bigelow et al., 2019; Christensen, 1997), it creates valuable opportunities for other incumbents and firms considering strategic entry (e.g., Argyres et al., 2015). By leveraging existing capabilities – particularly knowledge-based ones – firms may manage to leapfrog rivals and ensure sustained competitive advantage (Helfat & Raubitschek, 2000). In their seminal article on dynamic capabilities and strategic management, Teece et al. (1997) name a mismatch between the bundle of organizational processes required to meet the needs of a new industry as a major reason for entry failure. For instance, firms may

lack the financial resources to imitate capabilities in a timely manner (e.g., Helfat and Eisenhardt, 2004), may not be able to leverage their human capital (e.g., Hitt et al., 2001), or may not succeed in acquiring and assimilating external knowledge (e.g., Kogut and Zander, 1992).

Further, followers' strategic choices are dependent on "comparative adjustment costs" – costs that are influenced by three categories of organizational factors, namely (1) internal knowledge, capabilities, and resources, (2) internal incentives and organizational structures, and (3) relationships with third parties such as regulators and suppliers (Argyres et al., 2015) (see figure 4).

The first category includes a firm's technological knowledge base and financial assets. Firms with higher levels of embedded knowledge face lower adjustment costs as they enter a new industry or consider repositioning. Knowledge markets are often subject to severe information asymmetries (e.g., Caves et al., 1983), making knowledge acquisition a difficult and time-consuming process. Hence, the lower the firm's embedded knowledge, the greater the expected adjustments costs. The concept of absorptive capacity consists of a series of processes related to external knowledge: acquisition, appropriation, transformation, and exploitation of external knowledge, which is dynamic and heterogeneous. There is a consensus that firms with higher levels of absorptive capacity possess stronger abilities to learn from strategic partners, capture and integrate external information, and transform this information into value-enhancing, firm-embedded knowledge (e.g., Baía and Ferreira, 2019; Barreto, 2010; C. L. Wang and Ahmed, 2007). Building on these findings, a firm with strong absorptive capacity may face fewer challenges when acquiring and integrating knowledge than a firm with low absorptive capacity and thus, face considerably lower adjustment costs. This line of reasoning is also in accordance with the repositioning framework developed by Argyres et al. (2019) which aims to guide strategists who have to decide whether and how to reposition as a response to an innovation shock. Dynamic capabilities and adjustment costs are intimately linked as both approaches describe potential (financial) barriers firms face when modifying or updating their resources, capabilities, and knowledge. Further, particularly knowledge-based dynamic capabilities (including absorptive capacity) are of high relevance when explaining differences in competitive advantage and firm performance in dynamic environments.

When considering strategic entry, firms' strategists must also take into account the timing of entry. If an innova-



**Figure 4:** Factors that determine comparative adjustment costs

tion shock leads to a sufficient first mover advantage, followers may not be able to benefit from a sufficiently large share of the increased demand and therefore cannot keep up with the first mover (Argyres et al., 2015). In his pioneering work on industry evolution, Klepper (1996) found that early entrants ultimately gain an insurmountable cost advantage over later followers since returns on investment in cost-cutting process R&D grow with scale. Hence, as firms expand and become larger, the cost gap between early and later entrants also widens, leading to the exit of later entrants. Those observations were also confirmed for the specific case of firms entering an industry that has experienced an innovation shock (Argyres et al., 2015). The speed of change is part of strategic change which is defined as “a difference in the form, quality, or state over time” (Van de Ven & Poole, 1995, p. 512). This definition comprises three change dimensions, i.e., the type, the magnitude (form and quality), and the speed of change (over time). Yi et al. (2015) examined the relationship between dynamic capabilities and the speed of change and found strong technological capabilities and absorptive capacity to have a positive impact on firms’ speed of change. In the case of everchanging environments, technological skills and a strong resource base were found to complement absorptive capacity, enabling firms to quickly implement strategic change. The faster strategic change can be integrated, the more opportunities a company can capitalize on ahead of its competitors to achieve superior competitive advantage (Lieberman & Montgomery, 1988). The speed of implementation does not only provide insights about the need for change, but also about the absorptive capacity a firm possesses to realize strategic change, as this capacity is also accompanied by the slack required to respond quickly to external dynamism. Firms with high absorptive capacity may therefore also be quicker in implementing strategic change than firms who possess low levels of absorptive capacity.

In addition to implementation speed, the speed of strategic change covers the speed and efficiency of strategic decision-making (Eisenhardt, 1989). As absorptive capacity includes the ability to recognize the value of new external information, this may also be beneficial when having to choose between strategic directions. For instance, firms with comparably higher absorptive capacity are much more likely to imitate an innovation shock more quickly. As new innovations limit the value of established firms’ knowledge, they need to possess absorptive capacity to quickly recognize the value of newly available information and to develop a comparable product which stimulates the new demand (Bigelow et al., 2019). This is in line with findings of Henderson and

Cockburn (1994) who discovered a positive relationship between in-house knowledge and competence through R&D of pharmaceutical firms and its discovery productivity.

As reflected in its definition, absorptive capacity allows firms to better “receive” external knowledge, i.e., knowledge generated by other firms or partners. The ability to benefit from knowledge generated outside the firm may not only be valuable when cooperating with strategic partners or suppliers, but also in the context of knowledge spillovers (see figure 5). Such spillovers refer to the existence of externalities, commonly defined as often unanticipated externalities associated with an activity or process (Agarwal et al., 2010). More precisely, knowledge spillovers are external benefits from the creation of knowledge that also benefit parties other than those investing in the creation of knowledge. Such benefits include, among other things, improved innovation and productivity (Audretsch & Belitski, 2023). However, spillovers as a form of externality are only utilized in case the available knowledge results in a direct and clear benefit. Access to knowledge spillovers stimulates firms’ productivity and innovation efforts since the availability of new knowledge also strengthens firms’ ability to develop new products and streamline underlying processes. In contrast to knowledge spillovers, knowledge collaborations are based on active knowledge sharing through e.g., strategic partnerships (Cassiman et al., 2018). Such collaborations enable firms to allocate costs (e.g., R&D, equipment) between partners (Veugelers, 1997) and to shorten the product development phase in the innovation life cycle (Audretsch & Belitski, 2023; Hagedoorn, 1993). This, in turn, increases a firm’s competitiveness (e.g., W. M. Cohen and Levinthal, 1989; Miotti and Sachwald, 2003).

Some firms are better able than others to capture value from collaborations which can partly be attributed to the levels of absorptive capacity a firm possesses (Ritala & Hurmelinna-Laukkanen, 2013). Two dimensions of absorptive capacity are especially relevant regarding profiting from external knowledge implementation. The first one captures a firm’s propensity to acquire new knowledge and its understanding of what kind of knowledge is relevant. The second one is the firm’s ability to utilize and embed the external knowledge to an extent that results in competitive advantage.

Building on the above-mentioned findings and line of reasoning and putting them into the context of absorptive capacity and strategic entry, one may assume the following: Since adjustment costs are considerably lower for firms with high levels of embedded knowledge and since extensive ab-

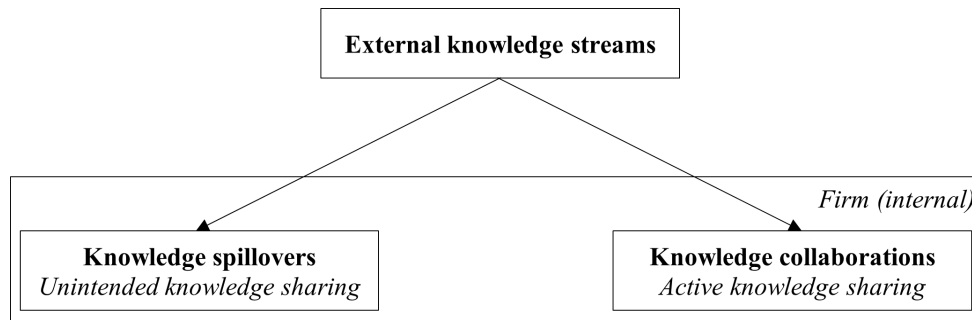


Figure 5: Forms of external knowledge streams

sorptive capacity enables firms to more easily acquire and integrate external knowledge, a firm's strategist may also assume that the organization faces lower comparative adjustment costs when entering a new industry when its perceived absorptive capacity is high than when its perceived absorptive capacity is low. Further, a firm's profit from entering a new industry is highly dependent on the speed of entry and the speed of change. Firms with extensive absorptive capacity are able to implement strategic change more quickly than rivals with limited absorptive capacity. Hence, taking these facts into account, a firm's strategist may rate the firm's speed in entering new industries higher when the perceived absorptive capacity is high than when the perceived absorptive capacity is low. Finally, drawing on the positive impact of knowledge spillovers and knowledge collaborations on firms' innovative behaviour and productivity, and the fact that strong absorptive capacity simplifies the process of receiving external knowledge, a firm's strategist may find the firm to be able to capture more value from knowledge externalities when the perceived absorptive capacity is high than when the perceived capacity is low. As stated in section 2.2, I assume that decision makers (i.e., strategists, senior managers) can anticipate consequences of a firm's courses of action and that their decisions have a significant impact of the strategic choices of a firm (Gavetti, 2005; Gavetti & Levinthal, 2000). Thus, I hypothesize:

**Hypothesis 1a)** As a firm's perceived absorptive capacity increases, so does the firm's strategists' assessment of entry attractiveness.

### 2.2.2. Perceived new product development capability and strategic entry

Similar to absorptive capacity, new product development capabilities play a crucial role with regard to firms' competitive position. To compete in new industries, a firm should not only be able to benefit from external knowledge but also to drive innovation and have the intrinsic motivation to do so. Therefore, I also assume the level of perceived new product development capability to be highly important for the assessment of strategic entry by the firm's strategist.

As stated in section 2.2.1, a firm's strategic move in response to changes in the environment caused by a rival firm, is not only dependent on financial or organizational con-

straints of the firm, but also on its entry timing. Firms considering entering a new industry must act quickly since, otherwise, the cost gap between early entrants and later followers will widen to the point that later entrants will have no other choice but to leave (Argyres et al., 2015; Klepper, 1996). Early entrants, on the other hand, may be able to neutralize the first mover advantage. The definition of new product development capability as a dynamic capability incorporates a strong and permanent determination to be at the cutting edge of technology. Firms that possess strong new product development capabilities aim to leapfrog their rivals when entering new industries. Being able to quickly adapt new product development processes and to transform technical knowledge into new offerings enables firms to remain competitive in changing environments. Firms that have high new product development capabilities may therefore be more likely to enter new industries quickly since they already have essential mechanisms in place to adapt internal operations flexibly and easily. On the other side, firms with low new product development capabilities may face various obstacles when entering new industries that delay the timing of entry. Such obstacles could include time-consuming R&D activities, or the creation of cross-functional teams to ensure new knowledge combinations. Hence, firms with strong new product development capability may be more likely to enter new industries in a timely manner which enables them to exploit more of the demand than those with low new product development capability.

In addition to a firm's "intrinsic" drive to enter new industries and to achieve technological leadership, this strategic decision is also linked to costs and efforts associated with technology resources required for superior performance. New product development comes with a considerable amount of funds such as specialized facilities, trainings, and state-of-the-art equipment (Helfat et al., 2007). Helfat and Winter (2011) argued that firms need to deploy their new product development capability multiple times to actually generate revenue for their investments to pay off. Schilke (2014) examined the relationship between new product development capability and competitive advantage under varying levels on environmental dynamism and stated that firms with strong new product development processes and routines tend to rely on experience which can result in or-



organizational inertia. However, as illustrated in section 2.1.2, I do not define new product development capability as e.g., existing routines to develop new products but much rather as a firm's capability to easily adapt its new product development approach to changing conditions. Hence, although I agree that new product development capability comes with considerable costs, I allocate maintenance costs for existing new product development processes and providing state-of-the-art equipment for employees to "basic" new product development routines and not to costs associated with new product development as a dynamic capability. Much rather, I assume new product development capability to be costly as it requires considerable managerial commitment and time and further integration mechanisms (e.g., Barrales-Molina et al., 2010, 2013; Zahra et al., 2006). Moreover, I do not consider organizational inertia as a problem for firms with strong dynamic new product development capability, because I assume their intention to be a technological pioneer is deeply rooted in its culture and underlying company values.

New product development is a highly complex process which requires various interactions to fully capture value from the firm's technological capabilities to develop new offerings and product features (Marsh & Stock, 2003). Ensuring efficient new product development necessitates strong new product development capabilities as underlying skills and mechanisms must be constantly renewed to remain competitive in changing environments. This happens through activities such as investing heavily in non-traditional R&D activities, and through continuous management commitment and entrepreneurial decision-making (as opposed to routine-based decision-making) in this area (Teece, 2014). As building up and maintaining such capabilities is costly and time-consuming, numerous scholars suggest that investing in new product development capability only makes sense if a firm aims to compete with dynamic rivals in dynamic environments (e.g., Barrales-Molina et al., 2013; Darawong, 2018). Taking into account the effort a firm takes when developing a strong new product development capability, one may assume that such firms are likely to use their capability to pursue new strategies such as expanding to new industries.

As reflected in the definition of new product development capability used in this article, firms that possess comprehensive new product development capability do not just drive to innovate and to be at the cutting edge of technology in their new products when they have no other choice – much rather this urge to innovate is deeply integrated into the organization, its human capital, and its strategic courses of action. Semadeni and Anderson (2010, p. 1178) define the construct *competitor organizational innovativeness* as "a competitor's history of introducing innovative offerings over time". I use the term *organizational innovativeness* when referring to the history of successfully launching innovative products and services by a firm considering strategic entry. A firm's organizational innovativeness sends both signals to (potential) rivals as well as to potential customers. Drawing on information-based theories with the underlying assumption that in dynamic environments, information asymmetry

is high, multiple scholars suggest that firms which are known for their success regarding innovations, are often perceived by their competitors as possessing crucial and superior market knowledge (e.g. Bergh et al., 2019; Bikhchandani et al., 1992). In addition, organizational innovativeness may cause other potential entrants to reconsider their decision to compete with a firm that has a long history of successful product launches and may cause less innovative incumbents to consider repositioning. At the same time potential consumers may connect the firm with strong organizational innovativeness and with superior, pioneering products (e.g., Pappu and Quester, 2016; Semadeni and Anderson, 2010) which would increase the probability of the entering firm to capture a portion of the newly discovered profit pool (i.e., increased demand). In addition to the signalling effect, multiple empirical studies proved that firms with a long history of successfully introducing new products – particularly in related industries – are more likely to succeed in entering new industries than firms with a less extensive history of innovative activity (e.g., Argyres et al., 2015; (Klepper, 1996)) (see figure 6).

Since firms with high new product development capabilities constantly attempt to pioneer in their new offerings, it seems reasonable to assume they also have a long history of successfully launching new products.

Putting these suggestions in the context of new product development and strategic entry assessment, one may assume the following. Since the share of market demand that a firm can capture when entering new industries is highly dependent on timing and since new product development capabilities enable firms to quickly adapt their underlying mechanisms to changing environmental conditions, a firm's strategist may expect the firm to be able to capture more value when the firm's perceived new product development capability is high than when the perceived new product development capability is low. Further, new product development capabilities are accompanied by a considerable amount of costs and commitment. Although these capabilities imply that the firm and its employees have an intrinsic drive to innovate, it nevertheless requires continuous effort. Therefore, a firm's strategist may find it necessary to actively deploy the firm's new product development capability in order for the benefits to outweigh the costs and required commitment. Finally, the definition of new product development capability implicates that firms with such a capability tend to have a strong history regarding innovations. Such a history of successfully launching innovative products and services serves as a signalling mechanism to potential customers and rivals and moreover, enhances overall firm performance. Therefore, a firm's strategist may rate the likelihood to be able to compete with rival firms in new industries as higher when the firm's perceived new product development capability is high than when the perceived new product development capability is low. Building on the above chain of reasoning, I hypothesize:

**Hypothesis 1b)** As a firm's perceived new product development capability increases, so does the firm's strategists' assessment of entry attractiveness.

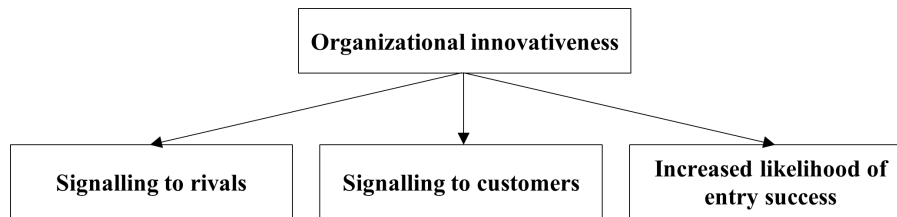


Figure 6: Effects of organizational innovativeness

### 2.3. The role of environmental dynamism

Since the effect of dynamic capabilities on competitive advantage and firm performance does not only depend on these capabilities themselves but also on the contextual setting in which they are applied (e.g., Levinthal, 2001), numerous scholars have started to examine the relationship based on different settings. Particular emphasis in research is placed on the role of environmental dynamism since a firm's ability and the necessity to change is, in most cases, at least somewhat dependent on the environmental context (e.g., Baía and Ferreira, 2019; Hrebiniak and Joyce, 1985; Schilke, 2014; Zahra et al., 2006). With regard to environmental dynamism, I draw on the work of Miller and Friesen (1983) and adapt their conception which states that both unpredictability (or uncertainty) and speed and amount of change (volatility) are fundamental determinants of environmental dynamism. Currently, two somewhat opposing views on the role of environmental dynamism with respect to dynamic capabilities and its outcomes prevail. While the first group of scholars posits that an urgent need to change is prerequisite to capture value from dynamic capabilities (e.g., Drnevich and Kriaucinas, 2011; Wilhelm et al., 2015; Winter, 2003; Zollo and Winter, 2002), the other literature stream assumes dynamic capabilities to be an inadequate means of change.

**Environmental dynamism as a positive factor** – The majority of scholars who classify high environmental dynamism as an enabler and prerequisite for dynamic capabilities build their argumentation on costs and efforts associated with developing such capabilities. Anticipatable costs typically involve those that accompany the continuous reconfiguration and learning process (Schilke, 2014). However, further anticipatable costs may arise if the necessity for resource alterations is wrongly estimated, or dynamic capabilities are deployed improperly. If a firm invests heavily in resources associated with dynamic capabilities without having an explicit need for change, this may result in comparatively poor firm performance. Therefore, firms' strategists need to match costs with the actual use of their dynamic capabilities. Kogut and Zander (1992) refer to dynamic capabilities as "strategic options" that enable firms to reconfigure their existing resource base when they recognize a need for change. If this need for change is low, the opportunity to "strike" the option is less likely, which in turn lowers the value of the dynamic capability. Following this line of reasoning, in environments with low dynamism, dynamic capabilities seem to be of comparably less importance for firms to realize sustainable competitive advantage. Such environments much

rather encourage firms to exploit present resources (Teece, 2007). Thus, the logical conclusion for these researchers is that low environmental dynamism limits the value of the deployment of dynamic capabilities. For instance, Wilhelm et al. (2015) analysed the impact of dynamic capabilities on the effectiveness and efficiency of operating routines under varying levels of environmental dynamism and their results show a positive impact of dynamic capabilities on efficiency only in highly dynamic environments. Since the maintenance of the capabilities is costly and since their effect on efficiency is limited, dynamic capabilities contributed less to efficiency in environments characterized by low dynamism.

**Environmental dynamism as a negative factor** – The other group of scholars emphasizes that dynamic capabilities are path-dependent and routine-based and thus, based on outcomes means for modifying existing resources locally, they may prove ineffective when new and unknown forces steadily change the basis of competitive success (in this case: highly dynamic environments) (Levinthal & March, 1993; Schreyögg & Kliesch-Eberl, 2007). In line with this, Schilke (2014) argued that unfamiliar states pose challenges for the deployment of dynamic capabilities and its effectiveness. However, contrary to most scholars who follow this perspective, he also found these capabilities to be relatively ineffective in environments characterized by low levels of environmental dynamism. This results from the few occasions to actually deploy expensive dynamic capabilities which significantly lowers their net value. Instead, moderate environmental dynamism constitutes the most profitable context for the execution of dynamic capabilities. This condition provides sufficient opportunities for strategic implementation of change while, at the same time, enabling the firm to leverage know-how and solutions from previous experience.

It becomes apparent that there is no consensus on the influence of environmental dynamism on the impact of dynamic capabilities on competitive advantage. This can predominantly be attributed to the differences in the conceptualizations of the dynamic capabilities construct – i.e., defining dynamic capabilities as identifiable and specific processes that are stable and analytic in less dynamic industries and fragile and experimental in high-velocity industries (Eisenhardt & Martin, 2000) vs. dynamic capabilities as capabilities in sensing, seizing and transforming (Teece, 2007) that are most effective in dynamic industries. As stated in section 2.1, I adapt the perspective that easily replicable best practices are not likely to constitute a dynamic capability.

### 2.3.1. Perceived absorptive capacity and environmental dynamism

As stated in section 2.2.1, I assume perceived absorptive capacity to have a positive impact on the likelihood that a corporate strategist will consider entering an industry that has recently experienced an innovation shock. For example, Woiceshyn and Daellenbach (2005), in their study on technology adoption (of Canadian oil firms) in the face of environmental technology change, found that absorptive capacity is crucial for firm survival and superior performance. Their results show that the adoption process for a new horizontal drilling technology of firms with higher absorptive capacity is more efficient than the process of firms with lower levels of absorptive capacity. Differences in the processes of adoption were determined by several dimensions: Firms with strong absorptive capacity (in contrast: firms with low absorptive capacity) developed strong long-term resource commitment, integrated external first-hand knowledge from partners such as joint ventures and strategic partnerships, anchored innovative behaviour and risk tolerance in their values and norms, fostered funding initiatives within managerial systems, and finally, ensured high skills in relevant areas through targeted project staffing and training.

Chen (2004) examined factors that influence a firm's ability to acquire and replicate knowledge from outside the firm and confirmed a positive relationship between a firm's absorptive capacity and knowledge transfer performance. Inward technology transfer –an integral part of the absorptive capacity construct – is, among other things, facilitated by the possession of superior technical skills, resources, and managerial commitment (e.g., Agmon and Von Glinow, 1991). It becomes quite evident that the development of absorptive capacity requires considerable and continuous investment (Marsh & Stock, 2003) and deep managerial commitment (Woiceshyn & Daellenbach, 2005). Given the effort of building superior absorptive capacity, I assume that firms need to extensively make use of such capability in order to generate revenue from it. Hence, I agree with the authors who state that, as developing dynamic capabilities is costly and requires strict commitment, absorptive capacity does not necessarily pay off in stable environments. In certain settings, the capability may even be destructive due to high maintenance costs (Li & Liu, 2014). High-velocity environments, on the other side, are characterized by comparably short product lifecycles with frequent technology shifts. While some scholars assume such conditions to decrease the effectiveness of dynamic capabilities, suggesting these capabilities are routine-based and thus not matchable to new settings (e.g., Schilke, 2014), I do not assume absorptive capacity to prove less effective in such environments.

As reflected in the definition I adapt in this article, absorptive capacity is the ability of a firm to capture value from “new” external information, implying this is of particular importance in new and unfamiliar industry settings. Given the constant threats of competitors and rapidly evaporating opportunities, a dynamic environment may enable firms with

strong absorptive capacity to gain an advantage over incumbents or new entrants with lower levels of absorptive capacity. Further, in hyper-competitive industries, resources and skills are difficult to obtain, making the ability to efficiently sense and adapt in a timely manner one of the few ways to achieve short-term advantage (D'Aveni et al., 2010). In less hostile environments where previous strategies can often be reused, absorptive capacity may be much less relevant and not necessarily beneficial, given the costs associated with building and maintaining such capability. However, if a firm decides to enter a new industry, this results in additional investments and resource commitment which are not necessarily related to dynamic capabilities. Such costs may involve implementing new quality controls to meet the new industry's regulations and standards, hiring new employees, or renting new buildings. Thus, although a firm with strong absorptive capacity may benefit from environmental dynamism in a new industry in terms of fully exploiting this dynamic capability, costs and capacity risks may increase due to resource scarcity and activities to maintain absorptive capacity. On the contrary, low-velocity industries may not offer sufficient opportunities to capture much value from absorptive capacity

As illustrated in section 2.2.1, in addition to active knowledge internalization, firms with absorptive capacity also benefit from passive knowledge acquisition as a result of knowledge spillovers. Firms with high absorptive capacity enjoy a better understanding of new and external knowledge. However, the likelihood of the occurrence of knowledge spillovers and of actually capturing value from such knowledge spillovers is not only in the hands of the firm entering a new industry. It is also determined by the mechanisms competitors deploy to secure their knowledge and lock it in. Such appropriability mechanisms include, among others, secrecy tactics, and intellectual property rights (e.g., patents, trade secrets). Altogether, these mechanisms form the “*appropriability regime*” of organizations (Ritala & Hurmelinna-Laukkanen, 2013). If a competitor has a strong appropriability regime, the likelihood of unintended spillovers is unlikely (McGahan & Silverman, 2006), making it difficult for the entering firm to use its absorptive capacity efficiently in this context. However, if a competitor lacks protection mechanisms for its innovation efforts and knowledge, unintended spillovers enable firms with high levels of absorptive capacity to profit and incorporate that external knowledge. Building on the theory of Porter (1997), considerable research suggests that industry characteristics such as the degree of competition and dynamism influence the degree of technical progress and the intensity of competitive forces, which in turn affect competitors' ability to prevent knowledge spillovers (James et al., 2013). Fast moving industries with strong competition and constant change make it difficult for innovators to protect their innovations, as, for example, the constant pressure to innovate and develop new products is accompanied by numerous new patent applications, which can take many years to be granted. Hence, in those industries, unintended knowledge spillovers are quite likely

to happen. On the contrary, in low-velocity industries with comparably long product life cycles, appropriability regimes are more extensive, and therefore knowledge spillovers can be avoided more easily by competitors (see figure 7).

Given that valuable opportunities in dynamic environments can only be exploited if the firm's employees are able to process respective external information, van Doorn et al. (2017) examined how top management teams and strategists enhance firms' entrepreneurial orientation in industries characterized by high environmental dynamism. Managers and strategists play an essential role in strategy formulation and execution and thus, their ability to interpret environments the firm operates in, contributes significantly to the firm's strategic positioning as a response to environmental changes (Cho & Hambrick, 2006; Kirova, 2023). Since it is assumed that absorptive capacity increases managers' ability to capitalize on external knowledge (Goll et al., 2007), van Doorn et al. (2017) assessed the interplay between external advice seeking and managers' absorptive capacity and found that only when combined with strong absorptive capacity, advice seeking aids top managers in elaborating innovative strategies in dynamic environments. Also, absorptive capacity enables managers to better evaluate the feasibility of advice and to refine useful information in a value-adding manner (Augier et al., 2001). Further, it eases timely decision-making which is an indispensable ability in high-velocity environments. (Szulanski, 1996). In such environments, windows of opportunities to achieve competitive advantage are short and absorptive capacity incorporates the skillset to identify such opportunities at an earlier stage, incorporate them, and apply them to commercial ends. Since accumulated knowledge shapes opportunities firms and individuals identify and transform into profitable business operations, managers' ability to understand and adopt external knowledge has an impact on the ability to capitalize on entrepreneurial opportunities – especially if the environment is dynamic.

Given the pace of change in dynamic environments, strategists operating in firms that lack timely decision-making processes and appropriate screening mechanisms, may consider entry into dynamic industries riskier and less attractive than competitors that are quicker and more efficient in strategic decision-making. High absorptive capacity enables firms to fasten strategic decision-making and to profit from external knowledge in dynamic as well as in stable environments. However, firms may be able to derive more benefits from such dynamic capability in high-velocity industries. Although environmental dynamism may increase maintenance costs for absorptive capacity, I expect the benefit it generates for the firm to outweigh its costs and hence, I assume that strategists give greater weight to the former. Further, not all determinants of absorptive capacity require continuous investments. For instance, employee incentives (Van Den Bosch et al., 1999), usage of information systems (Lenox & King, 2004), and percentage of technical employees (Luo, 1997) are frequently used proxies for absorptive capacity. Unlike, for example, R&D investments, these fac-

tors do not require continuous investment – the costs and effort occur predominantly in their development stage. Considering the potential for absorptive capacity in dynamic environments that arises through, e.g., streamlined decision-making processes, and leveraging unintended knowledge spillovers from competitors, strategists may rank entry into a high-velocity industry as more valuable than into a stable environment. For instance, if a firm's strategist assumes the firm to have high absorptive capacity, he or she might also assume the firm to be able to screen and apply external knowledge and to efficiently implement new strategies based on the generated insights. However, if this firm enters a stable environment where change is rare, strategy adjustments or implementations may not be necessary, and previous investments in absorptive capacity development may not pay off to the same extent. On the contrary, if the new industry is accompanied by frequent change, the perceived ability to quickly make decisions and execute new strategies may lead the strategist to assume the firm to have a substantial advantage over competitors. Moreover, as a result of unintended spillovers due to competitors lacking adequate protection mechanisms, the strategist may be better able to sense and screen knowledge outside the firm than in stable industries where it is easier for competitors to protect their knowledge. Thus, I hypothesize:

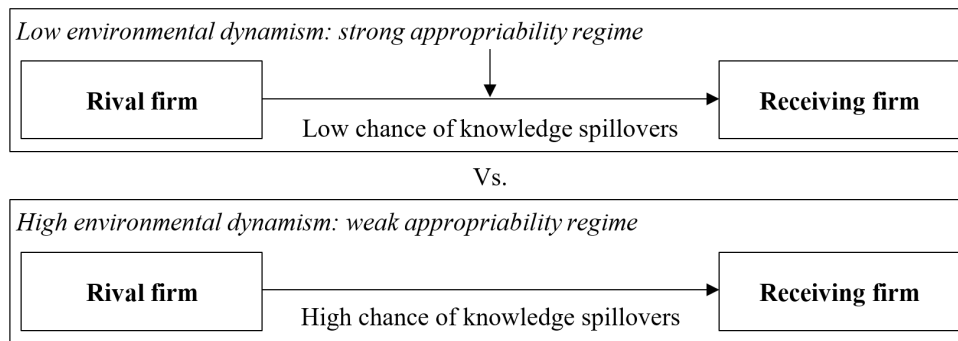
**Hypothesis 2a)** Perceived absorptive capacity will encourage a firm's strategist to enter a new industry, especially if the industry is expected to show high levels of environmental dynamism.

### 2.3.2. Perceived new product development capability and environmental dynamism

New product development capability is positively related to firm performance (M. Song et al., 2005), organizational effectiveness (Arnett et al., 2018), and competitive advantage (Drnevich & Kriauciunas, 2011). Firms with strong new product development capability are able to reconfigure and modify the way a firm develops new products and services based on changes in the environment it operates in. Similar to my discussion of absorptive capacity and dynamic capabilities in general, it should be noted that new product development capabilities usually require a sustained commitment of resources such as high investments in new R&D activities and adequate compensation to attract and keep technical employees. Given the commitment and costs, I anticipate that firms will need to leverage their new product development capability extensively to offset corresponding costs. This justifies the assumption that the strength of the positive impact of new product development capabilities on the above-mentioned outcomes varies depending on the degree of environmental dynamism.

Stable environments are characterized by infrequent change and comparably easily predictable actions of competitors and customers. Thus, in many cases, existing products and services can be sold without any major changes and old strategies can be reused (Hambrick, 1983). On the contrary, when contextual circumstances undergo relatively frequent





**Figure 7:** Knowledge spillovers in environments with low vs. high dynamism

changes, new product launches or overhauls are essential for firms to remain competitive (M. Song et al., 2005). Changes are required not only in the product itself but also in the whole process of developing new offerings. Multiple scholars have examined firm performance under varying levels of industry dynamics and have found innovative behaviour of firms to play a crucial role. For example, entrepreneurial orientation increases firm performance but at faster pace for businesses in dynamic environments (Wiklund & Shepherd, 2005).

Moreover, more entrepreneurially oriented firms are better able to capitalize on opportunities in such environments and are less prone to threats. Opportunities include, among other things, newly identified customer preferences (Sandvik et al., 2011), or new product development as a result of technological breakthroughs whose technical information is publicly available (Wilden & Gudergan, 2015). Threats, on the other hand may involve sunk costs resulting from existing products and services becoming obsolete or redundant due to changes in new environmental demands or changing customer preferences (Baum & Wally, 2003; van Doorn et al., 2017). To harness the potential of opportunities and to minimize vulnerability to threats, some firms place strong emphasis on the development of technologies, IT systems, and task-related activities, that allow them to rapidly develop new offerings – i.e., they strive for high new product development capabilities. However, although new product development capability is considered a major source of increased firm performance, gaps between investments on the dynamic capability and outcomes of such investments are not uncommon (Bicen & Hunt, 2012). Main causes of this gap include, for example, the increasing costliness and complexity of new product development and uncertainties associated with corresponding research and development (Rindfleisch and Moorman, 2001; Sivadas and Dwyer, 2000). To close the gap – or at least keep it as small as possible – firms need market information (Bicen & Hunt, 2012).

Being able to identify consumers' current needs and to predict their future actions and preferences is critical for targeted use of firms' new product development capabilities. Hence, if a firm's strategist assesses the attractiveness of entry, he or she may not only take into account the firm's level

of new product development capability but also its ability to predict future consumer needs. Constantly striving to pioneer and to be at the forefront of technology in new product introductions may not be sufficient to achieve a superior position in unknown high-velocity industries. Much rather, firms must implement procedures within the firm that enable them to identify environmental changes and then respond in a beneficial way. Arnett et al. (2018) examined the effect of new product development capability on organizational effectiveness and were able to prove a positive relationship. However, they included the ability to acquire external knowledge and integrate it into internal processes in their definition of new product development capability. They argued that gathering internal as well as external technical and market information is a prerequisite for an adequate resource allocation with respect to successful new offerings and that new product development capability can therefore be viewed as a type of market-sensing capability. Further, although there are variations across industries and firms, a review of the literature on new product development suggests that four basic stages underlie a successful new market offerings process, i.e., opportunity evaluation, technical development, experimentation and testing, and commercialization (e.g., Alam and Perry, 2002; De Jong and Vermeulen, 2003; Salunke et al., 2019).

In the first stage, firms aim to identify evolving market trends, competitor actions, and consumer behaviour and – based on their findings – assess their ability to successfully develop products that possess the features desired by the consumers (Sandvik et al., 2011). The technical development stage involves setting up the necessary processes and allocating resources required to address the opportunities discovered in the previous stage (Arnett et al., 2018). In the experimentation and testing stage, both the offering and its proposed sales program are assessed. This allows firms to make required changes before the product and its underlying activities are fully implemented (Thomke, 2008). Finally, the commercialization stage covers the implementation, management, and tracking of the new product launch (X. M. Song & Montoya-Weiss, 1998). Arnett et al. (2018) propose that firms must possess at least acceptable abilities in all four stages to create successful new offerings and that, thus, firms

must consider all stages when developing new products or taking new strategic directions. Moreover, they suggest that new product development capability as a dynamic capability provides firms with sufficient abilities in each stage. As stated earlier, Arnett et al. (2018) incorporate the ability to acquire and capitalize on external knowledge in their definition of this dynamic capability. I agree with the assumption that external and internal insights are crucial for market success. However, I take a different view on the definition of new product development capability. As described in section 2.1.1, I define absorptive capacity as a firm's ability to acquire and internalize external knowledge for the benefit of the organization. For new product development, on the contrary, I assume internal resources and activities to be the driving forces. Following this line of reasoning, I classify absorptive capacity as a market sensing dynamic capability and new product development capability as a more intrinsic drive to use internal skills to generate value with new offerings. Since I do not view new product development capability as a market sensing capability, I do not assume this capability to be a sufficient prerequisite for a firm to succeed in the opportunity evaluation stage. Even in the development stage, I suggest that firms require stronger market-sensing skills. For example, unintended and intended spillovers may help firms build up required processes and technical equipment. The four new product development stages are illustrated in figure 8. Further, the ones that require new market-sensing capabilities are highlighted. Therefore, I expect firms with high new product development capability to face significant challenges when entering dynamic industries with constant change if they lack accompanying screening abilities (covered by e.g., absorptive capacity).

Ruiz-Ortega and García-Villaverde (2008) examined the implications that the timing of entry has for the impact of dynamic capabilities on firm performance. They did not find variation in the relationship between new product development capabilities and firm performance for different moments of entries into new industries. However, pioneering firms and early followers run the risk of incurring too high a cost for their commitment. Firms that focus on imitation rather than on investments in innovative activities, on the contrary, face lower risks. Adapting this line of reasoning to the case of entry into a highly volatile industry that has just experienced an innovation shock, this would increase the risk for a firm with high new product development capability as such firms thrive to be at the forefront of technology in their new offerings. Other risks associated with high-velocity industries include unpredictable actions of competitors who may also launch new products resulting in increasing consumer choice, availability of new technologies which may enable rivals to imitate products with optimized features, and changing economic conditions which may limit the buying behaviour of potential consumers (Arnett et al., 2018).

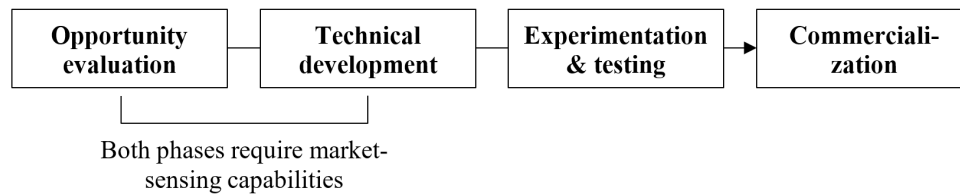
The urge to be at the forefront of technology is deeply rooted in the culture and values of firms with high new product development capability. Being able to innovate and develop new products is of high relevance in turbulent envi-

ronments. However, the ability to do so involves considerable commitment and multiple risks and does not necessarily pay off more in dynamic environments (M. Song et al., 2005). Overall, given the high costs required to remain competitive in high-velocity industries, I assume the risks in such environments to outweigh the opportunities new product development capability creates. This, in turn, might weaken the attractiveness of entry for decision makers. For instance, the perceived new product development capability of a firm may be high. If the firm's strategist decides to enter a highly volatile industry which has just experienced an innovation shock, the firm may be faster than competitors in terms of developing superior products and thus, be able to cover a significant portion of the new demand. On the other hand, entering such industries requires high costs for technical equipment, research and development, and maintenance. Such costs may even increase if the firm lacks mechanisms and skills that help acquire and internalize external information. The need for external information such as market, consumer, or competitor information is particularly important in turbulent settings and new product development capability does not necessarily provide firms with such ability. If incumbents possess high new product development capability, too, they may be able to outperform the entering firm. Further, entering a high-velocity industry involves risks associated with changing consumer demands. If the firm enters a comparable stable environment, on the other hand, it may still require its new product development capability to quickly develop development processes and respond to the innovation shock. However, the maintenance costs and risks are considerably lower as actions of competitors and consumers are generally easier to predict, and technology changes occur less frequently. Much rather, the firm could focus on becoming technology leader and further, try to build mechanisms to protect its technical knowledge, which is more doable in stable industries. Thus, I hypothesize:

**Hypothesis 2b)** Perceived new product development capability will encourage a firm's strategist to enter a new industry, especially if the industry is expected to show low levels of environmental dynamism.

#### 2.4. The role of internal knowledge sharing

In addition to dynamic capabilities, other organizational conditions, abilities, and mechanisms have a significant impact on sustainable competitive advantage and strategic choices, and on the relationship between dynamic capabilities and its outcomes (e.g., Baía and Ferreira, 2019; Barrales-Molina et al., 2010). One of the most examined organizational mechanisms to improve innovative performance and gain competitive advantage in dynamic environments is internal knowledge sharing (e.g., Davenport and Prusak, 1998; Grant, 1996; Pai and Chang, 2013; Zhao et al., 2021). As an essential knowledge-centred organizational activity, it allows employees to add value in knowledge distribution, exploitation and finally, to the competitive advantage of the firm they work for (e.g., Cabrera and Cabrera, 2005; Jackson



**Figure 8:** New product development phases and market sensing capabilities

et al., 2006; S. Wang and Noe, 2010). More precisely, knowledge sharing means providing information and know-how with the intention to collaborate and to help others (e.g., Cummings, 2004; S. Wang and Noe, 2010).

Existing research results can be roughly classified in two directions. One group of scholars suggests that organizational innovativeness is guaranteed by knowledge sharing (e.g., Jackson et al., 2006; C.-P. Lin, 2007). Other researchers agree that knowledge sharing partially impedes the innovation performance of firms. For instance, Ritala et al. (2015) found that, although knowledge sharing has a positive influence on innovation performance, unintentional or intentional external knowledge sharing negatively moderates this relationship. Moreover, knowledge sharing inevitably leads to knowledge resource heterogeneity within organizations, which, in turn, can cause gaps in internal knowledge exchange and finally, increase knowledge management costs and hinder innovative performance (Ancona & Caldwell, 1992).

However, although there are some differences in the results and conceptualizations of knowledge sharing, the majority of studies conclude that, as knowledge is the firm's most important resource, firms and their decision makers profit from knowledge sharing mechanisms in multiple ways. For example, it can help reduce production costs, increase the speed of new product development projects, strengthen team performance, and optimize firm performance through sales growth and growth of revenue from new products and services (e.g., Arthur and Huntley, 2005; Mesmer-Magnus and DeChurch, 2009; S. Wang and Noe, 2010) (see figure 9).

In the following, I use the term knowledge sharing when referring to knowledge sharing within a firm.

When I refer to knowledge sharing to external parties, I use the term external knowledge sharing. Further, I assume firms to possess high levels of knowledge sharing if internal processes for sharing information effectively among individuals, decision makers, and internal units are very well developed. In contrast, if such processes are only developed to a limited extent, a firm's level of knowledge sharing mechanisms is low.

#### 2.4.1. Perceived absorptive capacity and internal knowledge sharing

Absorptive capacity is a central organizational capability as it enables firm to gain competitive advantage through, for instance, increased learning abilities and knowledge acquisition and internalization (e.g., Baía and Ferreira, 2019).

While absorptive capacity plays a major role in firms' competitive performance, it is not the only element that has an effect on performance and strategic choices. Given the high relevance of both absorptive capacity and knowledge sharing, there is a growing interest in identifying and examining factors that determine the relationship between these two organizational mechanisms (e.g., Balle et al., 2020; Ceccagnoli and Jiang, 2013; Van Wijk et al., 2008). However, the results of studies on the relationship between absorptive capacity and knowledge sharing are somewhat puzzling and ambiguous. While some scholars claim that knowledge sharing is positively influenced by a firm's absorptive capacity (e.g., Ai and Tan, 2017; Berry, 2017; Miguélez and Moreno, 2015), others suggest a positive impact of knowledge sharing on absorptive capacity (e.g., Costa and Monteiro, 2016; Lim et al., 2015; Peltokorpi, 2017).

With respect to articles that regard absorptive capacity as an antecedent to knowledge sharing, the majority of scholars base their line of reasoning on the assumption that absorptive capacity provides the knowledge base necessary to establish knowledge sharing mechanisms in an organization and facilitates its process (Balle et al., 2020). It is assumed that absorptive capacity provides the grounding needed to engage in knowledge sharing activities. This happens, among other things, by applying best practices, and by identifying and integrating new knowledge opportunities (e.g., Grimpe and Hussinger, 2013). However, these arguments are difficult to reconcile with the definitions of dynamic capabilities and absorptive capacity adapted in this study. First, I do not define dynamic capabilities as best practices and, hence, do not assume absorptive capacity to foster knowledge sharing via the application of such learnings. Second, I define absorptive capacity as the firm's ability to internalize and profit from knowledge outside the firm, implying that internal knowledge sharing is not necessarily influenced by knowledge streams arising from the firm's absorptive capacity. Finally, although absorptive capacity increases knowledge transfer from external sources, I suggest that firms can still implement extensive knowledge sharing mechanisms and utilize already existing internal knowledge without requiring strong absorptive capacity.

On the other hand, regarding the literature stream that considers absorptive capacity as an outcome of knowledge sharing mechanisms, the major argument in qualitative studies is a boost in absorptive capacity resulting from the existence of knowledge sharing support practices (e.g., Elezi and Bamber, 2016). Quantitative articles, which are the major-

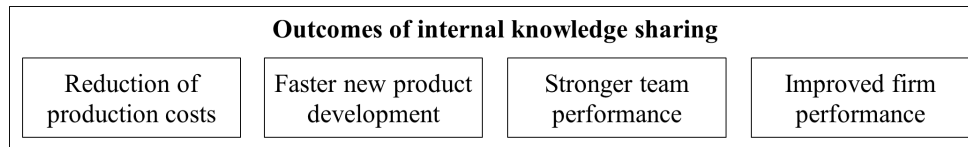


Figure 9: Outcomes of internal knowledge sharing

ity in this stream, mainly suggest that knowledge sharing increases knowledge in multiple units making it easier for firms to estimate and rank the value of external knowledge.

When faced with the choice to either enter new or related industries or remain in the current strategic position, firms' strategists must take into account both external as well as internal factors that may facilitate or complicate entry. Internal factors to consider include the firm's levels of knowledge sharing. Zhao et al. (2021) found that, although internal knowledge sharing cannot directly foster firms' innovation performance, absorptive capacity has a full mediating effect on this relationship. Further, since knowledge sharing exposes organizational teams to new knowledge and spreads it within the firm, this knowledge distribution may also help improve firms' absorptive capacity (Curado et al., 2015). In terms of outcomes of absorptive capacity, a considerable number of scholars have found a positive and direct relationship between absorptive capacity and firm and innovation performance (e.g., Bergh and Lim, 2008; Brettel et al., 2011). I agree with this view and further suggest a positive relationship between absorptive capacity and the assessment of strategic entry. However, I do not explore the role of knowledge sharing as a mediator but much rather as a moderator.

Knowledge sharing spreads knowledge across departments which can streamline the process of acquiring and internalizing knowledge. Further, Liao et al. (2007), in their article on knowledge sharing behaviour in knowledge-intensive industries, argue that if firms manage to establish a strong knowledge sharing culture, employees are likely to be affected in a way that increases their learning ability and motivation. Since knowledge sharing fosters interaction and emphasizes the firm's support for collaboration, employees are able to better understand their firm's positioning and engage more in learning activities. A firm with strong absorptive capacity is able to internalize external knowledge and capture value from it regardless of internal knowledge sharing and hence, may decide to enter a new industry. However, the firm's strategist's perception of knowledge sharing may impact the extent to which he or she assumes high levels of absorptive capacity can lower the barriers to strategic entry, because it often eases rapid and balanced distribution of newly acquired knowledge, and collaboration may lead to knowledge synergies. For example, a firm might possess high levels of absorptive capacity that enable the firm to internalize external knowledge acquired from spillovers and collaboration. However, sharing this extracted knowledge between teams and ensuring it also falls into the hands of specialists who might be able to utilize it in other beneficial

ways than those who internalized the knowledge in the first place might require considerable effort and time. Therefore, I assume a firm's strategist to rate strategic entry as much more attractive if he or she feels the organization disposes of sufficient processes to ensure the knowledge is distributed in a timely manner and that internal resources are actually committed to sharing knowledge and to learning from received knowledge. In contrast, if the firm is able to acquire and internalize external knowledge but it takes tremendous time to share such knowledge within the firm and there is no motivation to do so, strategists might agree that the firm is not able to fully capitalize on the newly acquired knowledge. Thus, I hypothesize:

**Hypothesis 3a)** Perceived absorptive capacity will encourage a firm's strategist to enter a new industry, especially if it is assumed that knowledge sharing within the firm is very well developed.

#### 2.4.2. Perceived new product development capability and internal knowledge sharing

Innovation is often explained in terms of modifications in firms' offerings and the way firms develop and deliver these offerings (Francis & Bessant, 2005). Drawing on Samson's (1991) innovation categories, i.e., product, process, and managerial and systems innovation, innovative capability is commonly assumed to be reflected in the ability to show performance in these three categories. As stated in section 2.1.2, new product development capability represents one of the numerous dimensions of innovative capabilities and is one of the most explored dynamic capabilities (e.g., Helfat and Winter, 2011; Schilke, 2014). While a considerable number of studies have examined the relationship between knowledge sharing, absorptive capacity as a specific dynamic capability, and their outcomes, comparably little research is available on the relationship between new product development capability and knowledge sharing. However, multiple scholars have focused on the investigation of how innovative capabilities (which incorporate new product development capabilities) and knowledge sharing relate to each other.

Quinn et al. (2009) suggested that intellect and knowledge grow exponentially when shared. If knowledge is only exchanged between two persons, this only results in linear growth. However, if this knowledge is further distributed by such persons, others integrate feedback and learnings and finally, the value becomes exponential. This is the case in firms that put a strong emphasis on the implementation of comprehensive knowledge sharing mechanisms. Building on this logic, Liao et al. (2007) explored the role of knowledge shar-



ing in firms' innovation efforts and proved a positive effect of knowledge on innovation capability. Since prior research was able to prove a positive impact of shared knowledge on various innovation outcomes such as product innovation (Camelo-Ordaz et al., 2011), team innovation (Hu & Randel, 2014), and technical innovation (Chen & Huang, 2009), knowledge sharing is likely to also improve overall organizational performance (Costa & Monteiro, 2016). Further, knowledge sharing mechanisms can be divided into knowledge donating and knowledge collecting (H.-F. Lin, 2007).

As knowledge is personal (Davenport & Prusak, 1998), a prerequisite for effective knowledge management in firms is the determination of employees to share their knowledge and to cooperate with colleagues. If a firm promotes knowledge donation, this encourages the development of innovative ideas and business opportunities, and thus facilitates innovative actions (Darroch & McNaughton, 2002). Knowledge collection, on the other hand, reflects mechanisms and processes for gathering internal and external knowledge (H.-F. Lin, 2007). Collecting essential knowledge represents a major element of successful innovation project completion and thus, also increases innovation capabilities (Hansen, 1999). Hence, employees' willingness to both donate and collect knowledge are positively related to a firm's innovation capability. As firms' performance is partially determined by sales and revenue numbers, Collins and Smith (2006) investigated the impact of knowledge practices on new product revenue and sales growth in high-technology firms and proposed that, as a higher level of shared codes and language between specialists facilitates frequent knowledge exchange and combination among specialists, this also increases both revenue from new product introductions as well as sales growth. Therefore, it is reasonable to say that, since effective knowledge sharing fastens and optimizes product innovation by driving individual learning, it is an essential enabler for idea and product innovations (Gao & Bernard, 2018).

However, knowledge sharing in firms is hampered by a variety of obstacles. One challenge that accompanies firms' new product development efforts, is the cross-functional nature of product development processes. If firms do not have various standardized knowledge sharing practices across departments in place, they may not be able to maximize the value from new product introductions. Such gaps in knowledge exchange might lead to costly mistakes. Additional main barriers to project success include a lack of detailed and transparent knowledge definitions, and of mechanisms to ensure access to relevant information in the multilingual environment (Bradfield & Gao, 2007).

Similar to the effect of knowledge sharing on perceived absorptive capacity and strategic entry, I expect the firm's strategist's perception of knowledge sharing to influence the extent to which high levels of new product development can lower strategic entry barriers. In this article, a firm's new product development capability is reflected in the ability to constantly attempt to pioneer and to be at the cutting edge of technology in its new product and service introductions. Knowledge sharing facilitates, among other things, new ideas

development, the learning ability of specialist employees, and employees' motivation to actively contribute to firm performance.

For instance, a firm might have extensive new product development capabilities and thus, benefit from increased competitiveness with regard to technological performance and quality of new products. However, if the firm lacks appropriate knowledge sharing mechanisms, the new product development process might involve high costs as a result of inefficient knowledge paths and untransparent technological documentations. The firm's strategist must believe that the firm has sufficient procedures in place to ensure high-quality knowledge sharing, to rate entry as a highly valuable strategic move. On the contrary, if the perceived new product development capability of the firm is high but the strategists assume that no adequate knowledge sharing mechanisms are implemented, the firm might be expected to face costly obstacles and thus, the strategist might rate the ability of the firm to capitalize as rather limited. Thus, I hypothesize:

**Hypothesis 3b)** Perceived new product development capability will encourage a firm's strategist to enter a new industry, especially if it is assumed that knowledge sharing within the firm is very well developed.

### 3. Method

To test my hypotheses, I conducted an online conjoint experiment with 52 strategists as the survey sample. The following section briefly explains the approach I used to define my sample, the benefits of conjoint analyses, and the main steps of my data collection. Further, I provide an overview of the participants' demographics, describe the assessment situation, and introduce the model's variables.

#### 3.1. Research approach

The concept of bounded rationality (Simon, 1955) indicates that, as limited rational agents, we cannot imagine all sets of available choices, nor can we specify the entire relationships between possible actions and their outcomes. The rather limited representations, based on which actors shape their environmental models, both simplify the interactions among decision makers and choices, and causal and spatial relationships (Gavetti & Levinthal, 2000; Weick, 1979).

However, with regard to managerial decisions and courses of actions, cognitive representations have proven to be a highly relevant factor (e.g., Gavetti, 2005; Gavetti et al., 2012; Walsh, 1995). Specifically, firms' strategic directions are, in many cases, a result of their decision makers cognitive representations. Although decisions are developed and formed in actors simplified mental space, it is possible for them to identify the most promising actions by translating their cognition into actual organizational behaviour. This happens through both a backward-looking and forward-looking logic (learning vs. consequences of actions) (Gavetti & Levinthal, 2000). By further examining the interplay between cognition and action, Gavetti (2005) found that the

way a firm's manager or strategist represents a given contextual situation, fundamentally affects the firm's strategic direction it will pursue (see figure 10). This implies that a firm's future actions and business agenda are typically shaped by such experts' advice which is of particular relevance when firms enter new fields or when external shocks result in a new structure of firms' strategic decision problem (Gavetti, 2005; Zajac & Kraatz, 1993).

Building on this logic, I performed my experiment with strategists since I assume they adequately represent their respective firms (further information on the sample is summarized in section 3.2). Of course, the answers in surveys are subjective and dependent on a variety of other factors – nevertheless, strategists' past and future directions shape firms' behaviour and they can partially anticipate the impact of their strategic decision-making on their firm's position. Further, strategic roles in organizations require deep theoretical and practical understanding regarding firms' strategic positioning behaviour. Hence, I do not only assume strategists to be able to anticipate broad consequences of their own strategic actions but also to consider essential firm theories and practical implications in their decision-making process. This is in line with other studies that focus on strategic management since they also commonly use managers and strategists as proxies (e.g., Schilke (2014): interviews with top-level managers, Kohtamäki et al. (2020): survey with CEOs, development, production, and innovation managers).

For my study, I used an online conjoint experiment to gather data on strategists' assessment of strategic entry. In such an experiment, respondents are required to make a series of assessments for a number of decision scenarios (Domurath & Patzelt, 2016). The set of attributes enables dismantling of decisions into their composing parts using hierarchical linear modelling (Green et al., 2001; McMullen & Shepherd, 2006). While the attributes in a scenario reflect the independent variables, the dependent variable is represented by participants' scenario assessment. The conjoint method has been used in plenty of decision-making and judgement articles and is highly appropriate for this type of study for several reasons. First, it allows for examination of interactions between the defined attributes which is reflected in some of my hypotheses (Domurath & Patzelt, 2016). Second, instead of relying on post hoc techniques and thus, accepting an increased risk of biased reporting (e.g., Sandberg and Hofer, 1987) and ignorance of a dynamic decision-making process (e.g., Hall and Hofer, 1993), conjoint analysis considers the recognition of opportunities instead of evaluating recognized opportunities (e.g., Ellis and Pecotich, 2001). Third, I integrate the call from Shepherd and Zacharakis (2018) to take into account complex and turbulent environments by considering environmental dynamism and innovation shocks, and fourth, I aim to spur future conjoint research taking the perspective of firms' stakeholders since this view falls, to this date, comparably short (Shepherd & Zacharakis, 2018).

### 3.2. Sample and data collection

My sample consisted of professionals employed in the position of strategist/ strategic growth expert, business development expert, or innovation expert (summarized under the term strategist). Such positions provide a good population for the topic of my study for the following reasons. First, assessing strategic moves and their potential outcomes is part of their daily work and hence, they know how to approach complex decision-making processes. Second, their performance is measured to a large extent by figures resulting from certain strategic decisions and expansion plans they make. This ensures their commitment in such tasks. Third, strategic decision-making requires a deep understanding of what capabilities are required for certain strategic actions and therefore, such experts know the relevance of a firm's ability to internalize external knowledge (absorptive capacity). Fourth, it is common that these professionals are in regular exchange with, for instance, R&D, production, and sales departments and are thereby informed about progress, challenges, and department-specific needs (new product development). Altogether, I assume that my sample has a reasonable understanding of the interplay between firms' capabilities and the likelihood of industry survival and competitive advantage.

The survey was built in Unipark and written in English. The channels I used to reach out to potential participants included LinkedIn, The Global Business Development Network (BDN) – a network of screened business development experts, executives, and business owners –, and firms' websites. To ensure participants' suitability for my survey, I applied two selection criteria: First, I only contacted professionals with at least three years of work experience since I do not assume that participation in major strategic decisions is the norm in early years. Second, to ensure that the assessment of strategic entry explored in my experimental approach is relevant to participants, at least to some extent, the majority of contacted professionals work in knowledge-intensive and/ or technology industries characterized by moderately or high levels of environmental dynamism. Since such environments are highly competitive and incorporate frequent change, they typically have higher expansion end repositioning potential (Domurath & Patzelt, 2016; Zacharakis & Shepherd, 2018). Altogether, I reached out to 173 potential participants. When contacting the professionals, I found that 37 were either not available under the email address provided on the firms' websites, did not match my selection criteria, or were not interested in participating. Hence, 136 potential candidates remained. In case the survey was not completed within three weeks, I sent a second email or personal message on LinkedIn as a reminder. In total, 52 professionals conducted the entire survey, which is reflected in a response rate of 30.1 % in terms of strategists contacted. The sample size is consistent with those of other conjoint studies (e.g., Choi and Shepherd (2004) with 55 and McMullen and Shepherd (2006) with 54 participants) and exceeds the minimum sample size of 50 participants proposed by Shepherd and Zacharakis (2018). Since conjoint analysis offers multiple data points within one individual, thus allowing individ-

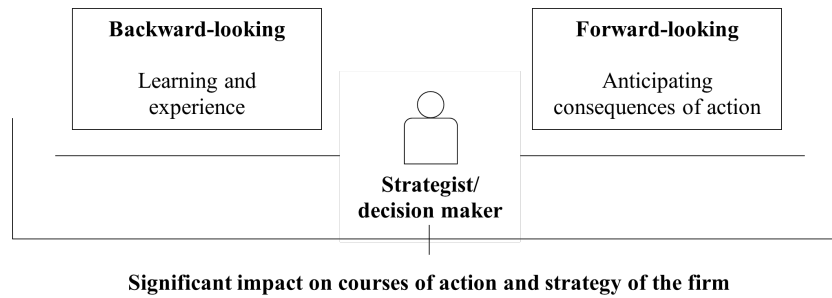


Figure 10: Decision-making process and impact on firm strategy

ual subject analysis, it requires a considerable smaller sample size than standard survey formats (Zacharakis & Shepherd, 2018).

The majority of participants were aged between 18 and 36 years, 40% were female, and more than 69% of the participants indicated a Master's degree or higher as their highest educational level. Further, more than half of the persons who conducted the survey had at least 6 years of work experience in (51.8%) and only 17.3% have worked for their current company for less than 3 years. The most frequently mentioned industries the participants are active in were "Computer and Technology" (19.2%), "Finance and Economics" (21.2%), and "Pharma" (19.2%). More detailed information regarding the experiment's participants is summarized in table 1.

### 3.3. Experimental design

A hypothetical scenario described an industry that has recently experienced an innovation shock and included information on the firm's absorptive capacity, its new product development capability, internal knowledge sharing process, and on industry dynamics (i.e., environmental dynamism) in the new industry. I chose these variables as evaluation inputs since the assessment of varying scenarios reflects strategists' assessment of strategic entry in diverse industries and with different underlying levels of organizational capabilities and processes. More precisely: there are differences in the strategist's perception of each of the variables. For example, a strategist may perceive his or her firm as capable of integrating external knowledge in some cases, while in others, he or she does not. Further, in some cases it may be anticipated that the firm strives to pioneer and outperform its competitors, while in others, it may lack the underlying values and technology resources to do so. The same accounts for the two moderators. In some cases, strategists may assume the firm is able to quickly allocate essential knowledge to the right person, while in others, the strategists may assume the knowledge sharing process is highly time-consuming. With regard to environmental dynamism, the assessment depends upon whether the strategists regard the industry as highly unpredictable or assumes that shocks and shifts in demand constitute the exception.

Hence, each hypothetical scenario included two attributes that described dynamic capabilities (i.e., absorptive

capacity, new product development capability), one attribute that described another organizational factor (i.e., knowledge sharing), and one attribute that described an external factor (i.e., environmental dynamism). Each of these attributes was varied at two levels resulting in  $2^4 = 16$  profiles. These profiles were fully replicated to ensure reliability, increasing the number to 32 profiles in total (Shepherd & Zacharakis, 2018). Since my model incorporates multiple interactions, I applied a full factorial design (as opposed to a fractional factorial design) to account for all interaction terms.

13% of the 52 participants did not answer reliably ( $p > .05$ ) – however, excluding their responses from my sample did not lead to significant changes in the statistical results. The mean correlation between the original profiles and their replications was 0.912. This indicates the assessments were reliable and consistent. Further, to avoid order effects, I randomly assigned the order of attributes within a profile and the profiles for four versions of the experiment. A variance analysis revealed no major differences across the different versions ( $p > .10$ ).

### 3.4. Assessment situation and research variables

The experiment started with the description of the assessment situation. The strategists were asked to put themselves in the position of the head of business development for an established firm. In their last strategy meeting with their board, they received the information that the firm is looking to expand to other industries as part of its new strategy. Hence, participants were primed that they are expected to make a strategic move. Further, in the hypothetical situation, the head of business development (i.e., the strategist) received an internal strategy report that contained information about a related industry that has recently experienced an innovation shock. A definition of an innovation shock was also included in the description, i.e., "a shift in an industry that occurs with the introduction of a breakthrough new product design by a single firm whose demand increases in an unanticipated way" (Argyres et al., 2015, p. 216). The report also indicated that firms with prior experience in related industries are much more likely to succeed in a new industry affected by an innovation shock when compared to de novo entrants (e.g., Argyres et al., 2015; Klepper, 1996). Therefore, in the experimental task, the head of business development could anticipate that strategic entry to the related

**Table 1:** Information of survey participants

| <i>Attributes</i>              | <i>N</i> | <i>In %</i> |
|--------------------------------|----------|-------------|
| Gender                         |          |             |
| Female                         | 21       | 40.4%       |
| Male                           | 31       | 59.6%       |
| Age                            |          |             |
| Under 18                       | 3        | 5.8%        |
| Between 18 and 36              | 34       | 65.4%       |
| Between 37 and 46              | 10       | 19.2%       |
| 47 onwards                     | 5        | 9.6%        |
| Work experience                |          |             |
| Between 3 and 5                | 25       | 48.2%       |
| Between 6 and 10 years         | 20       | 38.4%       |
| 11 years or more               | 7        | 13.4%       |
| Highest education              |          |             |
| Bachelor's degree              | 16       | 30.7%       |
| Master's degree                | 32       | 61.5%       |
| Ph.D. or higher                | 4        | 7.8%        |
| Years in current firm          |          |             |
| Between 1 and 2 years          | 9        | 17.3%       |
| Between 3 and 5 years          | 34       | 65.4%       |
| Between 6 and 10 years         | 7        | 13.5%       |
| 11 years or more               | 2        | 3.8%        |
| Top 3 industries and remaining |          |             |
| Computer and Technology        | 10       | 19.2%       |
| Finance and Economics          | 11       | 21.2%       |
| Pharma                         | 10       | 19.2%       |
| Other                          | 21       | 40.4%       |

industry is a potentially valuable business opportunity. This was further emphasized by the note that initial analyses have not revealed any red flags to entry and that the firm is not constrained by capital. At the end of the description, the head of business development received the task to assess whether to enter the related industry or not.

To ensure that participants did not conduct the experiment in parallel with other activities, ignoring relevant factors and terms, I integrated a timer which allowed them to proceed with the questionnaire only after thirty seconds of reading and an attention check that had to be passed to continue participating in the survey. The check was illustrated by a multiple-choice question that asked the strategists what the report indicated (correct answer: firms with prior experience in related industries are much more likely to succeed in a new industry). If the wrong answer was selected, the survey was cancelled, otherwise participants were forwarded to the next page which involved detailed instructions regarding the varying profiles, their assessment, and the adapted scale. Moreover, the page included an overview of the attributes' levels' definitions, which are summarized in table 2. The explanation page was followed by the experiment task (i.e., varying profiles) and ended with the post experimental questionnaire. Figure 11 summarizes the survey procedure.

To make sure instructions were clear and the defined at-

tributes were representative, I conducted a pre-test with two PhD students (strategy focus and market-oriented corporate management) and two senior managers in the field of strategic innovation.

**Dependent variable** – I defined strategic entry as the point in time where the firm initiated the sales of its products and/ or service in the new industry (Domurath & Patzelt, 2016). Based on the varying hypothetical scenarios, strategists were asked to evaluate the attractiveness of entry on a 7-point Likert scale. The scale ranged from *definitely not enter* (1) to *definitely enter* (7).

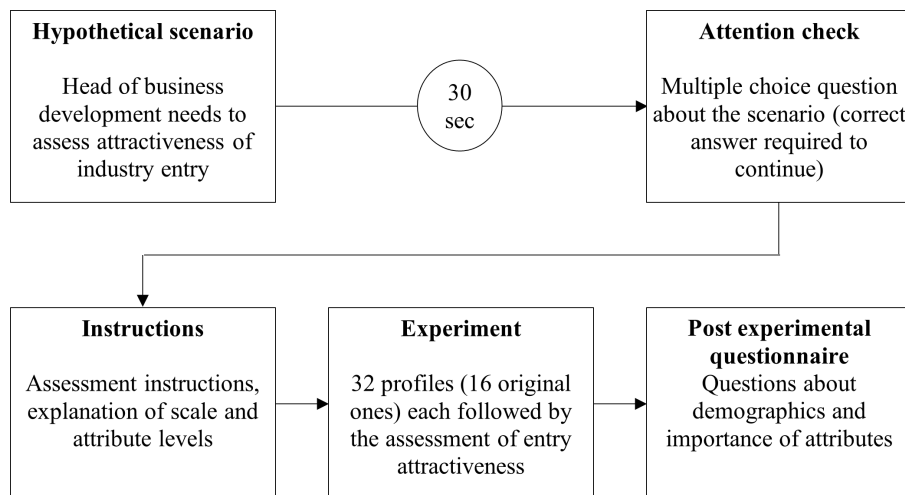
**Independent variables** – The profiles of my conjoint experiment consisted of four attributes. This number is consistent with other conjoint studies and the findings of Wright (1975) showing that a high number of attributes (eight or more) distorts participants' true decision-making principles as this tempts them to use simplifying tactics.

Two of the four attributes in my experiment described the strategist's firm's dynamic capabilities (absorptive capacity, new product development capability), one attribute reflected another organizational element (internal knowledge sharing), and one the characteristics of the environment in the new industry (environmental dynamism). In line with previous conjoint analyses, I differentiated between two levels when describing the attributes (e.g., Domurath and Patzelt,



**Table 2:** Decision attribute definitions

| <i>Attribute [level]</i>                     | <i>Description</i>   |
|--|--|
| Absorptive capacity<br>[High]                | Your company’s ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends is very well developed                |
| [Low]  | Your company’s ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends is only developed to a limited extent |
| New product development capability<br>[High] | Your company constantly attempts to pioneer and to be at the cutting edge of technology in its new product and service introductions                             |
| [Low]  | Your company rarely attempts to pioneer and to be at the cutting edge of technology in its new product and service introductions                                 |
| Environmental dynamism<br>[High]             | The new potential market is highly volatile in terms of the rate and amount of change and the actions of competitors and customers are very difficult to predict |
| [Low]  | The new potential market is very stable in terms of the rate and amount of change and the actions of competitors and customers can be predicted very well        |
| Knowledge sharing<br>[Extensive]             | Processes for sharing information effectively among individuals, decision makers, and internal units are very well developed in your firm                        |
| [Limited]                                    | Processes for sharing information effectively among individuals, decision makers, and internal units are only developed to a limited extent in your firm         |



**Figure 11:** Online survey procedure

2016; Haynie et al., 2009; McMullen and Shepherd, 2006). As shown in table 2, absorptive capacity, new product development capability, and environmental dynamism can be either high or low. Knowledge sharing in the strategist’s firm can be either extensive or limited.

**Control variables** – In total, I controlled for five factors. Age – First, I controlled for the age of the survey participants since, among others, Scherer et al. (1990) found that differences in age can result in different entrepreneurial behaviour and strategic decision-making in general.

*Work experience* – Further, numerous studies found years of work experience to impact strategic positioning decisions and innovation behaviour (e.g., Nuruzzaman et al., 2019; Shao et al., 2020). Hence, I also controlled for the total number of work experience of the strategist. At least one of two criteria had to be met for the work experience to be considered in the study. First, the prior position of the strategist had to be in the field of business development, strategic growth, or innovation strategy and/ or second, it had to be a higher-order position. For instance, I did not include work experience as a PR assistant in a newspaper since I expect this work experience to be irrelevant for evaluating the attractiveness of strategic entry.

*Field of study in educational background* – Since, for example, Colombo and Grilli (2005) argued that specialization in specified educational fields are associated with strategic decisions, I further controlled for strategists' educational background in business and economics, engineering, and natural sciences (categories adapted from Domurath and Patzelt (2016)). A binary coded variable was used for each of the categories (remaining educational fields as reference category).

*Industry focus* – I also controlled for the industry the strategists currently work in. Some industry characteristics are more likely to require strategic expansions in order to stay competitive and thus, this may influence the strategist's decision-making process (Zacharakis & Shepherd, 2018). This is particularly the case for high technology industries, such as computer and technology, pharma, and engineering. As with educational background, I used a binary coded variable for each of the three industries and the other industries served as reference categories.

*Years in company* – Finally, I included the years the strategist has worked for his or her current employer in my control variables. Strategic decision-making is influenced by prior experience in comparable contexts (Baron & Ensley, 2006; Domurath & Patzelt, 2016). Therefore, as firm specific knowledge regarding e.g., innovative behaviour, processes, and risk propensity of board member, I did not only account for general work experience but also work experience within the current firm.

Since experimental research is based on hypothetical scenarios, it is a challenge to select variables that are also taken into account by the experiment's participants in real-life decisions (Domurath & Patzelt, 2016; Zacharakis & Shepherd, 2018). To reduce this risk, I only defined attributes which relevance for value creation through knowledge and resources is underpinned by a strong theoretical foundation (Audretsch & Belitski, 2023; Deeds et al., 2000; Schilke, 2014). To further secure the informative value of my variables, I adapted the approach of Domurath and Patzelt (2016) and asked the strategists to assess the importance of each of the independent variables for their real-life decisions in a post-experimental questionnaire. Participants had to rate the perceived importance for real-life strategy decisions on entry of each attribute on a seven-point Likert scale (1-not important at all, 7-highly important). For all variables, the averages

answers exceeded the scale mean of 3.5 (i.e., 5.5 for absorptive capacity, 5.1 for new product development capability, 4.4 for internal knowledge sharing, and 3.8 for environmental dynamism). Therefore, based on self-reporting of the participants, the relevance of the attributes regarding strategic entry decisions is confirmed (at least to a certain extent).

### 3.5. Data analysis

My data analysis was done via the software R-studio. Following scale and data reliability checks, I tested for my hypotheses using the lme4-package for multilevel models. R-studio is particularly suitable for my setting, as it allows to plot and interpret interaction terms which were incorporated in hypothesis 2a, 2b, 3a, and 3b.

## 4. Results

The following section summarizes the results of my data analysis including correlations and findings of the hierarchical linear modeling analysis. Further, plots to explain interaction effects are presented.

### 4.1. Correlations

Correlations of the Level 2 variables are summarized in table 3. As described in section 3.3, I adapted an orthogonal full factorial design for my conjoint experiment. Hence, correlations between Level 1 variables are zero and therefore not included in the table. Correlations between Level 1 and Level 2 variables are also excluded since all participants were provided with the same profiles, and hence, Level 1 attribute levels do not differ between survey participants and do not correlate with Level 2 attribute levels. Since no value of the correlation between the remaining variables exceeds 0.7, multicollinearity is not a concern for my further analyses. This was further supported by a VIF analysis (all values <10) (e.g., Hair, 2011). An analysis of the correlation matrix based on the work of J. Cohen (1988) revealed no strong correlations between the Level 2 variables ( $|r| < 0.5$ ). There are moderate positive correlations between age and work experience and years in a company, and educational background and industry focus. However, they do not constitute a problem for further evaluations.

### 4.2. Results of the hierarchical linear modeling (HLM) analysis

Given that there are 32 decisions for each of the 52 participants of my study, the total number of 1,664 data points in my analysis are not independent of each other (32 decisions are nested within each strategist). To take into account the nested data structure, I used hierarchical linear modeling (HLM). Since this approach accounts for potential heteroskedasticity of data and for autocorrelation, it is well suited for my data analysis (Osborne, 2000). A random coefficient model was specified to account for between-individual variance (i.e., both intercepts and slopes could vary between individuals) (e.g. Domurath and Patzelt, 2016; Snijders and

Table 3: Correlations

| Variables               | 1        | 2        | 3        | 4       | 5      | 6       | 7      | 8       | 9     |
|-------------------------|----------|----------|----------|---------|--------|---------|--------|---------|-------|
| 1 Age                   | 1.000    |          |          |         |        |         |        |         |       |
| 2 Business education    | -0.029   | 1.000    |          |         |        |         |        |         |       |
| 3 Engineering education | 0.152    | -0.279** | 1.000    |         |        |         |        |         |       |
| 4 Science education     | 0.033    | -0.388** | -0.291** | 1.000   |        |         |        |         |       |
| 5 Engineering industry  | 0.139    | -0.052   | 0.368**  | -0.064  | 1.000  |         |        |         |       |
| 6 IT industry           | 0.054    | -0.025   | -0.130   | 0.457** | -0.179 | 1.000   |        |         |       |
| 7 Pharma industry       | 0.036    | -0.084   | -0.165   | -0.097  | -0.118 | -0.198  | 1.000  |         |       |
| 8 Work experience       | 0.454**  | -0.069   | 0.009    | 0.137   | 0.166  | 0.178   | -0.148 | 1.000   |       |
| 9 Years in company      | 0.543*** | -0.143   | -0.031   | 0.287** | 0.064  | 0.212** | -0.033 | 0.554** | 1.000 |

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Note: N = 52 strategists

IT, information technology; SD, standard deviation.

Bosker, 1999). In the following, I report the coefficient (including the level of significance [indicated by the asterisks]), and the robust standard errors for all variables. Level 1 variables include the four evaluation criteria, i.e., absorptive capacity, new product development capability, environmental dynamism, and internal knowledge sharing, and their interaction terms (absorptive capacity with environmental dynamism and internal knowledge sharing; new product development capability with environmental dynamism and internal knowledge sharing). At level 2, I entered the control variables to account for differences between participating strategists.

**Null model (model 1)** – HLM models accounts for variance that occurs at different levels of analysis since it considers nested data structures (Bryk & Raudenbush, 1992; Hofmann, 1997). In my experiment, variance at the lowest level (i.e., level 1) would be visible in variance in the outcome variable attractiveness of strategic entry, while the variance among subjects at the higher level (i.e., level 2) would relate to differences between strategists. To assess whether there is evidence of clustering of data in terms of my outcome variable, I first tested a model with no predictors (i.e., null model). Since clustering effects can produce biases in parameter estimates and standard errors, which in turn lead to erroneous conclusions in single level models, the null model is an important prerequisite for assessing whether a multi-level approach is warranted. Results of the null model which was used for calculating the intraclass correlation (ICC) are shown in model 1 (table 4). In HLM, the ICC serves as a basis for quantifying the distribution of variation at the different levels of the hierarchy. An ICC of 0 means the variation occurs exclusively at the individual level, while an ICC of 1 indicates the variation occurs exclusively at the group level (Aguinis et al., 2013; Domurath & Patzelt, 2016). In my setting, the ICC takes a value of .058, indicating that 5.8% of total variation in my dependent variable is accounted for by individual differences. Hedges and Hedges and Hedberg (2007) note that the ICC in educational and strategy research often ranges from .05 to .20 which is also confirmed in the book on multilevel

modeling techniques by Heck et al. (2013) who state that .05 is frequently considered a rough cut-off for evidence of substantial clustering. However, even trivial sets of clusters can still have a considerable impact on conclusions when running single level regressions (Pituch & Stevens, 2015; Scariano & Davenport, 1987). These numbers demonstrate that there is sufficient variability among individuals in my study which justifies the utilization of HLM.

**Level 1 main effects and level 2 control variables (model 2)** – In model 2, I included the control variables which were introduced in section 3.4. As can be seen in table 4, only one of my control variables (i.e., years in company) is significant beyond the .05 level, and thus explains variance in the strategists' assessments of strategic entry (coefficient = 0.209). This is in line with analyses of other scholars who argue that industries characterized by strong competition and technological progress typically require strategic actions to keep up with competitors (Zacharakis & Shepherd, 2018). Further, I expanded my analysis in model 2 by introducing the level 1 variables, i.e., absorptive capacity, new product development capability, environmental dynamism, and internal knowledge sharing. As presented in table 4, three out of the four assessment criteria at level 1 exhibit statistically significant deviations from zero. In particular, strategists rate strategy entry as more attractive if the firm has (1) high absorptive capacity (coefficient = 1.742,  $p < .001$ ), (2) high new product development capability (coefficient = 1.832,  $p < .001$ ), and if (3) processes for sharing information effectively within the firm are very well developed (coefficient = 0.679,  $p < .001$ ). Only the fourth attribute, i.e., environmental dynamism shows a negative coefficient (-0.308,  $p < .05$ ). Overall, the results support hypothesis 1a) and 1b) since both the positive relationship between absorptive capacity and entry assessment and between new product development and entry assessment are significant beyond 0.05.

**Level 1 interaction effects (model 3)** – Model 3 extends model 2 by including interaction effects. Specifically, I examined the interaction of environmental dynamism with absorp-

**Table 4:** Strategists' assessed entry attractiveness (models)

| Evaluation Criteria                        | Null model<br>(Model 1) |         | Level 1 main effects<br>Level 2 control variables<br>(Model 2) |         | Level 1 interactions<br>(Model 3) |                     |
|--|-------------------------|---------|--|---------|-----------------------------------|---------------------|
|  | Coefficient             | Rob. SE | Coefficient  | Rob. SE | Coefficient                       | Rob. SE             |
| Intercept                                  | 4.06***                 | 0.07    | 4.06***  | 0.07    | 4.06***                           | 0.07                |
| <b>Level 2</b>                             |                         |         |  |         |                                   |                     |
| Age  |                         |         | -0.18 <sup>†</sup>   | 0.10    | -0.18 <sup>†</sup>                | 0.10                |
| Business education                         |                         |         | 0.11   | 0.17    | 0.11                              | 0.17                |
| Engineering education                      |                         |         | 0.12   | 0.21    | 0.12                              | 0.21                |
| Science education                          |                         |         | 0.11   | 0.19    | 0.11                              | 0.19                |
| Engineering industry                       |                         |         | 0.23   | 0.23    | 0.23                              | 0.23                |
| IT industry                                |                         |         | -0.00  | 0.11    | -0.00                             | 0.11                |
| Pharma industry                            |                         |         | 0.33 <sup>†</sup>  | 0.21    | 0.33 <sup>†</sup>                 | 0.21                |
| Work experience                            |                         |         | -0.11  | 0.08    | -0.11                             | 0.08                |
| Years in company                           |                         |         | 0.21**   | 0.07    | 0.21**                            | 0.07                |
| <b>Level 1</b>                             |                         |         |  |         |                                   |                     |
| Absorptive capacity AC                     |                         |         | 1.74***  | 0.06    | 1.74***                           | 0.06                |
| New product development capability NPDC    |                         |         | 1.83***  | 0.08    | 1.83***                           | 0.08                |
| Environmental dynamism ED                  |                         |         | -0.30*   | 0.12    | -0.30*                            | 0.12                |
| Internal knowledge sharing IKS             |                         |         | 0.69***  | 0.05    | 0.69***                           | 0.05                |
| AC × ED                                    |                         |         |  |         | -0.18*                            | 0.08                |
| AC × IKS                                   |                         |         |  |         | -0.02                             | 0.08                |
| NPDC × ED                                  |                         |         |  |         | -0.20**                           | 0.07                |
| NPDC × IKS                                 |                         |         |  |         | 0.20**                            | 0.07                |
| <b>Variance components</b>                 |                         |         |  |         |                                   |                     |
| Level 1 variance                           | 2.73                    |         | 0.64   |         | 0.63                              | Δ1.36% <sup>‡</sup> |
| Level 2 variance                           | 0.17                    |         | 0.20   |         | 0.20                              |                     |
| ICC <sup>§</sup>                           | 0.06                    |         |  |         |                                   |                     |
| Pseudo R <sup>2</sup> Level 1 <sup>¶</sup> |                         |         | 0.66   |         | 0.66                              |                     |
| Pseudo R <sup>2</sup> Level 2 <sup>¶</sup> |                         |         | 0.08   |         | 0.08                              |                     |

<sup>†</sup> p < .1, \*p < .05, \*\*p < .01, \*\*\*p < .001

Note: N = 1,664 at the assessment level; N = 52 at the individual level

<sup>‡</sup> This value highlights the proportionate increase in explained variance attained by including interactions at Level 1 within the model (derived from the reduction in error variance at Level 1 due to inclusion of independent variables when compared to the previous model as a reference point)

<sup>§</sup> ICC = Level 2 variance / Level 1 variance = .165 / (.165 + 2.733)

<sup>¶</sup> Pseudo R<sup>2</sup> based on Snijders and Bosker (1999)

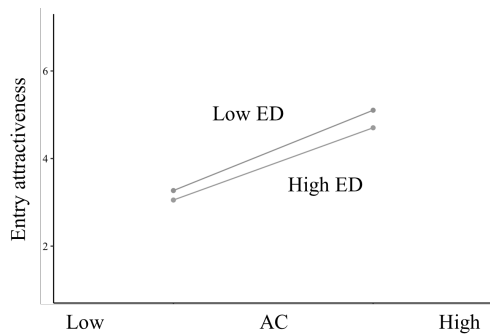
IT, information technology; Rob. SE, robust standard error; AC, absorptive capacity; NPDC, new product development capability; ED, environmental dynamism; IKS, internal knowledge sharing

tive capacity and new product development capability and the one of internal knowledge sharing with absorptive capacity and new product development capability. I predicted that environmental dynamism strengthens the positive influence of absorptive capacity on strategists' assessment of entry (hypothesis 2a) and weakens the positive influence of new product development capability (hypothesis 2b). As for internal knowledge sharing, I assumed that this would reinforce both the positive effect of absorptive capacity and new product development on strategists' entry evaluation (hypotheses 3a, 3b). In table 4 it can be seen that there are significant interactions between absorptive capacity and environmental dynamism (coefficient = -0.183, p < .05), new product development and environmental dynamism (coefficient = -0.205,

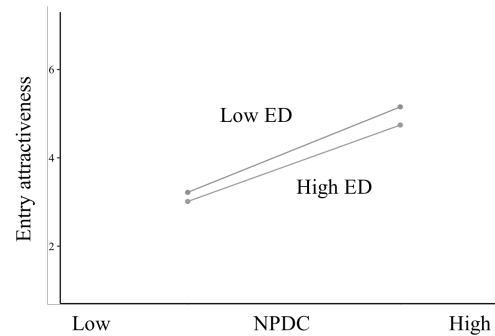
p < .01), and new product development and internal knowledge sharing (coefficient = 0.203, p < .01).

To specify the type of significant level 1 interactions, I followed the advice of J. Cohen (1988) to plot the interactions. On a y axis of assessed entry attractiveness and an x axis of absorptive capacity/ new product development capability, I plotted low and high levels of environmental dynamism and internal knowledge sharing (separate lines). The plot for the interaction between absorptive capacity and environmental dynamism, illustrated in figure 12, shows that entry attractiveness increases with stronger perceived absorptive capacity. However, this relationship is weaker for high levels of environmental dynamism (flatter line). Thus, it does not support hypothesis 2a. Figure 13 plots the interaction effects

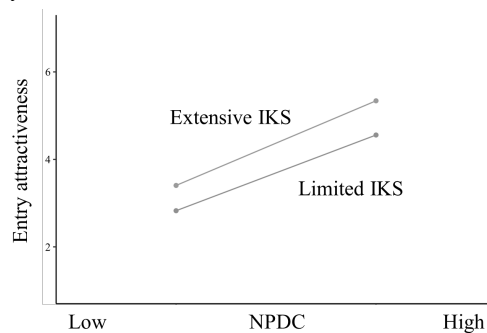




**Figure 12:** Absorptive capacity × environmental dynamism



**Figure 13:** New product development capability × environmental dynamism



**Figure 14:** New product development capability × internal knowledge sharing

between new product development capability and environmental dynamism. Similarly, to figure 12, the attractiveness of entry is significantly lower for high levels environmental dynamism which shows support for hypothesis 2b. Figure 14 demonstrates the positive effect of new product development on entry attractiveness and further indicates that this relationship is magnified when internal knowledge sharing is extensive (steeper line). The interaction between absorptive capacity and internal knowledge sharing is not significant (coefficient = -0.025,  $p > .05$ ) and therefore not plotted. Overall, my results support hypothesis 2a, 2b, and 3b – hypothesis 3a cannot be proven.

As described earlier in this section, HLM facilitates the estimation of individual variance components for every analysis level (Snijders & Bosker, 1999). In his book on multilevel analysis techniques, Hox (2010) points out that – although exceptions may exist – variables operating at a particular level are likely to explain the variability within that level, rather than influencing the variance components at other levels. In line with this, results in table 4 report a change in the level 1 variance component (within-individual variance) with the introduction of model 3 (i.e., interaction effects are included). Adding the level 1 interaction terms leads to an 1.38% increase in the explained variance of the dependent variable compared to the model without interactions. This incremental effect appears to be small – however, it is typical of interaction effects which tend to have small sizes (Bliese & Jex, 1999).

## 5. Discussion and conclusion

### 5.1. Key findings and implications

To date, most of research into entrepreneurial and strategic decision-making processes has relied upon post-hoc methods (Zacharakis & Shepherd, 2018). This work offers a real-time approach to understanding the impact of two dynamic capabilities on strategists' assessments of the attractiveness of entering new industries. By using a conjoint experiment with a hypothetical entry scenario, I examined the effect of absorptive capacity and new product development on entry decisions. Further, I accounted for external as well as internal organizational factors by including environmental dynamism and internal knowledge sharing in my model. My study acknowledges varying dynamics in everchanging industries and serves as a basis for further studies that broaden our understanding not only about the influence of dynamic capabilities on strategic decision-making but also about the interplay between such capabilities and essential organizational and industry-specific conditions.

The results of my study inform the strategy literature in the following ways. First, I found significant differences in strategists' assessments of strategic industry entry based on perceived absorptive capacity and new product development capability. More precisely, I found that both increases in perceived absorptive capacity and perceived new product development capability led strategists to value entry more attractive. Thus, these two dynamic capabilities are relevant

for strategists' entry decisions and hypothesis 1a and 1b are supported. These findings are in line with other studies investigating strategic decision-making based on dynamic capabilities (e.g., Bigelow et al., 2019; Domurath and Patzelt, 2016). Second, both the positive relationship between perceived absorptive capacity and entry attractiveness and perceived new product development capability and entry attractiveness are moderated by increases in environmental dynamism. For both dynamic capabilities, the positive relationship was weaker for high levels of environmental dynamism. These findings support hypothesis 2b and strengthen the argument that the perceived costs associated with developing and maintaining new product development capabilities in highly dynamic environments outweigh the advantages the capabilities can provide in such settings. The relationship between perceived absorptive capacity and entry attractiveness were moderated by environmental dynamism in the opposite direction of that I hypothesized in 2a. Given the benefits absorptive capacity can generate in high-velocity markets (e.g., timely decision-making processes, profiting from knowledge spillovers due to weak appropriability regimes), I assumed that strategists would rate the effect of such dynamic capability as even more valuable in dynamic industries. What I found, though, is that perceived absorptive capacity encourages firms' strategists to enter new industries, especially for low-velocity industries. Hence, the benefits resulting from absorptive capacity for high environmental dynamism seem to be outweighed by other factors leading strategists to perceive the dynamic capability as particularly valuable in more stable environments. Third, the positive effect of perceived new product development capability on strategic entry attractiveness is moderated by internal knowledge sharing in such a way that perceived new product development encourages strategists to enter new industries, especially when organizational knowledge sharing mechanisms are very well developed. This finding supports hypothesis 3b and confirms the importance of internal organizational mechanisms for the relationship between dynamic capabilities and entry attractiveness. Surprisingly, I was not able to prove a significant positive effect of internal knowledge sharing on the relationship between perceived absorptive capacity and entry attractiveness (hypothesis 3b). However, the significant interactions (hypothesis 2a, 2b, and 3a) show that the value of perceived absorptive capacity and new product development capability varies considerably across strategists (in terms of environmental dynamism and internal knowledge sharing), highlighting the importance of considering such relationships between dynamic capabilities and internal and external conditions in the related literature.

My study contributes to existing research on dynamic capabilities and entry decisions in several ways. First, it provides empirical evidence that a strategist's perception of the dynamic capabilities the firm he or she operates in possesses significantly affects the decision of whether to enter new industries. Although, I am not the first one to argue that dynamic capabilities and entry decisions are directly linked, most contributions to such literature stream are based on

qualitative studies, or their theory still lacks empirical confirmation (e.g., Protogerou et al., 2011). Second, scholars tend to rely on post-hoc instruments to examine decision-making motivations and outcomes which leaves comparably little room for adequate management implications (Helfat & Peteraf, 2009). I respond to the call by Zacharakis and Shepherd (2018) who demand the utilization of real time methods such as conjoint analysis to avoid errors and biases due to participants' motivation to bias their own survey results. Third, various scholars name context-dependency of dynamic capabilities studies as a major problem (e.g., Baía and Ferreira, 2019; Fainshmidt et al., 2019). It is suggested that future research should recognize internal as well as external aspects since the value of dynamic capabilities "is determined by a complex interplay of environmental and internal factors" (Ringov, 2017, p. 654). By integrating environmental dynamism and internal knowledge sharing into my model, I am able to prove that both the external as well as the organizational factor have an effect on the perceived value of the two dynamic capabilities for strategic entry decisions. All proven relationships are illustrated in figure 15.

Regarding practical implications, my study provides several guidelines for strategists and managers facing complex strategic positioning decisions. The results can serve as a basis for experts to reflect on their assessment of new or related industries and optimize their evaluation of entry attractiveness. Consequently, to increase the value of entry, strategists could aim to strengthen their firm's absorptive capacity and new product development capability. Since a firm's absorptive capacity and new product development capability depend, among other things, on the ability to recognize valuable external knowledge and deep technological skills, strategists could aim to set the management focus on developing internal market sensing mechanisms and on hiring technical experts. For instance, the BMW group has established a department *Marketing and Innovation* which is merely responsible for frequent market sensing to be able to identify and to react to current and future trends (Wilden & Guderган, 2015). Similarly, the group's subsidiary *Research and Technology* only carries new and uncommon R&D activities to be able to shape future developments. Moreover, I found environmental dynamism to influence the value of dynamic capabilities for the assessment of entry. Hence, strategists should base their decisions not only on organizational capabilities but also on environmental conditions in the potential industry. To be able to evaluate the importance of the degree of environmental dynamism, it may make sense to only screen the targeted industry, but also to estimate costs and commitment that might be required to optimize, adapt, and maintain the firm's dynamic capabilities in the respective environment. Internally, well developed knowledge-sharing mechanisms help foster the full potential of dynamic capabilities. The value of such mechanisms depends on the willingness of employees to share their knowledge and on adequate knowledge management. Hence, a strategist could aim to develop and improve internal knowledge sharing by, for example, offering incentives to employees to actively share their

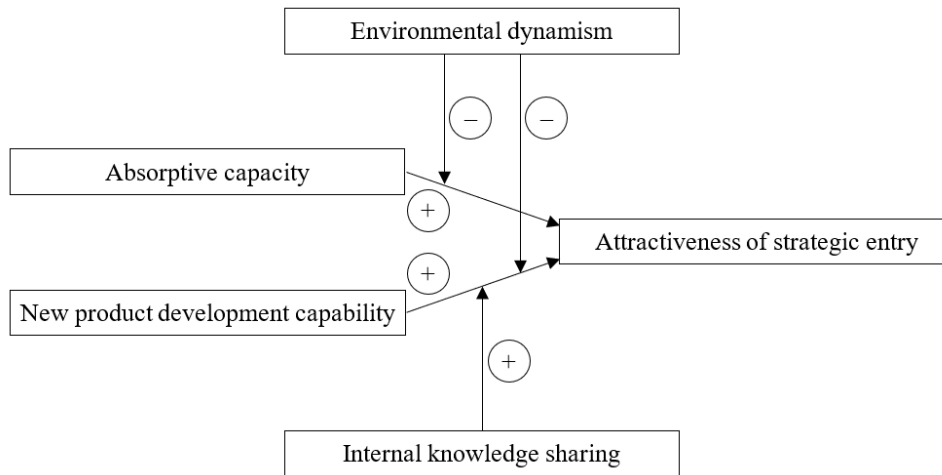


Figure 15: Proven relationships

knowledge and not “hide” it from other colleagues or departments. Further, knowledge sharing could be enhanced by implementing up-to-date knowledge management systems and by establishing frequent meetings between departments to spread knowledge across the entire organization.

## 5.2. Limitations and directions for future research

The results of my study need to be acknowledged in light of the following limitations. First, I examined the relationship between two specific dynamic capabilities and attractiveness of entry, but my work does not consider how the capabilities evolve, or whether some of my constructs are prerequisites for the development of another one. For instance, in his paper on the linkage between firms’ marketing capabilities and business performance, Morgan (2012) argues that, in order to successfully develop successful offerings and to keep up with products of rival firms, firms must acquire both internal as well as external technical knowledge. Such capability can be viewed as a type of market-sensing capability – a capability which is incorporated in the definition of absorptive capacity. Future research could build on suggestions like this and investigate whether some dynamic capabilities are antecedents for others (e.g., absorptive capacity as an antecedent for new product development capability).

Second, although I aimed to include all critical attributes in my model, it is not possible to create an entirely complete data set. Part of the differences in strategists’ evaluation of strategic entry may be the result of additional variables. For instance, strategists who have already been faced with entry decisions before and have had either positive or negative experience with their approaches and suggestions, may be biased. Moreover, personality traits could have an impact on how the strategist rates the likelihood of entry. Several scholars examine the effect of risk aversion on decision-making and find the risk tolerance of decision makers to be a significant factor (e.g., Alarcon and Jessup, 2023; Liu and Colman, 2009; Wong, 2023). In future studies, characteristics such as

risk aversion, propensity to trust others, and self-awareness could be considered, too.

Third, since the hypothetical scenarios in my experienced perceived the characteristics of the four attributes as either high or low (not as an actual objective number), it is not possible to examine what defines the difference between such descriptions. It would be interesting to find out more about how the perceptions are shaped based on objective measures. Also, the fact that I each variable could only take on two different values, limits the possible outcomes of my model. Schilke (2014) studied the role of dynamic capabilities regarding competitive advantage under varying levels of environmental dynamism and was able to confirm a u-shaped relationship, i.e., dynamic capabilities were most effective in securing competitive advantage in environments characterized by moderate levels of dynamism. Adding an additional level to the attribute environmental dynamism (e.g., high, medium, and low) would help to find out whether this might also be the case for the attractiveness of entry.

Fourth, although the survey participants differ in their backgrounds (e.g., industry focus, educational focus, nationality, age), they all share several characteristics that might have influenced the results. For example, the majority of them works in Germany, indicating that country-specific aspects such as legal conditions and cultural habits could have had an impact on the evaluation of the questionnaire (Domurath & Patzelt, 2016; Kiss & Danis, 2008).

Finally, I investigated the effect of two specific dynamic capabilities on attractiveness of strategic entry as this was suggested by previous research on dynamic capabilities (Baía & Ferreira, 2019). However, there are numerous dynamic capabilities worth exploring, such as the dynamic alliance management capability. It is common knowledge that a firm’s strategic alliances have a positive impact upon its innovativeness and knowledge flows between alliance partners are greater than those between non-allied firms (Shan et al., 1994). Especially when a decision has to be made of whether to enter a new industry or not, this may partly depend on a

firm's alliance management capability. Perhaps if a firm has strong strategic partnerships and knows how to build new ones in the potential industry, this may help reduce entry barriers and also offer insights into the new sector. Hence, strategists might rank industries as more attractive if they possess over strong alliance capabilities. Future research could have a look at further specific capabilities and also take into account potential interactions.

To conclude, my study confirms that strategists' assessment of industry entry is not only dependent on the strategist's firm's dynamic capabilities but also on organizational knowledge mechanisms and environmental conditions. The decision-making process regarding entry is a complex construct that requires the consideration of both internal as well as external factors. Further, my findings justify the investigation of further dynamic capabilities, their interplay, and the role of additional moderators.

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## Entwicklung eines Prozessmodells für missionsorientiertes Corporate Rebranding

### Development of a Process Model for Mission-Driven Corporate Rebranding

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#### Abstract

Big data, AI, geofencing - while the private sector is embracing modern approaches to make its brands even more influential, the third sector is cautiously approaching the idea of branding. Organisations need to engage with their corporate brand to influence their cohesion, credibility and perception of their social mission - in short, to remain competitive. However, there is a lack of appropriate marketing strategies. Previous studies have been based on self-legitimising logics without a scientific basis or provide explanations for individual factors and correlations, but not a holistic corporate rebranding strategy. Nor can it be a solution to impose the models of the private sector on the third sector - the requirements and characteristics of the organisations are too different. For this reason, this literature review first derives a catalog of principles for mission-driven corporate rebranding. The novel findings are compared to previous research and translated into a dedicated process model consisting of five phases and 25 steps. The model is explained using the example of a local African non-profit organisation. The results of this work make it clear that although mission-driven corporate rebranding is highly complex, it can also be mastered by practitioners without major capital investment. The practical process model could even stand up to application in profit-orientated companies and lead to more participation, motivation and communication here as well.

#### Zusammenfassung

Big Data, KI, Geofencing – während die Privatwirtschaft über moderne Ansätze grübelt, um ihre Marken noch einflussreicher zu machen, nähert sich der dritte Sektor der Vorstellung von Branding vorsichtig an. Organisationen müssen sich mit ihrer Unternehmensmarke auseinandersetzen, um Einfluss auf ihre Kohäsion, die Glaubwürdigkeit und Wahrnehmung ihres sozialen Auftrags zu nehmen – kurz gesagt: um wettbewerbsfähig zu bleiben. Es mangelt jedoch an geeigneten Marketinglehren. Bisherige Untersuchungen stützen sich auf selbst-legitimierende Logiken ohne wissenschaftliche Grundlage oder liefern Erklärungen für einzelne Faktoren und Zusammenhänge, nicht aber eine ganzheitliche Corporate Rebranding Strategie. Auch kann es keine Lösung sein, die Modelle der Privatwirtschaft dem dritten Sektor überzustülpen – zu unterschiedlich sind die Anforderungen und Eigenschaften der Organisationen. Aus diesem Grund wird in dem vorliegenden Literatur Review zunächst ein Prinzipienkatalog für missionsorientiertes Corporate Rebranding abgeleitet und anschließend im Abgleich mit früheren Forschungsarbeiten in ein dediziertes Prozessmodell – bestehend aus fünf Phasen und 25 Schritten – übersetzt. Das Modell wird anhand einer lokalen afrikanischen Nonprofit-Organisation erläutert. Die Ergebnisse dieser Arbeit verdeutlichen, dass missionsorientiertes Corporate Rebranding zwar eine hohe Komplexität birgt, aber auch von Praktiker:innen ohne großen Kapitaleinsatz gemeistert werden kann. Das praxistaugliche Prozessmodell könnte selbst einer Anwendung in profitorientierten Unternehmen standhalten und auch hier zu mehr Partizipation, Motivation und Kommunikation führen.

**Keywords:** corporate rebranding; mission-driven organization; model; nonprofit organization; social entrepreneurship

## 1. Einleitung

„Why can't you sell brotherhood like you sell soap?“ - Wiebe.<sup>1</sup>

### 1.1. Problemstellung und Relevanz der Forschungsarbeit

Big Data und Künstliche Intelligenz (KI) legen den Grundstein für ein neues Branding<sup>2</sup>-Zeitalter: Im Jahr 2030 werden Marken in der Lage sein, sich selbst zu kreieren und zu führen. Durch den Zugriff auf einen unendlichen Datenpool aktueller Bedürfnisse und Trendprognosen werden Marken ungesättigte Nischen selbstständig aufspüren, individuelle Angebote entwickeln und diese der Kundschaft zur richtigen Zeit über den präferierten Kanal zuspüren. Über moderne *Blockchain*-, *Geofencing*- und *Smart-Home*-Technologien<sup>3</sup> werden Marken ein Eigenleben führen, in dem sie vollkommen selbstständig Kaufentscheidungen treffen und sich untereinander vernetzen: Ein *Smart Fridge* wird auf Grundlage der Insulinwerte einer *Smart Watch* maßgeschneiderte Essenspläne entwerfen und nur Produkte eines bestimmten Markenökosystems einkaufen. Diese autonom geführten Marken werden auf globale Veränderungen reagieren, längst bevor die Gesellschaft den Wandel bemerkt. Marken werden sich also in Rekordzeit entwickeln und für eine veränderte Nachfrage wieder zersetzen. Das wird unser bisheriges Verständnis grundlegend verändern: Marken werden nicht mehr über Jahre hinweg etabliert und als Anker für Unternehmen und Verbraucher:innen verstanden; sie sind temporär, unbeständig und vermutlich mächtiger als je zuvor. Ob ein derartiges Zukunftsszenario, das Branchenberichte und Studien erwägen,<sup>4</sup> wünschenswert oder in den nächsten acht Jahren plausibel ist, sei dahingestellt, es verdeutlicht jedoch das Potenzial von Marken<sup>5</sup> und folgerichtig das Interesse von Wirtschaft, Forschung und Literatur an (Re)Branding.

Bereits heute gibt es kaum etwas, das sich nicht als Marke verkaufen lässt: Lebensmittel wie die *Chiquita* Banane, Zusatzstoffe wie *Nutrasweet*,<sup>6</sup> Komiker:innen wie *Jeff Foxworthy*, Unternehmer:innen und Politiker:innen wie *Donald Trump*.<sup>7</sup> Und es gibt kaum etwas, das eine erfolgreiche Mar-

ke nicht kann: Wie sonst ließe sich erklären, warum *Kellogg's* plötzlich deutlich besser schmecken nach Bekanntgabe des Namens,<sup>8</sup> warum die Enthüllung eines *Coca-Cola*-Logos Gehirnaktivität und Verhaltenspräferenz der Testpersonen gegenüber *Pepsi* so drastisch beeinflusst,<sup>9</sup> warum sich Menschen attraktiver mit einer *Victoria-Secret*-Tasche fühlen oder klüger mit einem MIT-Kugelschreiber in der Hand?<sup>10</sup> Warum erkennen mehr Befragte *Meister Propper*, der seit zehn Jahren aus der Werbung verschwunden ist, als den damals amtierenden Vizepräsidenten *George Bush*?<sup>11</sup> Und zu guter Letzt: Warum sollte Branding nicht genau so einen unstreitigen Einfluss auf *missionsorientierte Organisationen* (MO)<sup>12</sup> versprechen?

Bei gleichen Variablen, wie dem Preis, gewinnen laut *Parker und Parker* Markenprodukte immer gegenüber Produkten ohne Kennzeichnung.<sup>13</sup> Diese Logik gilt nicht nur für Supermarktware, sondern auch für Spendenaufrufe: Wenn sich *Ruffles* gegen unbekannte Hersteller durchsetzt, warum sollte das gleiche nicht für das *Rote Kreuz* gelten?<sup>14</sup> Der Halo-Effekt, den Marken versprechen – so wie *Victoria Secret* für Attraktivität steht oder *Jaguar* für Wohlstand – funktioniert auch unter wohltätigen Organisationen: Das *Rote Kreuz* steht für Mitgefühl und Schmerzlinderung.<sup>15</sup>

Während die profitorientierte Welt bereits über Jobbezeichnungen in einer neuer Marken-Ära grübelt und Wege für die gänzlich KI-gesteuerte Customer Journey schafft,<sup>16</sup> scheinen sich auch MOs dem lange verpönten Buzzword „Branding“ und seinen facettenreichen Vorteilen anzunähern.<sup>17</sup> Bei *Drucker* finden sich Hinweise darauf, dass Organisationen, die im Kern nicht auf Profit ausgerichtet sind, grundsätzlich eine Abneigung gegen Termini wie „Management“ und „Marketing“ aufweisen, weil zugehörige Methoden und Praktiken – folglich auch das Branding – mit den Werten und Zielen der Organisation unvereinbar scheinen: Welche:r Spender:in möchte schließlich, dass die Zuwendungen lediglich in weitere, unangenehme Akquisen an der Haustüre investiert werden, statt in die eigentliche soziale Arbeit?<sup>18</sup> „You have to spend money to make money“ is widely accepted – but not so, in the nonprofit world“, argumentiert *Ebarb* und führt an,

<sup>1</sup> Wiebe, Gerhart: *Merchandising Commodities and Citizenship on Television*, Oxford, 1952, S. 679, zitiert nach Kotler und Zaltman 1971, S. 3.

<sup>2</sup> Die vorliegende Arbeit verwendet durchgängig die englischen Begriffe „Branding“ und „Rebranding“ aus Mangel an passenden und prägnanten, deutschen Übersetzungen und aus Gründen der Lesbarkeit. Darunter wird die Bildung einer Marke (Branding) bzw. ihre Neuausrichtung (Rebranding) verstanden. Eine genauere Differenzierung der beiden Begriffe wird in Kap. 1.2, Kap. 2.1.1 und Kap. 2.1.2 vorgenommen. Diese Begriffe bleiben im Genitiv unverändert; das gilt auch für weitere Anglizismen.

<sup>3</sup> Eigennamen, Organisationen oder Konzepte werden im Folgenden kursiv geschrieben, mit Ausnahme von Begriffen in Anführungszeichen, Begriffen im Anhang und Akronymen.

<sup>4</sup> Vgl. *Foresight Alliance* 2014, S. 3, S. 5-6, S. 12; vgl. *Hamburg Innovation GmbH* (Hrsg.) 2018, S. 8, S. 34; vgl. *Thiemann und Piel* 2020; vgl. *Weber* 2018, der den Begriff „Smart Brand“ nachdrücklich verwendet.

<sup>5</sup> Dieses Potenzial birgt natürlich auch die Gefahr, dass Marken rigoros in den Rückstand geraten, sollten sie derartige Trends nicht implementieren (wie *Kodak* und *Gillette*, vgl. *Aaker* 1991, S. 219; *Brandtner* 2012).

<sup>6</sup> Vgl. *Aaker* 1991, S. 30.

<sup>7</sup> Vgl. *Parker und Parker* 2013, Kap. 4 „Everyone's favorite happy-go-lucky hick“; vgl. *Vinjamuri* 2004, S. 2.

<sup>8</sup> Vgl. *Hartley, Robert*: *Marketing Mistakes*, New York, 1986, S. 91ff., zitiert nach *Aaker* 1991, S. 33.

<sup>9</sup> Vgl. *McClure et al.* 2004, S.381ff.

<sup>10</sup> Vgl. *Park und John* 2012, S. 684

<sup>11</sup> Vgl. *Vinjamuri* 2004, S. 5.

<sup>12</sup> Unter MOs werden im Folgenden sämtliche Organisationen zusammengefasst, die im Kern nicht auf Profit, sondern eine soziale Mission ausgerichtet sind. Neben nicht-profitorientierten Organisationen (NPOs), umfasst das auch Non-Governmental Organizations (NGO), Social Enterprises u. m. Dieser Terminus gehört bislang nicht zum etablierten, deutschen Wortschatz und wird in Kap. 2.2.1 genauer erläutert.

<sup>13</sup> *Parker und Parker* 2013, Kap. 2 „What about those of us who aren't as big as Denny's?“.

<sup>14</sup> Vgl. *Webster* 2002.

<sup>15</sup> Ebd.

<sup>16</sup> Vgl. *Foresight Alliance* 2014, S. 4ff; vgl. *Hamburg Innovation GmbH* (Hrsg.) 2018, S. 8.

<sup>17</sup> Vgl. *Kylander und Stone* 2012, S. 37; vgl. *Pope et al.* 2009, S. 185, S. 198; vgl. *Vinjamuri* 2004, S. 2.

<sup>18</sup> *Drucker* 1990, S. x, S. 40, S. 58ff.

dass man im dritten Sektor eher darüber spreche, wie wenig Geld eine Organisation ausbebe, statt über die Wirkung, die sie mit ihren Mitteln erziele. Nicht-profitorientiert sei schließlich ein Steuerstatus, kein Geschäftsmodell.<sup>19</sup>

Nicht nur Verbrauchende, auch Mitarbeitende könnten das Investieren der hartverdienten Fördermittel in Branding-Maßnahmen kritisieren, vielleicht sogar die Integrität ihrer Organisation in Frage stellen.<sup>20</sup> Es sei jedoch darauf verwiesen, dass Branding positive Auswirkungen auf die interne Moral und Kohäsion, sowie Kompetenz und Fokus haben kann – nämlich dann, wenn die Mitarbeitenden die Markenbotschaften selbst leben und den Markenbildungsprozess zur Verbesserung der strategischen Ausrichtung nutzen.<sup>21</sup>

Eine Marke ist längst kein bloßer Fundraising-Beschleuniger für MOs<sup>22</sup>, denn Branding hat nicht nur Auswirkungen auf Spender:innen, es kann eine Organisation besser im Wettbewerb um Partner:innen, Aktivist:innen und Arbeitskräfte positionieren.<sup>23</sup> Derartige Vorteile sind mit Blick auf die Entwicklungen im dritten Sektor überlebenswichtig für MOs geworden: Die Herausforderungen, mit denen sie zu kämpfen haben, zeichnen sich über Ländergrenzen hinweg ab – wie der Rückgang staatlicher und privater Fördermittel und das gegenläufige Wachstum der Sozialwirtschaft.<sup>24</sup> Megatrends, wie die Globalisierung und Digitalisierung, erhöhen den Druck auf MOs, ihre Angebote gegenüber anderen – darunter profitorientierten – Organisationen durchzusetzen<sup>25</sup>, um eine zunehmend jüngere Zielgruppe mit geringerem Spendenaufkommen in einem derart reizüberfluteten Umfeld überhaupt zu erreichen.<sup>26</sup>

Branding trägt zur wahrgenommenen Professionalität und Glaubwürdigkeit einer MO bei, was bedeutend für die Ansprache einer potenziellen Zielgruppe ist, aber auch Freiräume schaffen kann, um flexibler über deren Mittel zu verfügen.<sup>27</sup> Denn Branding hilft dabei, frühere Kommunika-

tionsfauxpas‘ oder undurchdachte Einfälle – wie ungeplante, amateurhafte Leitbilder und Logos – auszubügeln und die Mitarbeitenden dabei zu unterstützen, die Kernbotschaften ihrer Organisation verständlich, selbstbewusst und einheitlich zu kommunizieren.<sup>28</sup> Das ist gerade deswegen so wichtig, weil MOs aufgrund ihrer meist immateriellen, schwer greifbaren Leistungen vor der Hürde stehen, das soziale Problem und den Wert ihrer Arbeit zu vermitteln.<sup>29</sup> Branding verdeutlicht in diesem Fall nicht nur die Daseinsberechtigung einer MO, sondern kann ihr Anliegen nachdrücklicher an Politik und Gesellschaft herantragen.<sup>30</sup> Das *Memorial Sloan Kettering Krebszentrum* stellte im Rahmen seines Branding nicht die Einrichtung selbst in den Mittelpunkt, sondern die Aufklärung der Patienten:Patientinnen, das Krebszentrum sofort nach der Diagnose aufzusuchen, um so mehr Leben zu retten.<sup>31</sup>

Branding muss kein Deckmantel für reine Selbstdarstellung und Übertreibung sein und die Zielgruppe hinter Licht führen – auch wenn mit Blick auf manche profitorientierte Organisationen der Gedanke nahe liegt mag: Im zunehmenden Pool der Unternehmen, die ihre Branding-Maßnahmen darauf ausrichten, gesellschaftliche und ökologische Missstände anzuprangern (z. B. *Benetton* mit seiner *All the colors of the world*-Kampagne)<sup>32</sup> wird die Abgrenzung zuweilen schwieriger zwischen jenen, die sich nun einmal in der Pflicht sehen, ihre Stimme für die Allgemeinheit zu nutzen, jenen, die darin eine Chance zur Reputationsstärkung und Ansprache einer bestimmten (meist jungen) Zielgruppe sehen und zuletzt auch den Unternehmen, die unter diesem Vorwand die negativen öko-sozialen Auswirkungen des Kerngeschäfts verschleiern wollen (sog. Greenwashing).<sup>33</sup> Auch vor diesem Hintergrund erscheint es schlüssig – aber wahrlich paradox dass MOs, die tatsächlich eine soziale Mission verfolgen, sich von dem Konzept Branding aus ethischen Gesichtspunkten distanzieren könnten.<sup>34</sup>

Zusammenfassend lässt sich sagen, dass Branding für MOs einer Lose-Lose-Situation gleicht: Ohne Marke ist der Wettbewerb aussichtslos, mit Marke steht die Organisation in der ständigen Verantwortung, diese vermeintlich kommerzielle Disziplin zu rechtfertigen, um nicht ihre Glaubenssätze zu verraten und mit ihrer Existenz einzubüßen.<sup>35</sup>

<sup>19</sup> Ebarb 2019.

<sup>20</sup> Vgl. Chad 2016, S. 6, S. 10; vgl. Chapleo 2015, S. 15; vgl. Weisenbach Keller und Conway Dato-On 2009, S. 108ff.

<sup>21</sup> Vgl. Balmer 2001b, S. 1-2; vgl. Durham und Duffett 2014, S. 4-6, S. 19; vgl. Greyser und Urde 2019, S. 83; vgl. Kylander und Stone 2012, S. 37; vgl. Sabir et al. 2021, S. 13-14, S. 18; vgl. Vinjamuri 2004, S. 2-3.

<sup>22</sup> Ohnehin sind Forschungsergebnisse (wie jene von Durham und Duffett (2014, S. 7)), die einen direkten Zusammenhang von (Re)Branding und Fundraising bezeugen, mit Vorsicht zu genießen, da sie nicht ausreichend den Einfluss der einzelnen Variablen (z. B. die strategische Neuausrichtung), die häufig Teil des (Re)Branding sind, untersuchen.

<sup>23</sup> Vgl. Alameda 2018; vgl. Morand 2020; vgl. Durham 2015; vgl. Deutscher Markenmonitor 2021c; vgl. Durham und Duffett 2014, S. 4ff, S. 14; Finisterra do Paço et al. 2014, S. 11-12; vgl. Greyser und Urde 2019, S. 83; vgl. Kylander und Stone 2012, S. 37; vgl. Vinjamuri 2004, S. 3, S. 6; vgl. Weisenbach Keller und Conway Dato-On 2009, S. 106.

<sup>24</sup> Vgl. Morand 2020; vgl. Durham und Duffett 2014, S. 4; vgl. Finisterra do Paço et al. 2014, S. 11-13; vgl. Hahn 2021, S. 16-17; vgl. Iwankiewicz-Rak und Mróz-Gorgoń 2017, S. 126-127; vgl. Mirzaei et al. 2021, S. 186-187; vgl. Priller et al. 2012, S. 6-7; vgl. Weisenbach Keller und Conway Dato-On 2009, S. 106.

<sup>25</sup> Vgl. Chapleo 2015, S. 16; vgl. Korkmazdevrani 2019, S. 775; vgl. Meyer et al. 2013, S. 148-149, S. 227, S. 231; vgl. Priller et al. 2012, S. 7.

<sup>26</sup> Vgl. Drucker 1990, S. xi-xii; vgl. Meyer et al. 2013, S. 422; vgl. Sardovski 2022, S. 14-15; vgl. Weisenbach Keller und Conway Dato-On 2009, S. 106.

<sup>27</sup> Vgl. Kylander und Stone 2012, S. 38.

<sup>28</sup> Vgl. Durham und Duffett 2014, S. 16-18; vgl. Meyer et al. 2013, S. 421-422.

<sup>29</sup> Durham und Duffett schildern, dass nahezu alle der 350 befragten, amerikanischen NPOs Rebranding-Maßnahmen unternahmen, um ihre Arbeit besser greifbar zu machen [vgl. ebd., S. 4-11, S. 31ff.]; vgl. Drucker 1990, S. 39-40.

<sup>30</sup> Vgl. Cogan 2001, S. 15; vgl. Durham und Duffett 2014, S. 5; vgl. Ibrisevic 2019; vgl. Vinjamuri 2004, S. 5-7.

<sup>31</sup> Vgl. Vinjamuri 2004, S. 5.

<sup>32</sup> Vgl. Benetton Group 2022.

<sup>33</sup> Vgl. Foresight Alliance 2014, S. 8; vgl. Hahn 2021, S. 22; vgl. Mirzaei et al. 2021, S. 186-187; vgl. Veluchamy et al. 2021, S. 115ff. S. 122. Es sei darauf verwiesen, dass es auch Unternehmen gibt, die derartiges Social Branding [vgl. Kap. 2.2.1] aus einer Kombination dieser Gründe oder Weiterer betreiben.

<sup>34</sup> Vgl. Kylander und Stone 2012, S. 38ff.

<sup>35</sup> Vgl. Aaker 1991, S. 13ff.; vgl. Ritchie et al. 1999, S. 5, S. 21-24.

Nicht nur die geschilderten Stigmen oder die allseits bekannten finanziellen und personellen Engpässe im dritten Sektor erschweren das Branding,<sup>36</sup> in der Literatur hält sich insbesondere eine Behauptung vehement: Es mangelt an Verständnis über *missionsorientiertes (Re)Branding*<sup>37</sup>. Zunächst einmal sei herkömmliches Branding ein äußerst umstrittenes, wenn nicht das am meisten missverständliche Konzept im Marketing, geprägt durch ein diffuses Bild in Privatwirtschaft und Wissenschaft, ohne Konsens über Definition oder Methodik.<sup>38</sup> Zudem widmeten sich vergangene Forschungsbemühungen vorrangig Teilbereichen, wie dem Produktbranding, nicht jedoch dem Corporate Branding, das nicht nur einzelne Angebote, sondern die gesamte Organisation als Marke auffasst.<sup>39</sup> Nun kommt hinzu, dass MOs auf diesen unzureichenden Wissensstand der profitorientierten Welt aufzubauen müssen, da derartige Marketinglehren üblicherweise nicht für ihre Bedürfnisse konstruiert wurden.<sup>40</sup> Das ist insofern hochproblematisch, da MOs einzigartige Charakteristika, wie etwa non-lineare Abläufe, heterogene, schwer messbare Ziele und komplexere Abhängigkeiten zwischen den diversen Zielgruppen aufweisen.<sup>41</sup> Es zeigt sich immer wieder, dass kommerzielle Marketingmethoden ihren Anforderungen zwangsläufig nicht gerecht werden können.<sup>42</sup> Laut Meyer et al. sei der Mangel an spezifischen Methoden nicht nur durch die prekäre Übertragbarkeit von kommerziellen Praktiken begründet, sondern auch der Tatsache geschuldet, dass der dritte Sektor zu komplex sei und sich niemals alle Organisationen über einen Kamm scheren ließen.<sup>43</sup> Ohnehin sind Organisationen keine statischen Konstrukte, sondern können im Laufe der Zeit hinsichtlich ihrer sozialen bzw. wirtschaftlichen Ausrichtung schwanken, sodass gelegentlich mehr oder weniger kommerzielle Instrumente zum Einsatz kommen.<sup>44</sup> Vor diesem Hintergrund stützt sich die vorliegende Forschungsarbeit auf die Argumentation nach Meyer et al., dass es (Marketing-)Methoden geben muss, die die Eigenarten von MOs achten, dennoch nicht blindlings

von den Führungskräften übernommen werden, sondern mit Blick auf den jeweiligen betrieblichen Kontext.<sup>45</sup> Das setzt jedoch zweifelslos ein Marketingwissen voraus, das de facto im dritten Sektor oft gar nicht vorhanden ist. Hier ist man sich zwar einig, dass die Marke ein maßgeblicher Differenzierungsfaktor ist – vielleicht sogar eine wichtigere Funktion als in kommerziellen Unternehmen erfüllt – bis heute herrscht aber kein Konsens darüber, was Marketing überhaupt ist und wie derartige Methoden generell umgesetzt werden können.<sup>46</sup>

Wenn man diese Sachverhalte nun auf das Forschungsfeld überträgt, bedeutet das, dass ein Branding-Modell für MOs möglichst anpassbar und zudem leicht zugänglich und verständlich sein muss. Vor diesem Hintergrund ist fraglich, wie realitätsnah manche Corporate-Branding-Anleitungen der Fachliteratur sind: Ungeachtet ihrer Ausrichtung auf die Privat- oder Sozialwirtschaft benennen einige Autorinnen lediglich einzelne Faktoren oder Zusammenhänge für erfolgreiches Corporate Branding, ohne dass diese eine ganzheitliche, sachdienliche Strategie darstellen.<sup>47</sup> In anderen Quellen hingegen finden sich generelle Untersuchungen auf Branding-Strategien (wie Co-Branding), jedoch nicht die dazugehörigen Abläufe.<sup>48</sup> Manche Schriftsteller:innen bilden das Vorgehen wiederum ab, erläutern die einzelnen Prozessschritte jedoch gar nicht oder nicht ausreichend.<sup>49</sup> In manchen Werken finden sich zwar solche Prozessschritte, jedoch fehlt bei ihnen die (kontinuierliche) Kontrolle,<sup>50</sup> die unumstrittener Bestandteil einer jeden strategischen Handlung sein sollte.<sup>51</sup>

Mit Blick auf die Branding-Literatur, die sich gezielt an MOs wendet, zeigt sich ein weiteres Phänomen: Sie widmet sich entweder nur bestimmten Organisationen und Organisationsformen (wie nicht-profitorientierte Organisationen (NPOs) im Gesundheitswesen)<sup>52</sup> oder einzelnen Termini (wie Markenimage/-persönlichkeit) und Disziplinen (wie der Messbarkeit der Brand Equity).<sup>53</sup> Umfassendere Ansätze für *missionsorientiertes Corporate Rebranding* (MCR) scheinen nur in der Populärliteratur aufzutauchen – und zwar massenhaft in Blogartikeln, die „komplette“ oder „ultimative“ Guides

<sup>36</sup> Vgl. Drucker 1990, S. 46; vgl. Priemer: Finanzierungsmix, in: Krimmer (Hrsg.) 2019, S. 115ff.; vgl. Muzellec und Lambkin 2006, S. 803; vgl. Pope et al. 2009, S. 191ff, S.195; vgl. Webster 2002.

<sup>37</sup> Hierunter werden (Re)Branding-Maßnahmen von MOs verstanden. Sie sind vom oben geschilderten Social (auch: Purposeful) Branding abzugrenzen, bei dem kommerzielle Unternehmen soziale bzw. ökologische Themen bewerben, um sich im Wettbewerb zu differenzieren [vgl. Mirzaei et al. 2021, S. 187].

<sup>38</sup> Vgl. Albisser 2022, S. 23-24ff.; vgl. Boldt 2010, S. 4; Parker und Parker 2013, Kap. „Really important note“, „What is brand really?“.

<sup>39</sup> Vgl. Ahonen 2008, S. 32, S. 36;; vgl. Chad 2016, S. 5; vgl. Schmitt 2012.

<sup>40</sup> Vgl. Chapleo 2015, S. 1; vgl. Drucker 1990, S. x-xi; vgl. Finisterra do Paço et al. 2014, S. 13-14; vgl. Iwankiewicz-Rak und Mróz-Gorgoń 2017, S. 126-129; vgl. Kylander und Stone 2012, S. 37.

<sup>41</sup> Vgl. Anheier 2000, S. 4, S. 6-7, S. 13; vgl. Chad 2016, S. 11; vgl. Chapleo 2015, S. 7, S. 15; vgl. Drucker 1990, S. x; vgl. Hahn 2021, S. 29-30; vgl. Meyer et al. 2013, S. 145ff, S. 227ff, S. 239; vgl. Pope et al. 2009, S. 185, S. 194.

<sup>42</sup> Vgl. Anheier 2000, S. 9-10ff.; vgl. Meyer et al. 2013, S. 153, S. 145ff.; vgl. Pope et al. 2009, S. 197-198.

<sup>43</sup> Vgl. Meyer et al. 2013, S. 145, S. 153; diese Wahrnehmung vertreten auch weitere Autoren aus früherer und heutiger Zeit, u. A. Chad (2016, S. 12) und Ritchie et al. (1999, S. 4).

<sup>44</sup> Vgl. Anheier 2000, S. 13.

<sup>45</sup> Vgl. Meyer et al. 2013, S. 153-154.

<sup>46</sup> Vgl. Chiagouris 2005, S. 30-33; vgl. Drucker 1990, S. x; vgl. Durham und Duffett 2014, S. 2, S. 4; vgl. Finisterra do Paço et al. 2014, S. 12; vgl. Iwankiewicz-Rak und Mróz-Gorgoń 2017, S.126ff; vgl. Mirzaei et al. 2021, S. 186; vgl. Pope et al. 2009, S. 184-185, S. 191, S. 195-198; vgl. Webster 2002; vgl. Weisenbach Keller und Conway Dato-On 2009, S. 106.

<sup>47</sup> Siehe bspw. die Werke von Balmer (2001b), Chad (2016), Hatch und Schultz (2001), Iwankiewicz-Rak und Mróz-Gorgoń (2017), Merrilees und Miller (2008) und Wittkamp (2015), der sich jedoch eher auf die Wahrnehmung unter Arbeitskräften bezieht und weitere Stakeholder:innen der Corporate Brand ausklammert.

<sup>48</sup> Siehe Wojciechowska (2022).

<sup>49</sup> Siehe Ahonen (2008), Lomax et al. (2002) und Muzellec und Lambkin (2006).

<sup>50</sup> Siehe Tevi und Otubanjo (2013). Ahonen (2008) erwähnt sie im Fließtext, eine grafische Hervorhebung fehlt.

<sup>51</sup> Vgl. Meyer et al. 2013, S. 315ff, vgl. Schneider et al. 2007, S. 55-58ff.

<sup>52</sup> Siehe Khosravizadeh et al. (2021) und Vinjamuri (2004), bei dem zudem die grafische Darstellung fehlt.

<sup>53</sup> Bei Iwankiewicz-Rak und Mróz-Gorgoń (2017, S. 128) findet sich eine detaillierte Aufführung. Siehe Kap. 2.1.3 zur Erläuterung von Brand Equity.



propagieren.<sup>54</sup> Diese verfolgen aber selbst-legitimierende Logiken, denen es an einer theoretischen Grundlage fehlt.<sup>55</sup>

Aus der geschilderten wissenschaftlichen Lücke ergibt sich das Forschungsinteresse: die Besonderheiten von MCR sollen wissenschaftlich fundiert aufbereitet und systematisch in ein ganzheitliches und praxistaugliches Prozessmodell übertragen werden.

## 1.2. Zielsetzung, Methodik und Aufbau der Forschungsarbeit

Die vorliegende Arbeit soll einen wissenschaftlichen Beitrag zur Marketingforschung, speziell der Förderung von Branding in MOs, leisten. Dabei handelt es sich um ein Forschungsfeld, das als vergleichbar wenig untersucht gilt.<sup>56</sup>

Mit Blick auf die im dritten Sektor vorhandene Aversion gegenüber herkömmlichen Praktiken und Begriffen aus den Bereichen Management und Marketing<sup>57</sup> wurde zunächst eine Übernahme der zugehörigen Termini für diese Forschungsarbeit hinterfragt. Diese Debatte wurde jedoch beigelegt, weil MOs mit dem Einsatz von Branding tatsächlich (per definitionem) ökonomische Ziele verfolgen, wie die Steigerung von Effizienz, Reichweite und Professionalität.<sup>58</sup> Eine betriebswirtschaftliche Konnotation verspricht gerade das.<sup>59</sup> Um dennoch die Eigenheiten von MOs hervorzuheben und die Pflege von eigenständigen Begriffssystemen im dritten Sektor zu fördern,<sup>60</sup> werden kommerzielle Bezeichnungen um den Zusatz „missionsorientiert“ erweitert: missionsorientiertes Marketing/Branding. Kapitel 2.2. erläutert deren Besonderheiten genauer.

Die Vielzahl von Subdisziplinen dieser beiden Untersuchungsgebiete erfordert eine genauere Eingrenzung des Forschungsfeldes. Abbildung 1 verdeutlicht, welche Konzepte in der vorliegenden Arbeit mehr oder weniger Beachtung finden. Kernbestand der Untersuchung ist das MCR, das jedoch nicht weiter unterteilt wird – z. B. nach geografischem oder kulturellem Kontext. Wie die Grafik abbildet, gehen aus dem Wortstamm „Branding“ zahlreiche Ausrichtungen, wie das Produkt- und Employer Branding<sup>61</sup>, hervor. Manche dieser Schwerpunkte überschneiden sich (z. B. Produkt- und Ingredient Branding). Es gibt weitere Ausprägungen, die aus Gründen der Lesbarkeit nicht grafisch abgebildet werden – so kann bspw. auch eine Produktmarke in einzelnen Punkten überarbeitet (sog. Brand Refresh/Renewal) oder wesentlich verändert (Rebranding) werden, digital erlebbar sein (sog.

Digital Branding) oder als Kooperation von mehreren Unternehmen entstehen (sog. Co-Branding). Die wichtigsten Disziplinen werden in Kapitel 2.1 erläutert. Das sog. „No-Brand-Branding“ findet im Folgenden keine Beachtung. Darunter werden Waren verstanden, die ohne Namensnennung, Logo oder ähnliche Elemente vermarktet werden, damit ihre Qualität erschwinglicher wird.<sup>62</sup> Diese Kategorisierung wird abgelehnt, da schließlich auch derartige Handelsgüter einen gewissen Wiedererkennungswert haben und ein Vorstellungsbild kreieren, das ggf. zum Wiederkauf führt.

Es scheint, als würden täglich neue Branding- Unterkategorien (bspw. Healthcare Branding) aus dem Boden sprießen, die hier nicht alle erfasst werden können und sich ohnehin meist einem übergeordneten Konzept (bspw. dem Dienstleistungsbranding) zuordnen lassen.

Diese Forschungsarbeit fokussiert sich auf den Schwerpunkt Corporate Rebranding, da in der Praxis viele MOs aus primär unscheinbaren, wenig strukturierten Vorhaben entstehen und zunächst zahlreiche Tätigkeiten ausüben, die einem eher zeit- und kostenintensiven Prozess – wie dem Branding – vorweilen.<sup>63</sup> In diesen Fällen entwickelt sich die Unternehmensmarke peu à peu, oftmals ohne aktives Zutun der Organisation. Sofern diese Corporate Brand dann zu einem späteren Zeitpunkt angegangen und bewusst geformt wird, soll im Folgenden darunter bereits das Rebranding<sup>64</sup> verstanden werden.

Es sei angemerkt, dass Abbildung 1 nicht die Überschneidungen aller verwandten Konzepte realitätsgetreu abbildet. Sie kann bspw. nicht dahingehend interpretiert werden, dass NPO-Marketing knapp zur Hälfte den Logiken des herkömmlichen Marketing folgt. Stattdessen soll die Grafik einen Eindruck der Abhängigkeiten zwischen den Ansätzen und in Bezug auf ihre übergeordneten Bereiche vermitteln. Sie sagt bspw. aus, dass sich einzelne Lehren des Change Management auch in Branding-Vorhaben wiederfinden.<sup>65</sup> Das Herausarbeiten derartiger Zusammenhänge ist für eine umfangreiche Recherche ausgesprochen hilfreich. Gerade weil das Kernthema der vorliegenden Arbeit so spezifisch und unzureichend erforscht ist, können auf diese Weise mehr Suchbegriffe generiert werden. Konkret bedeutet das, dass für die vorliegende Arbeit auch Quellen herangezogen werden, die sich bspw. dem kommerziellen Corporate Branding oder NPO-Marketing annähern, ohne dass sie in direktem Bezug zum MCR stehen. Einkreiste Forschungsfelder, die sich hingegen nicht mit dem in Abbildung 1 rot markierten Untersuchungsgegenstand überlappen, werden bei der Recherche systematisch mittels Boolescher Operatoren ausgegrenzt (bspw.: „NPO AND Corporate Branding -product“). Eine Auswahl der verwendeten Suchstrings befindet sich in Anhang B. Ausgehend von einzelnen Keywords wie „social

<sup>54</sup> Eine Google-Suche mit dem Suchstring „Corporate Branding AND npo OR nonprofit OR non-profit“ ergibt bspw. über 300 Millionen Einträge [Zugriff am 01.06.22].

<sup>55</sup> Siehe Morand (2020), GlobalOwls (2024) und Kimbarovsky (2024), um nur drei dieser Quellen zu nennen.

<sup>56</sup> Insb. in Bezug auf NPOs; vgl. Finisterra do Paço et al. 2014, S. 13ff.; vgl. Wojciechowska 2022.

<sup>57</sup> Vgl. Akbar et al. 2021, S. 4; Drucker 1990, S. x, S. 55-58.

<sup>58</sup> Siehe Kap. 1.1.

<sup>59</sup> Vgl. Meyer et al. 2013, S. 424, S. 426-427.

<sup>60</sup> Vgl. ebd.

<sup>61</sup> Englische Bezeichnungen, die im Deutschen geläufiger als die spracheigenen Pendanten sind, werden für den Verlauf der Arbeit beibehalten (bspw. Corporate oder Employer Branding, Change Management).

<sup>62</sup> Vgl. Bakalarska et al. 2017, S. 15.

<sup>63</sup> Vgl. Cogan 2001, S. 13, S. 47; vgl. Durham 2015; vgl. Todor 2014, S. 59-63.

<sup>64</sup> U. U. auch Brand Refresh/Renewal; siehe Kap. 2.1.2 für eine Differenzierung dieser Konzepte.

<sup>65</sup> Vgl. Canady 2017. Und vice versa, vgl. Shelton 2003, S. 192ff.

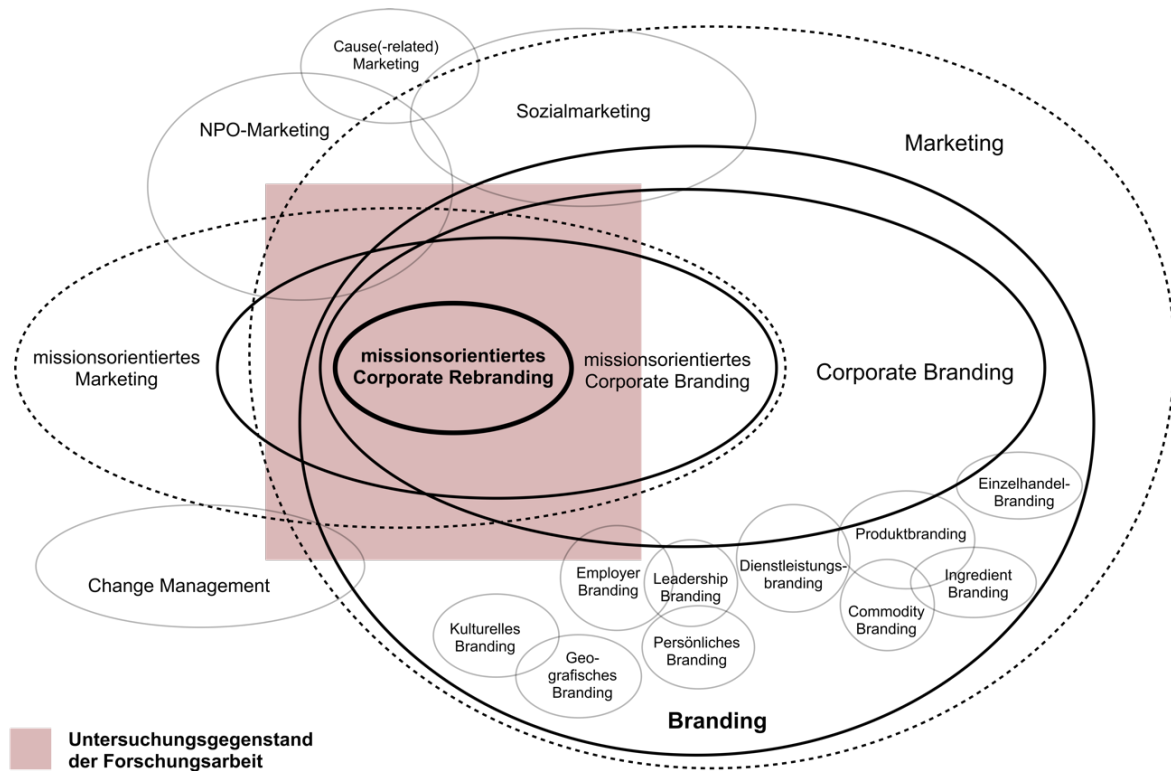


Abbildung 1: Untersuchungsgegenstand der Forschungsarbeit in Rot. Eigene Darstellung. Höhere Auflösung in Anhang A.

AND Branding“ können weiter generiert werden: cause, conscious, impact ... Branding. Die Suchstrings im Anhang verdeutlichen, dass sich die Anzahl der Ergebnisse von Branding zu Rebranding verringert und dass sich deutlich mehr Literatur zu Branding in NPOs, statt zu vergleichbaren Organisationen [wie Non-Governmental Organizations (NGOs)], ausfindig machen lässt.

Ermittlung und Durchsicht von vorhandenen Informationen stellen die erste Phase eines Literatur Review dar (sog. Analyse), auf die das Zusammentragen dieses eruierten Wissensstands folgt (sog. Synthese).<sup>66</sup> Das Literatur Review wurde als Forschungsverfahren für die vorliegende Arbeit gewählt und dient als Grundlage für die darauffolgende Erarbeitung eines neuen Prozessmodells für MCR.

Ein Literatur Review zeichnet sich dadurch aus, dass keine Primärforschung betrieben wird und dass Quellen verschiedener Herkunft verwendet werden.<sup>67</sup> Das kann Daten umfassen, die nicht unmittelbar dem Forschungsgebiet zuzuordnen sind.<sup>68</sup> Eine besondere Bedeutung kommt Standardwerken und der sog. Grauen Literatur zu – darunter Broschüren, Konferenzpräsentationen und Reporte.<sup>69</sup> Wie von Rowley und Slack empfohlen, legt die vorliegende Arbeit ihr Augenmerk auf akademische und wissenschaftliche Beiträge, da diese über eine solide, theoretische Basis und kritische Betrachtung der Untersuchungsgegenstände, sowie über ein

umfangreiches Literaturverzeichnis verfügen.<sup>70</sup> Letzteres ist für die Rückwärtssuche (sog. Schneeballsystem) relevant, bei der die zitierten Referenzen auf die grundlegende, gängige Literatur untersucht werden.<sup>71</sup>

Für das vorliegende Literatur Review werden ausschließlich kostenlos zugängliche, deutsch- oder englischsprachige Quellen und bevorzugt aktuellere Beiträge aus hochrangigen Journalen mit Peer-Review-Verfahren verwendet. Derartige Journale, aber auch Konferenzaufschriebe und Dissertationen, werden auf Onlinedatenbanken wie *ResearchGate* abgerufen. Ergänzend dazu werden die Bibliotheksbestände der *Hochschule für Musik und Theater Hamburg* und der *Münchener Stadtbibliothek* nach Büchern durchsucht. Für den Zugriff auf Internetquellen kommen elektronische Suchmaschinen zum Einsatz. Die genannten Suchstrings werden in einem privaten Fenster in *Google Scholar* eingegeben und so wissenschaftliche Quellen durch eine neutralere Suche ermittelt. In einem zweiten Schritt wird auch *Google* durchkämmt und zusätzlich praxisrelevante Populärliteratur identifiziert. Abbildung 2 skizziert die Vorgehensweise dieser Arbeit und somit den Ablauf des Literatur Review.

Nachdem in Kapitel 1 Gegenstand und Umfang der Forschungsarbeit diskutiert und qualitative, wie sprachliche Auswahlkriterien und Suchbegriffe definiert wurden, folgt in Kapitel 2 die Aufarbeitung der Literatur und das Zusammentragen des Wissensstands. Die Ausführungen in Kapitel 2

<sup>66</sup> Vgl. Cooper 1988, S. 106-107; vgl. Rowley und Slack 2004, S. 32.

<sup>67</sup> Vgl. ebd., S. 107; vgl. ebd., S. 31.

<sup>68</sup> Vgl. Rowley und Slack 2004, S. 32.

<sup>69</sup> Vgl. ebd., S. 33; vgl. George et al. 2014, S. 67-68.

<sup>70</sup> Vgl. Rowley und Slack 2004, S. 32.

<sup>71</sup> Ebd., S. 33.

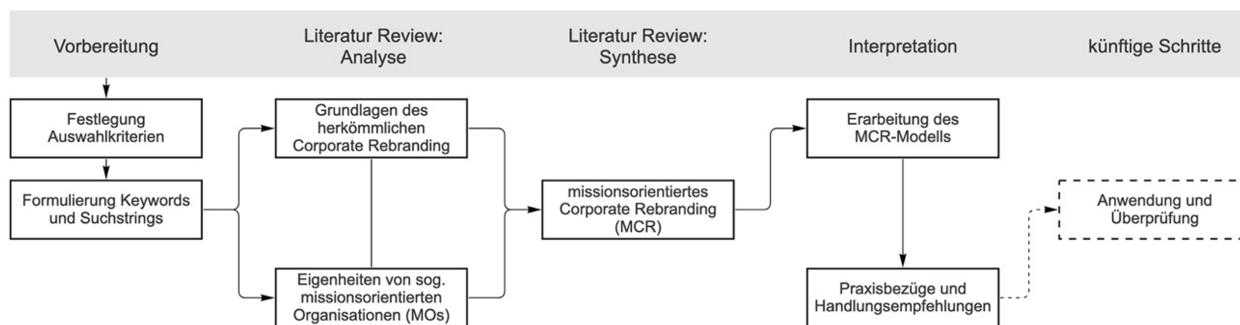


Abbildung 2: Vorgehensweise der Forschungsarbeit. Eigene Darstellung.

verfügen über einen gewissen Detaillierungsgrad, da das Literatur Review das Fundament dieser Arbeit ist. Die Themenfelder „Corporate Rebranding“ und „Missionsorientierte Organisationen“ werden aufgrund der geschilderten Unzulänglichkeiten der fachübergreifenden Literatur im Wesentlichen getrennt voneinander untersucht. Da die Unterkapitel eine ähnliche Struktur verfolgen und aufeinander aufbauen, wird der Untersuchungsgegenstand so immer mehr herausgeschliffen.

Entstehungsgeschichte und Wortherkunft des Branding werden vorweg beleuchtet, um aktuelle Entwicklungen und Diskrepanzen zwischen den Denkschulen aufzuzeigen. Eine erste Arbeitsdefinition zu Branding wird erarbeitet. Weitere, für diese Arbeit relevante Fachtermini werden im Folgenden in Fettschrift hervorgehoben und erläutert. Es folgt die Annäherung an das Corporate Rebranding durch Abgrenzung von anderen organisatorischen Bereichen. Die Verantwortlichkeiten, zeitlichen Abfolgen und Elemente des Corporate Rebranding werden geklärt.

Der zweite Teil des Kapitels widmet sich den Anforderungen, die MOs an das Corporate Rebranding stellen. Dafür werden zuerst die Organisationen des dritten Sektors, die von Bedeutung für die vorliegende Arbeit sind, beschrieben und grafisch differenziert. Ihre Charakteristika werden gesammelt und durch die Lupe des Corporate Rebranding betrachtet. Daraus lassen sich spezifische Herausforderungen ableiten, die im nachfolgenden Kapitel 3 in einen Prinzipienkatalog für MCR übersetzt und schließlich in das Prozessmodell umgewandelt werden. Obwohl das Literatur Review aus einer möglichst neutralen Perspektive verfasst wird, erfordern insb. diese Schritte die eigene Meinungsbildung der Autorin, da teils widersprüchliche Ansätze miteinander in Ausgleich gebracht werden sollen.<sup>72</sup>

Die vorliegende Arbeit versteht unter einem Prozessmodell die vereinfachte, schematische Darstellung der chronologisch-sachlogischen Abfolge von Tätigkeiten.<sup>73</sup> Einen Prozess zeichnet aus, dass er sich über eine gewisse Zeit erstreckt und

allmählich herausbildet.<sup>74</sup> Es wird ein normatives Modell entwickelt, das einen Soll-Prozess abbildet.<sup>75</sup> In vielen Fällen, so auch beim MCR, laufen mehrere Prozesse auf unterschiedlichen Hierarchieebenen der Organisation zusammen und stellen ein äußerst komplexes Konstrukt dar, aus dem im Folgenden durch Abstraktion lediglich die Hauptaufgaben herausgefiltert werden.<sup>76</sup> Das bedeutet bspw., dass genauere Ausführungen zum Rechtsgebiet (sog. Markenrecht) oder zu sehr spezifischen Tätigkeiten wie der Namensfindung, Farbgebung und dem Einsatz von Kreativitätsmethoden nicht gemacht werden. Anspruch dieser Arbeit ist es schließlich, den MCR-Prozess möglichst ganzheitlich und anwenderfreundlich im vorgegebenen Umfang abzubilden.

Diese Forschungsarbeit richtet sich an Praktiker:innen in MOs der mittleren und oberen Führungsebene, Sachkundige und Forschende; sie verwendet Fachsprache.<sup>77</sup>

Bei der Entwicklung des Schaubilds und seiner dazugehörigen Beschreibung werden des Öfteren Parallelen zu anderen Theoriemodellen aus dem profit- und nichtprofitorientierten Bereich gezogen. Diese wurden bereits in Kapitel 1.1 untersucht, um das Forschungsdefizit zu schildern. Es wurde herausgearbeitet, dass kein Modell einer Anwendbarkeit auf MCR standhält; in Kapitel 3 jedoch wird sich zeigen, dass aus der Kombination ihrer einzelnen Ansätze und unter Abgleich des Prinzipienkatalogs ein ganzheitlicheres Prozessmodell entwickelt werden kann. Einzelne Prozessschritte des neuen Modells werden anhand eines realen Praxisbeispiels anschaulich beschrieben.

Im vierten Kapitel werden die Ergebnisse und Grenzen der empirischen Forschung diskutiert. Das MCR-Modell wird hinsichtlich seiner Qualität und Schwachstellen beurteilt. Es wird abschließend untersucht, für wen und in welchem Kontext das Modell eingesetzt werden kann.

Zuletzt werden die zentralen Erkenntnisse dieser Arbeit zusammengetragen und Handlungsempfehlungen abgeleitet, die zu einer Nutzung und Weiterentwicklung des MCR-Modells motivieren sollen.

<sup>72</sup> Vgl. Cooper 1988, S. 108-110.

<sup>73</sup> Vgl. Bundesministerium des Innern und für Heimat (BMI) 2022; vgl. Schneider et al.: Prozess- und Qualitätsmanagement, Zürich, 2008, S. 48, zitiert nach Durst et al. 2020. Gelegentlich wird ein Prozessmodell auch als „Vorgehensmodell“ bezeichnet.

<sup>74</sup> Vgl. Duden (2022b).

<sup>75</sup> Vgl. Schneider et al.: Prozess- und Qualitätsmanagement, Zürich, 2008, S. 48, zitiert nach Durst et al. 2020.

<sup>76</sup> Vgl. ebd.

<sup>77</sup> Vgl. Cooper 1988, S. 112.

## 2. Terminologische Grundlagen

„A transaction is a date. [...]“

A brand is a marriage.“ – Parker und Parker, 2013.<sup>78</sup>

### 2.1. Corporate Rebranding

#### 2.1.1. Geschichtlicher Hintergrund und Begriffsentwicklung des Branding

Mit Symbolen versehene Ziegelsteine zur Zeit der Pharaonen und das *Red-Bull*-Universum sind – genau genommen – beides Beispiele für Branding. Unser heutiges Markenverständnis baut auf einer sehr langen Entwicklungsgeschichte auf. Branding ist keine Erfindung unserer Zeit und doch eine neue, grundsätzlich andere Disziplin.<sup>79</sup>

Vielen Definitionen gelingt es nicht, diese Weiterentwicklung seit den frühen Anfängen abzubilden. Einige von ihnen sind in Anhang C aufgeführt. Insb. jene Erklärungsansätze, die sich aus der Wortherkunft speisen, greifen zu kurz: Der deutsche Terminus „Marke“ ist seit dem 17. Jahrhundert bezeugt und geht aus dem französischen „marque“ (ursprünglich lat. „marka“) hervor: ein Kennzeichen.<sup>80</sup> Das deckt sich mit der Herleitung von „Branding“ aus dem altnordischen „brandr“ (dt. „brennen“), denn beide Begriffe spielen darauf an, dass Bauern/Bäuerinnen bereits früher ihr Vieh mit Brandzeichen versahen, um das Tier vom benachbarten Eigentum zu unterscheiden.<sup>81</sup> Dabei handelt es sich um eine der ältesten Branding-Maßnahmen. In der Literatur finden sich weitere Exkurse in die Markengeschichte: von beschriebenen Wiskyfässern im frühen 16. Jahrhundert, zurück zu den Wasserzeichen auf italienischem Papier im 13. Jahrhundert und der markierten Tonware in Asien um 1.300 v. Chr.<sup>82</sup> Diesen Beispielen ist gemein, dass Branding in seiner frühesten Form das Kennzeichnen eines Gegenstands durch ein Symbol und später auch durch Namen und Zahlen meinte.<sup>83</sup>

Die Industrialisierung schließlich befeuerte das Phänomen des Markenartikels, denn Unternehmen begannen, ihre Ware zu verpacken und zu beschriften. Das Konzept der Produktmarke war geboren.<sup>84</sup> Mit dem Anstieg des globalen Hyper-Wettbewerbs, der Angleichung von Produktqualität und der wachsenden Bedeutung von Discountern und Einzelhändlern, müssen Hersteller außerhalb ihrer Preispolitik Differenzierungsmerkmale schaffen.<sup>85</sup> Eine Marke – insb. eine Unternehmensmarke – ist schwerer kopierbar und hat einen längeren Lebenszyklus als ein Produkt, ohne dass ständige Innovation nötig ist.<sup>86</sup> Eine Marke kann wertvoller und

leichter zu verteidigen sein als ein Patent, schreibt Aaker 1991.<sup>87</sup>

Der Geltungsbereich des Branding wächst weiter, auch Personen und Länder werden zur Marke, der Schwerpunkt verlagert sich zudem vom Produkt- zum Corporate Branding.<sup>88</sup> Branding entwickelt sich schnell zur Schlüsselkomponente der Unternehmensstrategie, sogar zu „Kunst und Grundstein des [modernen] Marketing“;<sup>89</sup> ab sofort wird ausgehend von der Marke gehandelt.<sup>90</sup> Unternehmen sind bereit, immer größere Summen in ihre (Re)Branding-Maßnahmen zu investieren, trotz steigender Werbekosten.<sup>91</sup> 1988 wird Kraft von Philip Morris für über 13 Milliarden US-Dollar, sprich 600% über dem Buchwert, gekauft.<sup>92</sup> 2007 beträgt der Markenwert von Coca-Cola über 65 Milliarden US-Dollar und somit knapp 55% des Börsenwertes.<sup>93</sup> Die Beispiele von schwergewichtigen Investitionen in Marken häufen sich. Unter den Verbrauchenden übersteigt laut Boldt das Vertrauen in starke Marken jenes in Institutionen wie Kirche, Polizei und Regierung.<sup>94</sup>

Obwohl sich (Re)Branding längst im allgemeinen Sprachgebrauch etabliert hat, zeichnen sich erst ab den 2000er Jahren vermehrt wissenschaftliche Bemühungen ab.<sup>95</sup> Insb. Aaker und Joachimsthaler prägen das Forschungsfeld.<sup>96</sup>

Es dauert etwa ein weiteres Jahrzehnt, bis (Re)Branding auch im dritten Sektor breite Aufmerksamkeit findet, sowohl in Praxis, als auch Literatur.<sup>97</sup> Nicht nur aufgrund des in Kapitel 1.1 geschilderten, zunehmenden Wettbewerbs, auch weil immer mehr Führungskräfte von der Privat- in die Sozialwirtschaft wechseln und ihre Methoden mitbringen.<sup>98</sup> Nachdrücklich verändert sich auch die Wahrnehmung von MOs; von einem Zulieferer des Staates zum bedeutenden Arbeitgeber und zentralen Akteur bei der Erfüllung spezifischer Bedürfnisse. Mittlerweile ist die Rede von einem „Sektor“.<sup>99</sup> Zu den weltweit bekanntesten Marken zählen *Amnesty International* und *World Wildlife Fund* (WWF).<sup>100</sup>

In den 1990er Jahren findet ein Paradigmenwechsel statt, der unser Markenverständnis bis heute prägt: Von der frühen Auffassung, der:die Markeninhaber:in habe die Kon-

<sup>87</sup> Vgl. Aaker 1991, S. 163.

<sup>88</sup> Vgl. Albisser 2022, S. 14, S. 18; vgl. Hatch und Schultz 2003, S. 1041, S. 1044.

<sup>89</sup> Kotler, Philip: *Marketing Management: Analysis, Planning, Implementation and Control*, New Jersey, 1997, zitiert nach: Ritchie et al. 1999, S. 1; vgl. auch Aaker 1991, S. 21.

<sup>90</sup> Vgl. Aaker und Joachimsthaler 2000, S. 33ff; vgl. Albisser 2022, S. 13; vgl. Ritchie et al. 1999, S. 1.

<sup>91</sup> Vgl. Aaker 1991, S. 12, S. 21;

<sup>92</sup> Vgl. ebd., S. 21; vgl. Sing 1988.

<sup>93</sup> Vgl. Boldt 2010, S. 1.

<sup>94</sup> Ebd., Verweis auf Esch, Franz-Rudolf: *Strategie und Technik der Markenführung*, München, 2008, S. 5ff.

<sup>95</sup> Vgl. Muzellec und Lambkin 2006, S. 804.

<sup>96</sup> Vgl. Schultz und Hatch 2003, S. 25.

<sup>97</sup> Vgl. Chapleo 2015, S. 2; vgl. Iwankiewicz-Rak und Mróz-Gorgoń 2017, S. 126-128; vgl. Kylander und Stone 2012, S. 37.

<sup>98</sup> Vgl. Drucker 1990, S.159ff.; vgl. Kylander und Stone 2012, S. 38; vgl. Vinjamuri 2004, S. 2.

<sup>99</sup> Vgl. Drucker 1990, S. ix, S. x; vgl. Finisterra do Paço et al. 2014, S. 11.

<sup>100</sup>Vgl. Kylander und Stone 2012, S. 37.

<sup>78</sup> Parker und Parker 2013, Kap. 6 „Flash-in-the-pan is as flash-in-the-pan does“.

<sup>79</sup> Vgl. Aaker 1991, S. 21; Vgl. Boldt 2010, S. 4, vgl. Kenton 2022; vgl. Paul 2004.

<sup>80</sup> Vgl. Duden 2022a; Wahrig Herkunftswörterbuch 2019.

<sup>81</sup> Vgl. Kenton 2022; vgl. Khan und Mufti 2007, S. 75.

<sup>82</sup> Vgl. Aaker 1991, S. 21; vgl. ebd.; vgl. ebd.

<sup>83</sup> Vgl. ebd.; vgl. ebd.; vgl. ebd.

<sup>84</sup> Vgl. Boldt 2010, S. 1. vgl. Kenton 2022.

<sup>85</sup> Vgl. Aaker 1996, S. 28-29; vgl. Boldt 2010, S. 1; vgl. Todor 2014, S. 59.

<sup>86</sup> Vgl. Aaker 1991, S. 12, S. 21.; vgl. Hatch und Schultz 2001, S. 7; vgl. Weber 2018.



trolle über die Marke, ihren Wert und sämtliche Marketingbotschaften, die unweigerlich von den passiven, rational handelnden Verbrauchenden (Stichwort *Homo Oeconomicus*) aufgenommen werden, zur Annahme, dass eine Marke in den Köpfen der Zielgruppe entsteht und somit unbedingt im Zusammenspiel mit dieser kreiert wird.<sup>101</sup> Diese neue Denkschule lässt sich durch die Herausforderungen unseres modernen, digitalen Zeitalters und den Kulturwandel erklären: Die Konsumierenden werden immer informierter, kritischer und anspruchsvoller.<sup>102</sup> Sie kaufen nicht mehr aus Loyalität oder Mangel an Auswahl, sondern entscheiden sich bewusster für jene Marken, die ihnen mehr als eine reine Transaktion bieten, sondern sie auf einer emotionalen Ebene erreichen und ihre Werte und Interessen am besten vertreten.<sup>103</sup> Das Augenmerk verschiebt sich von innovativen, luxuriösen Marken hin zu jenen, die sozialbewusst, menschlich und vertrauenswürdig erscheinen.<sup>104</sup> Für Unternehmen ist es schwerer geworden, ihr Soll-Bild linear an die Zielgruppe zu vermitteln. Denn die Kundschaft ist involvierter und erwartet, dass eine Marke zu jeder Zeit und über jeden Touchpoint authentisch gelebt wird. Das bedeutet nicht nur über sämtliche Social-Media-Kanäle hinweg, sondern auch ungeachtet der internen Funktionen, Hierarchien und Märkte.<sup>105</sup> Anhand von Marken, die auf eine Jahrhunderte alte Geschichte zurückblicken, lassen sich diese radikalen Veränderungen und Zukunftstrends ablesen: So entwickelte *Faber-Castell* (gegründet im Jahr 1761 als Bleistifthersteller) erst vor wenigen Jahren eine Augmented Reality App, mit der Nutzer:innen ihre bemalten Papierfiguren zum Leben erwecken und durch Spielepisoden führen können.<sup>106</sup> Die Entwicklung von Branding ist keineswegs in Stillstand geraten.<sup>107</sup>

Branding ist ein Gesamtkonzept mit ausufernder Komplexität. Es geht längst nicht mehr nur darum, Produkte aus der Anonymität zu heben – durch Logos, Farben oder Buchstaben. Ohnehin handelt es sich bei diesen lediglich um Elemente des Branding, was jedoch nicht implizieren soll, dass eine Marke zwangsläufig in ihrer Kombination oder Summe entsteht.<sup>108</sup> Den Definitionen in Anhang D gelingt es somit

eher, das neue Markenverständnis abzubilden.<sup>109</sup> Auf ihrer Grundlage wird eine Arbeitsdefinition ausgearbeitet, die in den folgenden Kapiteln schrittweise ergänzt wird.

Eine **Marke** (engl. „brand“) ist ein umfassendes Konstrukt aus funktionalen und nicht-funktionalen Nutzenbündeln, das seinen Bezugsgruppen nachhaltig eine Orientierungshilfe bei der Differenzierung gegenüber vergleichbaren Nutzenbündeln bietet. Eine Marke entsteht zwischen allen Bezugsgruppen und in der Gesamtheit aller Interaktionen. Der:die Markeninhaber:in kann, bedingt und ausgehend von den Bedürfnissen der relevanten Zielgruppe, auf die Wirkungsperspektive der Marke Einfluss nehmen. Dafür kommen in der Regel verschiedene Elemente, wie etwa ein systematisches Absatzkonzept, Qualitätsmanagement, aber auch Farben, Logos, Architektur und weitere, technische Details zum Einsatz, um die kognitive und emotionale Verknüpfung der Bezugsgruppen mit der Marke aktiv zu unterstützen. Dieser Prozess wird als „**Branding**“ bezeichnet.

### 2.1.2. Einordnung von Corporate (Re)Branding in den betrieblichen Kontext und Abgrenzung von verwandten Disziplinen

Obwohl eine Marke im Zusammenspiel zwischen allen Bezugsgruppen entsteht – bspw. im Außenauftritt der Mitarbeitenden oder externer Partner:innen, im Gespräch unter Kunden:Kundinnen und durch den Pressespiegel – gibt es Unternehmensbereiche, die sich besonders aktiv mit der Markenführung auseinandersetzen. Diese Verantwortlichkeiten sind abhängig davon, auf welcher Ebene das Branding stattfindet. Ungeachtet davon ist Branding aber immer eine Aufgabe des Marketing, denn beide Disziplinen hängen unmittelbar miteinander zusammen und befruchten sich gegenseitig. So kann bspw. eine bessere Markenwahrnehmung eine andere Preispolitik ermöglichen und andererseits kann eine Kommunikationspolitik über die veränderte Marke informieren.<sup>110</sup>

Beim Corporate Branding jedoch entstehen deutlich mehr Synergien zwischen den Abteilungen, als es bspw. bei einer Produktmarke der Fall ist.<sup>111</sup> In der Theorie und Praxis zeichnet sich ab, dass das Buy-in von Mitarbeitenden aus allen Unternehmensbereichen genutzt werden sollte (sog. Internal Branding).<sup>112</sup> Unter „Buy-in“ wird die allgemeine Akzeptanz gegenüber dem Branding verstanden, nicht die tatsächliche

pische Branding-Elemente erfolgreich sind [vgl. Parker und Parker 2013, Kap. 4 „Ignition Points“].

<sup>109</sup>Interessanterweise manifestiert sich dieses neue Markenverständnis insb. in der Populärliteratur und in Internetquellen, darunter gewöhnliche Blogartikel. In der hochrangigen Fachliteratur finden sich hingegen häufiger veraltete Definitionen. Zudem ist das Erscheinungsjahr der Definition kein Indikator für den Erklärungsansatz. In anderen Worten: Definitionen jüngerer Zeit folgen nicht prinzipiell der neuen Denkschule.

<sup>110</sup>Vgl. Aaker 1991, S. 29; vgl. Ahonen 2008, S. 32; vgl. Balmer 2001a, S. 249; vgl. Chad 2016, S. 25; vgl. Muzellec und Lambkin 2006, S. 807; vgl. Ostapenko 2019; vgl. Todor 2014, S. 61.

<sup>111</sup>Vgl. Balmer 2001a, S. 249ff.; vgl. Hatch und Schultz 2003, S. 1045; vgl. Muzellec und Lambkin 2006, S. 803-806.

<sup>112</sup>Vgl. Chad 2016, S. 24-25, S. 28; vgl. Cogan 2001, S. 33; vgl. Lomax et al. 2002, S. 5. Siehe Kap. 2.1.3.

<sup>101</sup>Vgl. Albisser 2022, S. 3-4, S. 14-16ff. ff.; vgl. Foresight Alliance 2014, S. 2, S. 5; vgl. Hedding et al. 2009, S. 20-21, S. 29-32ff. ff.

<sup>102</sup>Vgl. Albisser 2022, S. 3-4, S. 19; vgl. Boldt 2010, S. 1-2; vgl. Foresight Alliance 2014, S. 2; vgl. Hamburg Innovation GmbH (Hrsg.) 2018, S. 8, S. 33; vgl. Ritchie et al. 1999, S. 18; Weber 2018.

<sup>103</sup>Vgl. Albisser 2022, S. 2-4, S. 17; vgl. Bakalarska et al. 2017, S. 15; vgl. Foresight Alliance 2014, S. 7-8, S. 10.

<sup>104</sup>Vgl. Bauer et al. 2011, S. 10; vgl. Foresight Alliance 2014, S. 7-8; vgl. Hamburg Innovation GmbH (Hrsg.) 2018, S. 33; Schmidt 2020a, S. 4; vgl. Weber 2018.

<sup>105</sup>Vgl. Albisser 2022, S. 2-4ff.; vgl. Boldt 2010, S. 1; vgl. Deutscher Markenmonitor 2021b; vgl. Foresight Alliance 2014, S. 6; vgl. Weber 2018.

<sup>106</sup>Vgl. Faber-Castell 2020.

<sup>107</sup>Boldt (2010, S. 1ff.) führt als künftige Trends das sog. „Experience Branding“ und „5-Sence-Branding“ an. Auch der Deutsche Markenmonitor, 2021d, 2021g; Thiemann und Piel 2020 verdeutlicht, dass Markenerlebnisse zunehmend individualisierter, digitaler und interaktiver werden (müssen). Vergleiche auch Kap. 1.1.

<sup>108</sup>Schließlich gibt es auch Marken, wie Komiker:innen, die ohne derart ty-

Beschäftigung aller Mitarbeitenden im Prozess. Dieser Unterschied ist maßgeblich, da andernfalls das ohnehin zeitaufwendige Vorhaben je nach Organisationsgröße wohl kaum umsetzbar wird.<sup>113</sup> Lomax et al. vermerken zudem, dass auch Vertraulichkeitsaspekte gegen die unternehmensweite Einbindung sprechen.<sup>114</sup>

Um die Akzeptanz unter den Mitarbeitenden zu fördern, wird bestimmten Schnittstellen – wie der Personalabteilung und der mittleren und oberen Führungsebene – eine besondere Rolle zuteil. Aaker empfiehlt, trotz der Einbindung funktionsübergreifender Teams eine Person oder einen Personenstamm hauptverantwortlich für das Branding zu machen. Drucker erwähnt eine dedizierte Abteilung: „Next, you have the problem of organizing the new. It must be organized separately. Babies don't belong in the living room, they belong in the nursery.“<sup>115</sup> Aaker führt spezifische Berufsbezeichnungen auf – darunter „Brand (Equity) Manager“ und „Brand Champion“.<sup>116</sup> Er macht außerdem darauf aufmerksam, dass ein Interessenkonflikt entsteht, wenn die Verantwortlichen auf Basis kurzfristiger Erfolge honoriert werden. Das sei häufig der Fall, gerade dann, wenn die Führungskräfte kulturbedingt rotieren und ihren Anspruchsgruppen Fachkenntnisse und Weitblick fehlen. Beim Branding aber müssen insb. langfristige und nachhaltige Ziele angesteuert werden.<sup>117</sup> Eine Agentur über einen längeren Zeitraum mit dem Branding zu beauftragen, kann hier Abhilfe schaffen, zudem schärfen externe und unvoreingenommene Berater:innen den Blick auf das große Unterfangen. Das Management selbst kann u. U. die Komplexität des Prozesses gar nicht erst realistisch einschätzen.<sup>118</sup>

In der Literatur finden sich keine allgemeingültigen Angaben zu Dauer oder Kosten des Corporate Branding.<sup>119</sup> Ohnehin stellt sich die Frage, ob eine moderne Definition von „Branding“ eine derartige Einordnung ermöglicht. Schließlich geht es nicht mehr nur um die zeitlich-begrenzte Ausarbeitung eines Kennzeichens oder von Vergleichbarem, sondern um die konstante Einflussnahme auf die Wirkungsperspektive der Marke. Die Zielgruppe soll konditioniert, nicht zu einem einzelnen Kaufabschluss bewegt werden.

Corporate Branding wird zunächst einmal auf der strategischen Ebene eingeläutet, in der Regel durch die Entscheidung des Senior Management.<sup>120</sup> Obwohl Erfolgsbeispiele

wie *Disney* und *Microsoft* den wirtschaftlichen Nutzen einer Unternehmensmarke gegenüber einzelnen Produktmarken belegen, muss Corporate Branding nicht für jede Organisation die richtige Entscheidung sein: Firmen, die auf neuen Märkten Risiken eingehen oder Ableger in umstrittenen Branchen (wie der Tabakindustrie) haben, möchten ihre Unternehmensmarke vielleicht nicht in Verbindung mit unerprobten bzw. ethisch bedenklichen Produkten bringen.<sup>121</sup> In diesem Fall widmet sich das Branding den einzelnen Produkten oder Unternehmenszweigen.

Eine Unternehmensmarke steht auf einem Fundament, das zuerst gebaut werden muss. Laut Aaker handelt es sich dabei um die sog. Brand Identity, diese unterteilen Greyser und Urde weiter in Mission, Vision, Kultur und (Kern-)Kompetenzen der Organisation.<sup>122</sup> An anderer Stelle tauchen die Begriffe „Markenkern“, „-persönlichkeit“, „-essenz“ und „Corporate Identity“ auf und es lässt sich feststellen, dass kein Konsens über die genaue Bedeutung dieser Konzepte herrscht.<sup>123</sup> Balmer führt an, dass sich viele dieser Begriffe in erster Linie aufgrund ihrer schwindenden Popularität und nicht ihrer Bedeutung unterscheiden.<sup>124</sup> Im Wesentlichen handelt es sich bei diesem Fundament um das Selbst- und Sollbild der Unternehmensmarke, ihre Werte und Versprechen. Die vorliegende Arbeit wählt dafür den Begriff „**Markenidentität**“ und erachtet lediglich eine Unterscheidung zur **Markenpersönlichkeit** als sinnvoll: Durch Persönlichkeitsmerkmale – wie Stil und Tonalität – tritt die Markenidentität nach außen hervor.<sup>125</sup>

Die Markenidentität wird von der Führungsebene formuliert, bspw. in Form einer Corporate Brand Proposition oder Value Proposition.<sup>126</sup> Dann folgt die langfristige Zielsetzung des Branding und es werden konkrete Strategien erarbeitet, um diese Ziele in naher und ferner Zukunft in Ergebnisse umzuwandeln.<sup>127</sup> Das Branding verschiebt sich allmählich von der strategischen Ebene zu einem vorrangig operativen Geschäft.<sup>128</sup> Wie bereits erläutert, findet die Umsetzung der Branding-Maßnahmen auf mehreren Hierarchiestufen und eventuell extern statt. Sie obliegt nicht mehr länger nur der Unternehmensspitze. Bei der Entwicklung von Claim und Slogan ist bspw. zu erwarten, dass auch Mitarbeitende aus den Abteilungen Marketing und Vertrieb involviert werden. Dennoch fällt die laufende Überwachung der Unternehmensmarke in den Bereich des Management.<sup>129</sup> Dieser Prozess der Kontrolle und Anpassung wird vereinzelt als „Brand Management“ bezeichnet; er lässt sich aber nicht ent-

<sup>113</sup>Vgl. Chad 2016, S. 28; vgl. Lomax et al. 2002, S. 5.

<sup>114</sup>Vgl. Lomax et al. 2002, S. 6.

<sup>115</sup>Drucker 1990, S. 10.

<sup>116</sup>Aaker 1996, S. 343-346.

<sup>117</sup>Vgl. ebd., S. 34-35, S. 343-344.

<sup>118</sup>Vgl. ebd., S. 348; vgl. Chad 2016, S. 28; vgl. Lomax et al. 2002, S. 7.

<sup>119</sup>Häufiger tauchen Praxisbeispiele des Corporate Rebranding auf. deren Dauer reicht von einzelnen Monaten, bis zu zehnjährigen Unterfangen. Diese Angaben sind jedoch mit Vorsicht zu genießen, weil sie sich oft nur auf einen Aspekt des Rebranding – wie die Namensänderung – beziehen [vgl. Daly und Moloney 2005, S. 32ff.; vgl. Greyser und Urde 2019, S. 83; vgl. Lomax et al. 2002, S. 2ff.; vgl. Muzellec und Lambkin 2006, S. 804].

<sup>120</sup>Griffin, Jennifer: To brand or not to brand? Trade-offs in Corporate Branding Decisions, *Corporate Reputation Review* (5), 2002, zitiert nach Muzellec und Lambkin 2006, S. 807.

<sup>121</sup>Vgl. Hatch und Schultz 2001, S. 3-4.

<sup>122</sup>Vgl. Aaker 1996, S. 340; Greyser und Urde 2019, S. 83.

<sup>123</sup>Vgl. Albisser 2022, S. 27; vgl. Balmer 2001a, S. 251-252; vgl. Greyser und Urde 2019, S. 83-84; vgl. Park und John 2012, S. 684; vgl. Parker und Parker 2013, Kap. 13, „Look where you are“.

<sup>124</sup>Vgl. Balmer 2001a, S. 267-268.

<sup>125</sup>Vgl. Mirzaei et al. 2021, S. 187ff. Siehe auch Kap. 2.1.3.

<sup>126</sup>Vgl. ebd., S. 280-281; vgl. ebd., S. 84ff, sowie Aaker 1996, S. 340-341.

<sup>127</sup>Vgl. Drucker 1990, S. 3-5, S. 34-36; vgl. Durham und Duffett 2014, S. 24; vgl. Todor 2014, S. 59.

<sup>128</sup>Vgl. Hamburg Innovation GmbH (Hrsg.) 2018, S. 3.

<sup>129</sup>Vgl. Balmer 2001a, S. 280.

scheidend vom Branding abgrenzen<sup>130</sup> und wird daher im Folgenden auch nicht gesondert betrachtet. Eine Unterscheidung von Branding und Rebranding, das sich im Verlauf des Markenzyklus und idealtypisch an das Ende der Wachstumsphase anschließt,<sup>131</sup> erscheint jedoch sinnvoll, obwohl auch diese Grenzen verschwommen sind.

„Rebranding“ setzt sich aus zwei Wörtern zusammen, wovon das vorangestellte, englische „re“ zunächst einmal nur beschreibt, dass das Branding erneut betrieben wird. Rebranding ist deutlich fundamentaler als ein Brand Refresh (auch: Brand Renewal). *Sardovski* vergleicht letzteres treffend mit dem Auftragen einer neuen Wandfarbe oder einer moderneren Einrichtung: „the feeling is different, but the basic structure remains the same“.<sup>132</sup> Um Rebranding von diesen vereinzelt, oberflächlichen Veränderungen abzugrenzen, taucht in der Literatur auch die Bezeichnung „Revolutionary Rebranding“ auf.<sup>133</sup> Die Veränderung des Unternehmensnamens wird als Beispiel genannt.<sup>134</sup> Die vorliegende Arbeit setzt nicht den Einsatz bestimmter Branding-Maßnahmen – wie die Namensgebung – für eine derartige Unterscheidung voraus, sondern orientiert sich an der Wirkungsperspektive der Marke; spricht daran, ob sich durch das Rebranding das grundlegende, interne wie externe Verständnis von der Marke verändert. Damit ist nicht zwangsläufig die Markenidentität gemeint. Auch sie kann vom Rebranding betroffen sein und doch empfiehlt es sich, bei großen Veränderungen nicht jeden Anker zu lichten.<sup>135</sup>

Es sei an dieser Stelle erneut betont, dass Rebranding die Bezugsgruppen darüber informiert, dass sich die Unternehmensmarke wesentlich verändert (hat) – nicht ihr Name oder ihre Farbpalette. Idealerweise geht dem Rebranding also eine strategische Umstrukturierung (bspw. eine Veränderung auf der Führungsebene oder Neupositionierung) voraus, damit sich der Wandel nachhaltig in den Köpfen der Zielgruppe manifestiert.<sup>136</sup>

Die Entscheidung, eine Unternehmensmarke dem Rebranding zu unterziehen, wird im Wesentlichen pro- oder reaktiv getroffen: Als Antwort auf eine Verbesserungs- oder Wachstumsmöglichkeit, oder als notwendige Reaktion auf ein Problem. Zu den häufigsten Gründen für Corporate Rebranding zählen strukturellen Änderungen (bspw. Fusionen),

geografische oder sektorale Ausdehnungen (aus *Scottish Telecom* wurde *Thus*), Neupositionierungen im Wettbewerb, Reputationsschäden und die Mitgestaltung kultureller Trends (wie der Wechsel zu einer nachhaltigeren Produktion).<sup>137</sup> Rebranding orientiert sich an Gründen, nicht dem Alter, der Größe, Branche, Rechtsform oder Struktur einer Organisation.<sup>138</sup> Rebranding muss jedoch kein Erfolgsrezept sein. Manche Vorhaben sind von vornherein zum Scheitern verurteilt, bspw. wenn die Marke durch das Rebranding auf einem aussterbenden Markt über Wasser gehalten werden soll. Es muss also abgewogen werden, ob Rebranding dem Aufgeben einer Marke vorzuziehen ist.<sup>139</sup>

Eine ausführliche Situationsanalyse stellt somit den Ausgangspunkt des Corporate Rebranding dar. Auch Umfang und Kosten müssen berücksichtigt werden. In der Praxis zeichnet sich die Tendenz ab, den Aufwand des Rebranding zu unterschätzen.<sup>140</sup>

Nachdem das Rebranding also strategisch vorbereitet wurde, werden – wie auch beim Branding – zunehmend mehr Bezugsgruppen involviert. Eine besondere Herausforderung stellt dabei die Mitarbeiter:innenführung dar, denn Unternehmens- und Selbstidentität der Mitarbeitenden können verwoben sein und wechselseitig wirken.<sup>141</sup> Entscheidend für das erwähnte Buy-in ist eine gute Kommunikationskultur, begonnen bei der Erläuterung der Gründe für das bevorstehende Rebranding.<sup>142</sup> Dann folgen Kommunikation und ggf. Einbeziehung der Kundschaft und weiterer Stakeholder:innen.<sup>143</sup> Diese sog. Co-Creation ist nicht nur erfolgsentscheidend für die Maßnahmen, sondern auch die externe Akzeptanz des Corporate Rebranding. Denn im Gegensatz zum Branding sollte es ihm gelingen, sowohl eine neue Zielgruppe zu gewinnen als auch die bestehende Kundschaft zu halten.<sup>144</sup> Grundsätzlich kann behauptet werden, dass Corporate Rebranding ganzheitlicher und somit herausfordernder als verwandte Disziplinen – wie das Produktbranding – ist.<sup>145</sup> Es kann zusammengefasst werden:

Beim **Corporate Rebranding** wird die gegenwärtige Unternehmensmarke maßgeblich verändert. Damit reagiert das Unternehmen aktiv oder reaktiv auf die Dynamiken seines Umfelds. Dieser Prozess kann u. a. durch ein verändertes Erscheinungsbild der Unternehmensmarke an die Bezugsgruppen kommuniziert werden.

<sup>130</sup>Siehe Schmidt 2020a, S. 6-8. Kylander und Stone (2012, S. 38) verwenden sogar eine Definition für „Brand Management“, die überschneidungsfrei mit Definitionen zu Branding ist. Kap. 3.2 verdeutlicht, dass Kontrolle und Anpassung in den Aufgabenbereich des Branding fallen.

<sup>131</sup>Vgl. Sardovski 2022, S. 14.

<sup>132</sup>Ebd., S. 15.

<sup>133</sup>Bspw. bei Chad (2016, S. 18) oder Muzellec und Lambkin (2006, S. 804-806).

<sup>134</sup>Vgl. Daly und Moloney 2005, S. 30ff.; vgl. Muzellec und Lambkin 2006, S. 806.

<sup>135</sup>Vgl. Aaker 1996, S. 32; vgl. Chad 2016, S. 20ff.; vgl. Daly und Moloney 2005, S. 30ff.; vgl. Deutscher Markenmonitor 2021a. Synonyme für Anker könnten auch „Unternehmensvermächtnis“ (engl.: legacy) und „Unternehmensgeschichte“ (engl.: history) sein [vgl. Chad 2016, S. 23; vgl. Vinjamuri 2004, S. 10.].

<sup>136</sup>Vgl. Ahonen 2008, S. 32; vgl. Durham und Duffett 2014, S. 24; vgl. Lomax et al. 2002, S. 1.

<sup>137</sup>Vgl. Wojciechowska 2022, S. 971-972. Vgl. auch Muzellec und Lambkin 2006, S. 809ff., Todor 2014, S. 63. Praxisbeispiele finden sich bei Lomax et al. (2002, S. 4ff).

<sup>138</sup>Wenngleich sich bspw. in manchen Industrien, wie im Finanz- und Energiewesen, mehr Rebranding-Beispiele finden lassen [vgl. Lomax et al. 2002, S.2-3; vgl. Muzellec und Lambkin 2006, S. 809-810].

<sup>139</sup>Vgl. Aaker 1991, S. 207ff., S. 219ff.; vgl. Todor 2014, S. 63.

<sup>140</sup>Vgl. Lomax et al. 2002, S. 6.

<sup>141</sup>Vgl. Chad 2016, S. 9, S. 26-28. vgl. Daly und Moloney 2005, S. 32

<sup>142</sup>Vgl. ebd., vgl. Durham und Duffett 2014, S. 8; vgl. Muzellec und Lambkin 2006, S. 803, S. 816. An dieser Stelle werden die Überschneidungen von Rebranding und Change Management deutlich [vgl. Chad 2016, S. 16].

<sup>143</sup>Vgl. Daly und Moloney 2005, S. 32; vgl. Lomax et al. 2002, S. 6.

<sup>144</sup>Vgl. Parker und Parker 2013, Kap. 5ff „Death of the one, death of the brand“.

<sup>145</sup>Vgl. Greyser und Urde 2019, S. 81-82.

### 2.1.3. Abläufe und Bestandteile von Corporate Rebranding

Nach Ahonen<sup>146</sup> besteht Corporate Rebranding aus vier Phasen, die sich überschneiden und nicht zwangsläufig in der folgenden Reihenfolge auftreten: Nach der oben genannten Situationsanalyse folgt die Planungsphase, bei der nicht nur Verantwortlichkeiten definiert und Mittel bewilligt werden: Ein Begriff, der in diesem Rahmen häufig fällt, ist das „Repositioning“. Durch die **Markenrepositionierung** will sich das Unternehmen der Zielgruppe besser präsentieren und sich im Wettbewerb hervorheben.<sup>147</sup> Das muss jedoch nicht zwangsläufig auf Kosten der Mitbewerber:innen geschehen; es können bspw. auch Strategien erarbeitet werden, um den Absatzmarkt für alle Anbieter:innen zu vergrößern. Dadurch lassen sich die zu erwartenden, starken Reaktionen der Konkurrenz gegenüber dem Rebranding lindern.<sup>148</sup>

Bei der Positionierung werden der funktionale und emotionale (auch: symbolische) **Markennutzen** abgebildet.<sup>149</sup> Im Falle von *Red Bull* stellt das die Qualität des Energiedrinks dar, gepaart mit der individuellen Selbstverwirklichung der Konsumierenden – z. B. ihrem Gefühl, einer Community von Extremsport-Begeisterten anzugehören.<sup>150</sup> Mit diesem Beispiel wird deutlich, wie eng die Markenpositionierung mit der **Markenassoziation**<sup>151</sup> verbunden ist. Die Markenassoziation beschreibt nicht nur die mentale Verknüpfung von Angebot und Attribut bzw. Gefühl, sondern kann sich auch auf ein bestimmtes Konzept, wie eine Produktkategorie, ausweiten: die Rede ist bspw. von „Tesa“ statt des „durchsichtigen Klebbands“ einer anderen Marke.<sup>152</sup> Die Markenassoziation ist eine Steigerung der **Markenbekanntheit**, die lediglich Wiedererkennungswert und funktionale Einordnung einer Marke beschreibt.<sup>153</sup> Bestimmte Handlungen des Unternehmens können eine positive Markenassoziation bei der Zielgruppe begünstigen: bspw. die Personifizierung von unbelebten Objekten (*Amazon Alexa*), die Wahl von Testimonials (*Dirk Nowitzki* für *ING DiBa*), Markenbotschaftern:botschafterinnen (wie *Instagram*-Influencer) oder das Kreieren passender und prägnanter Ausdruckselemente – wie Farben (*Tiffany-Blau*), Symbole (*McDonald's Clown*),

Stimmen (*Seitenbacher*), Umgangston und Vokabular (*World Wrestling Entertainment*), Musik (*Telekom*), Geruch (*Abercrombie & Fitch*), Architektur (*Walt Disney Concert Hall*), Kleidung – sogar Tattoos und Piercings – der Mitarbeitenden (*EB Game*).<sup>154</sup> Die Möglichkeiten sind unendlich und doch bleibt der Einfluss eines Unternehmens auf sein übergeordnetes **Markenimage** beschränkt. Das Markenimage beschreibt die Wahrnehmung der Unternehmensmarke auf dem Zielmarkt. Im Gegenteil zur Markenidentität blickt sie nach außen und bildet die Ist-Wahrnehmung der Marke ab.<sup>155</sup> Im idealen Fall zeichnet sich keine Differenz zwischen Markenidentität und -image ab.<sup>156</sup> Abbildung 3 verdeutlicht ihre Beziehung zueinander.

Ein positives Image der Corporate Brand sichert oder verbessert den Bestand des Unternehmens, wohingegen ein schlechtes Image es vernichten kann.<sup>157</sup>

Das Markenimage entsteht aus einer Reihe von Markenassoziationen sowie Erfahrungen der Zielgruppe mit der Unternehmensmarke – das sog. **Markenerlebnis**. Dieses kann vom Unternehmen mitgestaltet werden (bspw. durch den Service, Brand Content oder Events), oder weitgehend außerhalb der Kontrolle liegen (bspw. die Verbreitung von Informationen über Social Media oder die Handlungen der Konkurrenz).<sup>158</sup> Für (deutsche) Unternehmen stellt es – in Bezug auf ihr Branding – die größte Herausforderung dar, die Marke über sämtliche Touchpoints konsistent erlebbar zu machen.<sup>159</sup> In diesem Zusammenhang spielt das **Internal Branding**, bei dem sich auch die Mitarbeitenden markenkonform verhalten, eine immer entscheidendere Rolle.<sup>160</sup>

Globale Unternehmensmarken stellen in puncto Markenkonsistenz eine besondere Herausforderung dar. Im Rahmen der Planungsphase wird entschieden, ob und welche Markenelemente – bspw. Absatzkonzept, Produkte, Name oder Logo – international beibehalten oder für den jeweiligen Kulturraum adaptiert werden.<sup>161</sup>

Auch Überlegungen zur **Umstrukturierung** der Unternehmensmarke finden in der Planungsphase Berücksichtigung. Möglichkeiten von strategischen Kooperationen (Co-Branding) oder Unterteilungen der Dachmarke (sog. Subbranding) werden eruiert.<sup>162</sup>

Ahonen ordnet weitere Prozesse – die **Umgestaltung** und **Umbenennung** – der Planungsphase unter.<sup>163</sup> Die Literatur betrachtet den Unternehmensnamen als den wohl wichtig-

<sup>146</sup>Vgl. Ahonen 2008, S. 35-36. Ahonen verweist dabei insb. auf Muzellec und Lambkin (2006). In vielen literarischen Werken finden sich vergleichbare Phasen und Prozesse von Corporate Rebranding. Ahonen wird als Repräsentantin gewählt.

<sup>147</sup>Vgl. Schmidt 2020a, S. 23-26.

<sup>148</sup>Bspw. können Konsumierende durch Kampagnen dazu animiert werden, bestimmte Produkte häufiger oder unter neuen Anlässen zu nutzen (wie den „Clinique's Twice-a-day-moisturizer“, kalorienarme Desserts oder das „Wet Tunes Shower-Radio“) [vgl. Aaker 1991, S. 209-212].

<sup>149</sup>Vgl. Albisser 2022, S. 42-43; vgl. Vinjamuri 2004, S. 9-10. Bspw. in einem sog. Positionierungskreuz.

<sup>150</sup>Vgl. Albrecht 2018.

<sup>151</sup>Ähnliche Begriffe – wie die „Markenwahrnehmung“ [bspw. bei Mirzaei et al. 2021, S. 188] – die sich nicht maßgeblich von den hier aufgeführten, fett markierten Termini unterscheiden oder für den Untersuchungsgegenstand weitgehend irrelevant sind, finden im Verlauf der Arbeit keine Beachtung.

<sup>152</sup>Vgl. Aaker 1991, S. 30; vgl. Schmitt 2012, S. 10; vgl. Webster 2002. Der Nachteil an der engen Verknüpfung eines generischen Produkts mit einer Marke ist u. U. der Verlust des eingetragenen Markennamens.

<sup>153</sup>Vgl. Aaker 1991, S. 29, S. 61; vgl. Finisterra do Paço et al. 2014, S. 14; vgl. Schmitt 2012, S. 8-9.

<sup>154</sup>Vgl. Mirzaei et al. 2021, S. 187ff.; vgl. Parker und Parker 2013, Kap. 3 „It's a hap-hap-happy place“; vgl. Schmidt 2020a, S. 31-33; vgl. Vinjamuri 2004, S. 10-11; vgl. Zube 2021, S. 3.

<sup>155</sup>Vgl. Aaker und Joachimsthaler 2000, S. 40; vgl. Albisser 2022, S. 29-30; vgl. Fahlevi 2021, S. 2.

<sup>156</sup>Vgl. Kylander und Stone 2012, S. 39-41.

<sup>157</sup>Vgl. Fahlevi 2021, S. 1.

<sup>158</sup>Vgl. Schmidt 2020a, S. 27; Schmitt 2012, S. 10; vgl. Vinjamuri 2004, S. 10.

<sup>159</sup>Vgl. Deutscher Markenmonitor 2021b.

<sup>160</sup>Vgl. Deutscher Markenmonitor 2021c.

<sup>161</sup>Vgl. Aaker 1991, S. 227-228.

<sup>162</sup>Vgl. Ahonen 2008, S. 35.

<sup>163</sup>Vgl. ebd., S. 35-36.



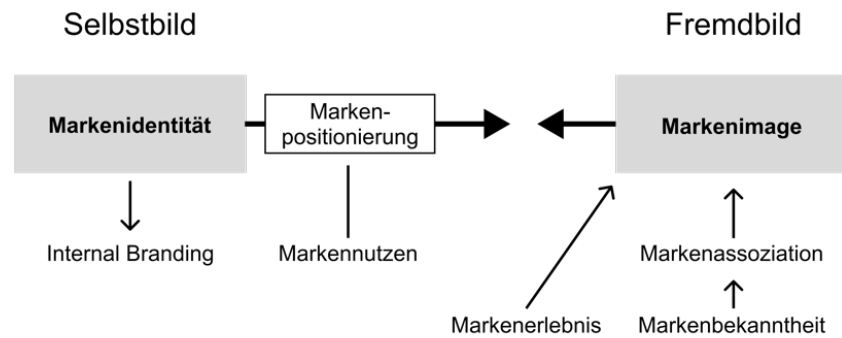


Abbildung 3: Markenidentität und -image. Eigene Darstellung.

ten Bestandteil einer Corporate Brand.<sup>164</sup> Obwohl nicht ausdrücklich davon die Rede ist, ist anzunehmen, dass Veränderungen vergleichbarer Elemente – wie Slogans – auch Teil der Planungsphase sind. Dabei handelt es sich um die letzten Schritte, die von der Markenpositionierung strategisch abgeleitet und realisiert werden.<sup>165</sup> Im Idealfall folgt ein Markttest. Spätestens hier werden weitere Stakeholder:innen – wie Kunden:Kundinnen – in das Corporate Rebranding involviert (Co-creation).<sup>166</sup>

Mit dem zunächst internen, dann öffentlichen **Relaunch** der neuen Unternehmensmarke wird die dritte Phase, laut Ahonen die **Implementierung**, eingeläutet.<sup>167</sup> Weitere Prozesse werden nicht unter dieser genannt.

Das Corporate Rebranding endet schließlich mit der **Evaluierung** (auch: **Markencontrolling**). Als zu messendes Ergebnis des (Re)Branding, taucht in der Literatur meist die sog. **Brand Equity** auf. Als deutsches Pendant wird irrtümlicherweise oft der „Markenwert“ angeführt. Der Unterschied liegt darin, dass sich letzterer auf den monetären Wert der Marke – bspw. für einen Kauf – bezieht, wohingegen die Brand Equity die immaterielle Bedeutung der Marke für ihre Bezugsgruppen beschreibt. Sie beeinflusst den finanziellen Markenwert.<sup>168</sup> Brand Equity entsteht aus mehreren Komponenten (z. B. Markenassoziationen und -loyalität), die einzeln oder in ihrer Kombination gemessen werden können; bspw. quantitativ über die Anzahl der Wiederkäufe oder qualitativ über das Markenimage.<sup>169</sup> Dafür kommen standardisierte oder individualisierte Marktforschungsinstrumente zum Einsatz.<sup>170</sup> Die Brand Equity manifestiert sich über einen längeren Zeitraum als kurzfristige Vertriebsstrategien – z. B. Preisaktionen.<sup>171</sup> Das erschwert ihre komplexe Bewertung zusätzlich.

<sup>164</sup>Vgl. Aaker 1991, S. 26, S. 163; vgl. Muzellec und Lambkin 2006, S. 804; vgl. Ritchie et al. 1999, S. 27.

<sup>165</sup>Vgl. Deutscher Markenmonitor 2021d; vgl. Vinjamuri 2004, S. 9-10.

<sup>166</sup>Vgl. Ahonen 2008, S. 35; vgl. Foresight Alliance 2014, S. 5; vgl. Weber 2018.

<sup>167</sup>Vgl. Ahonen 2008, S. 35-36.

<sup>168</sup>Vgl. Schmidt 2020b.

<sup>169</sup>Vgl. Aaker 1991, S. 48; vgl. Finisterra do Paço et al. 2014, S. 13ff.

<sup>170</sup>Vgl. Schultz und Hatch 2003, S. 24.

<sup>171</sup>Vgl. Aaker 1991, S. 12-13.

Ungeachtet der übergeordneten Brand Equity sollten auch die Erfolge und Fehler des Corporate Rebranding evaluiert werden. Erste Ergebnisse zeichnen sich erfahrungsgemäß bereits innerhalb der ersten Monate und insb. beim operativen Tagesgeschäft ab – bspw. gelingt es den Mitarbeitenden schneller und selbstsicherer Brand Content herzustellen.<sup>172</sup> Corporate Rebranding kann unter Berücksichtigung seiner ursprünglichen Ziele und Indikatoren bewertet werden. Weitere Faktoren stellen bspw. die Einprägung des neuen Markennamens, die Kunden:Kundinnenabwanderungsrate aufgrund des Rebranding oder die geänderte Preisbereitschaft dar.<sup>173</sup>

Corporate Rebranding ist folglich eine ausgesprochen komplexe Unternehmensdisziplin unter herkömmlichen, kommerziellen Unternehmen. Somit lässt sich bereits erahnen, dass ihre Anwendung umso mehr Herausforderungen für MOs bereithält.

## 2.2. Missionsorientierte Organisationen (MOs)

### 2.2.1. Begriffsklärungen und Abgrenzungen zu verwandten Konzepten

Dem dritten Sektor wird weltweit eine wichtige Rolle zuteil: er ergänzt die von Staat und Wirtschaft erbrachten Leistungen, schafft zahlreiche Kultur- und Freizeitangebote, leistet einen wesentlichen Beitrag zur gesellschaftlichen Integration und zum Arbeitsmarkt<sup>174</sup> und ermöglicht eine vergleichbar schnelle und unbürokratische Katastrophenhilfe.<sup>175</sup>

Zu ihm zählen jene Organisationen, die weder denen der Wirtschaft noch der öffentlichen Hand zuzuordnen sind, wenngleich eine sektorale Abgrenzung oft nicht ohne weiteres möglich ist.<sup>176</sup>

<sup>172</sup>Vgl. Durham und Duffett 2014, S. 21.

<sup>173</sup>Vgl. Ahonen 2008, S. 35-36; vgl. Chad 2016, S. 27-28; vgl. Deutscher Markenmonitor 2021f.

<sup>174</sup>Zuweilen verzeichnet der dritte Sektor den höchsten Beschäftigungsanstieg. Jede:r zehnte sozialversicherungspflichtig Beschäftigte arbeitet im dritten Sektor [vgl. Krimmer: Summary: Zivilgesellschaft im Überblick, und Priemer und Hohendanner: Wirtschaftlich Aktive, in: Krimmer (Hrsg.) 2019, S. 5, S. 46].

<sup>175</sup>Vgl. ebd. Priemer et al.: Organisierte Zivilgesellschaft, S. 7; vgl. Meyer et al. 2013, S. 5ff.

<sup>176</sup>Eine Herausforderung stellt bspw. die Zuordnung von Unternehmensstiftungen dar [vgl. Priemer: Größe und Entwicklung der organisierten Zivilgesellschaft in Deutschland, in: Krimmer (Hrsg.) 2019, S. 9].

Das bekannteste Beispiel für Organisationen des dritten Sektors sind NPOs. Ihre Beschreibung birgt jedoch gerade aufgrund des Terminus „nicht-profitorientiert“ Hürden: Es ist eine falsche Annahme, dass NPOs keine Profite erzielen (dürfen), denn auch sie wollen wirtschaftlich erfolgreich arbeiten, Reinerträge verzeichnen und Reserven bilden.<sup>177</sup> Immer wieder wird der seit den 70er-Jahren geläufige Negativbegriff in Frage gestellt, Alternativen dazu (wie „Freiwilligenorganisation“) erscheinen aber mindestens ebenso problematisch.<sup>178</sup> Die vorliegende Arbeit versteht NPOs im Sinne des englischen Ausdrucks „Not-For-Profit Organization (NFPO)“: zugehörige Organisationen sind im Kern nicht auf finanziellen Gewinn, sondern einen sozialen bzw. ökologischen Erfolg ausgerichtet, ohne das Erwirtschaften von Profiten auszuschließen. Eine Abgrenzung zu den NGOs erscheint unerheblich. Wörtlich genommen umfassen NGOs nämlich sämtliche Organisationen der Sozial- und Privatwirtschaft, solange sie nur nicht-staatlich sind.<sup>179</sup> Eine Unterscheidung wird lediglich zur gemeinnützigen Körperschaft gemacht: hierunter werden vom Finanzamt anerkannte, steuerbefreite Organisationen verstanden, die den Grundsätzen der Ausschließlichkeit, Unmittelbarkeit und Selbstlosigkeit folgen. Das muss nicht auf jede NPO zutreffen.<sup>180</sup>

Ebenso Teil des dritten Sektors sind Social Enterprises<sup>181</sup>. Bei ihnen handelt es sich um hybride Organisationen, weil sie sowohl Elemente der profit- als auch nicht-profitorientierten Welt vereinen:<sup>182</sup> Ihre Selbstlegitimierung ergibt sich aus einem sozialen bzw. ökologischen Problem, das sie durch den Einsatz unternehmerischer Mittel systemisch lösen. Sie verfolgen also gleichzeitig wohltätige und finanzielle Ziele. Kennzeichnend sind u. a. ihre komplexe und nachhaltige Finanzierungsstruktur, wirtschaftliche Steuerungsinstrumente und die Reinvestition von Gewinnen.<sup>183</sup> In der Literatur tauchen angeblich verwandte Phänomene von Social Entrepreneurship auf – darunter das Social Business und Social Start-up. In Anlehnung an Hahn werden diese im Folgenden höchstens als Unterformen von Social Entrepreneurship verstanden, da sich derartige Abgrenzungsversuche weder in Theorie noch Praxis bewiesen haben.<sup>184</sup> Selbst die un-

ter Autoren: Autorinnen beliebte Unterscheidung zum Social Intraprise (das angeblich innerhalb einer bestehenden Organisation stattfindet und keine Betriebsneugründung beinhaltet) wird – nach Hahn – abgelehnt und mit einem Social Enterprise gleichgesetzt.<sup>185</sup>

Bislang hat sich kein Begriff etabliert, der die genannten Organisationsformen umfasst.

Die vorliegende Arbeit pflegt den Terminus „missionsorientierte Organisationen“ ein.

Abbildung 4 verdeutlicht, dass diese sehr divers, aber im Wesentlichen von profitorientierten Unternehmen abzugrenzen sind. Es sei angemerkt, dass selbst die Bezeichnung „profitorientiert“ Schwachstellen hat, da derartige Organisationen neben wirtschaftlichen Zielen auch weitere Interessen verfolgen, wie die der Kunden: Kundinnen.<sup>186</sup> In vielen Fällen [bspw. für Maßnahmen der Corporate Social Responsibility (CSR)] treten die kommerziellen Ansätze zur Profitmaximierung sogar zu Gunsten der sozialen bzw. ökologischen Interessen in den Hintergrund.<sup>187</sup> Entscheidend für eine Differenzierung zu den MOs ist, dass solch sozialverantwortliche Unternehmen eine gemeinnützige Mission dennoch nicht als zentrale Handlungsmaxime verfolgen.<sup>188</sup>

Obwohl der dritte Sektor – u. a. aufgrund vielfältiger Aufgabenfelder und Rechtsformen – heterogen ist, zeichnen sich zahlreiche Gemeinsamkeiten zwischen MOs ab, die eigenständige Marketinglehren erfordern.<sup>189</sup> Sie werden im nächsten Kapitel beschrieben.

Seit den 70ern wird die Meinung vertreten, dass es eine sektorale Differenzierung von Marketing geben muss. Es entstehen zunehmend mehr Kategorien, wie etwa das NPO-Marketing, Sozial- und Cause(-related) Marketing.<sup>190</sup> Für die vorliegende Arbeit greifen diese Gattungen jedoch zu kurz, denn viele von ihnen erwecken zwar den Anschein, richten sich aber nicht ausdrücklich an MOs: Durch Sozialmarketing (auch: Social Marketing) sollen gemeinnützige Ideen und Praktiken an die Zielgruppe herangetragen und so ein gesellschaftlicher Wandel herbeigeführt werden. Sozialmarketing wird ebenso von profitorientierten Unternehmen und staatlichen Einrichtungen eingesetzt. Ein Beispiel ist die „Gurte retten Leben“-Kampagne des Bundesministeriums für Verkehr, Innovation und Technologie (BMVI).<sup>191</sup> Das Cause(-related) Marketing auf der anderen Seite beschreibt eine strategische Allianz zwischen einem kommerziellen Un-

<sup>177</sup>Vgl. Hahn 2021, S. 19-20; vgl. Meyer et al. 2013, S. 6.

<sup>178</sup>In diesem Fall, weil u. U. nicht nur Volontäre zum Einsatz kommen [vgl. Drucker 1990, S. ix-x; vgl. Meyer et al. 2013, S. 5-6]. Meyer et al. merken zudem an, dass eine negative Abgrenzung (so auch „gewaltfreie Erziehung“) ja nicht zwangsläufig schlecht sein muss [vgl. ebd.].

<sup>179</sup>Folglich sind alle NPOs nicht-staatlich, sprich NGOs [vgl. Hahn 2021, S. 20; vgl. Meyer et al. 2013, S. 7].

<sup>180</sup>Vgl. Augsten 2008, S. 21ff.; vgl. Hahn 2021, S. 20.

<sup>181</sup>Die deutsche Bezeichnung „Sozialunternehmen“ ist breiter gefasst und betont u. a. nicht den Aspekt der Innovation [vgl. Hahn 2021, S. 1, S. 15]. Sie wird im Folgenden abgelehnt.

<sup>182</sup>Nach Hahn (2021, S. 39-40) neigen sich Social Enterprises jedoch eher den Grundzügen einer NPO entgegen, da sich jede unternehmerische Handlung der sozialen Mission unterordnet.

<sup>183</sup>Vgl. ebd., S. 44-48.

<sup>184</sup>Bspw. wurde der Begriff „Social Business“ von Muhammad Yunus geprägt, dessen sieben Prinzipien für Social Business sich jedoch nicht auf den deutschen Raum übertragen lassen [vgl. ebd., S. 23]. Aus einer Vielzahl von Unterformen werden nur die gängigsten in der nachfolgenden Grafik erfasst.

<sup>185</sup>Ein Social Enterprise kann somit sämtliche Formen der Neugründung annehmen [gl. ebd., S. 41].

<sup>186</sup>Das verdeutlichen Modelle wie der Stakeholder-Ansatz oder die Balanced Scorecard [ebd., S. 22]. Drucker schreibt zurecht, dass Unternehmen, die sich nur auf ihre finanziellen Ergebnisse fokussieren, nicht lange überleben können [vgl. Drucker 1990, S. 107].

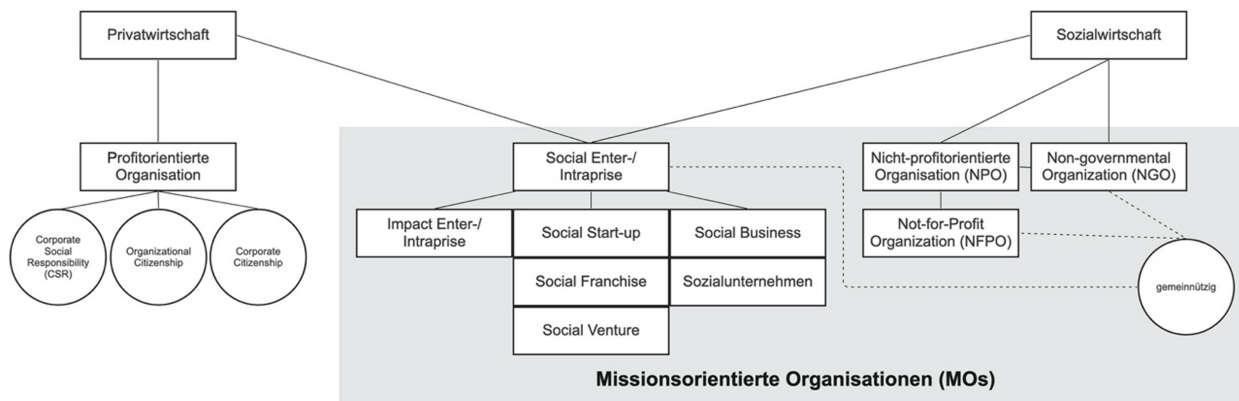
<sup>187</sup>Hahn, S. 22; vgl. Fueglistaller et al. 2019, S. 387. Es ist an dieser Stelle unerheblich, ob dies aus wohltätigen oder bspw. werbewirksamen Gründen erfolgt.

<sup>188</sup>Vgl. ebd., vgl. ebd.

<sup>189</sup>Vgl. Meyer et al. 2013, S. 5.

<sup>190</sup>Vgl. ebd., S. 232-234; vgl. Ahmad et al. 2019, S. 2 vgl. Akbar et al. 2021, S. 2.

<sup>191</sup>Vgl. ebd., S. 233; vgl. ebd., S. 115; vgl. ebd.; vgl. Helmig 2018; vgl. Veluchamy et al. 2021, S. 115-116.



**Abbildung 4:** Umfang von missionsorientierten Organisationen (MOs) in grau und Abgrenzung verwandter Konzepte. Eigene Darstellung. Höhere Auflösung in Anhang E.

ternehmen und einer NPO, bei der sich beide Parteien (zumindest angeblich) gemeinsam für einen wohlthätigen Zweck verpflichten (bspw. Edeka und WWF).<sup>192</sup>

Zuletzt erscheint auch das NPO-Marketing für MOs nicht ganz treffend, da es andere Organisationsformen – wie Social Enterprises, die sich maßgeblich von klassischen NPOs unterscheiden – terminologisch ausschließt. Nichtsdestotrotz beweisen seine Ansätze weitgehend Allgemeingültigkeit für MOs, wie der umbenannte Marketingmix deutlich macht: Statt Produkt-, Preis-, Distributions- und Kommunikationspolitik ist hier von „Leistungs-, Gegenleistungs-, Distributions- und Kommunikationspolitik“ die Rede.<sup>193</sup>

Simultan mit dem Terminus „missionsorientiertes Marketing“ wird der Begriff „missionsorientiertes Branding“ eingepflegt. Dieses ist aus den gleichen Gründen vom NPO-Branding, Cause(-related) Branding und Social (auch: Purposeful) Branding abzugrenzen.<sup>194</sup> Auch hier lassen sich etliche Gemeinsamkeiten zum konventionellen Branding feststellen, wenngleich die Unterschiede von missionsorientierten und kommerziellen Organisationen eigene Branding-Theorien und -Modelle erfordern.

### 2.2.2. Herausforderungen beim missionsorientierten Corporate Rebranding (MCR)

Bereits in Kapitel 1 wurden Eigenheiten von MOs erwähnt, die auch im Zuge des Branding eine besondere Betrachtung erfordern, wie bspw. die Komplexität der Bezugsgruppen und die finanziellen und personellen Engpässe. Die dort aufgeführten Merkmale werden im Folgenden um weitere ergänzt, die sich prinzipiell ebenso von den Charakteristika kommerzieller Unternehmen unterscheiden. Dabei werden sämtliche Faktoren, die in der Literatur NPOs, NGOs und Social Enter-/Intraprises – sprich MOs – zugeschrieben werden, zusammengetragen, kategorisiert und tabellarisch erfasst. Tabelle 1 bildet sie ab, zur besseren Lesbarkeit empfiehlt sich jedoch Anhang F. Es sei angemerkt, dass es sich

um keine abschließende Auflistung handelt. Es wurden zudem nur Umstände berücksichtigt, die einen maßgeblichen, direkten oder indirekten Einfluss auf das MCR versprechen. Zudem weisen MOs auch Eigenschaften auf, die sich eher positiv auf das Branding auswirken, oder zumindest nicht als ausschließlich negative Faktoren ausgelegt werden können; bspw. die tendenziell eher flachen Hierarchien und eine netzwerkartige Organisationsstruktur, die zwar oftmals einen erhöhten Zeitaufwand bei der Entscheidungsfindung und Umsetzung bergen, auf der anderen Seite aber – zumindest in der Theorie – den Weg für eine transparente Kommunikationskultur, Kohäsion und das Internal Branding ebnet.<sup>195</sup> Tabelle 1 legt den Fokus jedoch gerade auf die negativen Ausprägungen eines Faktors, sprich die Herausforderungen, denen MOs im strategischen und operativen Alltag begegnen, damit auf ihrer Basis schließlich Konsequenzen für ein möglichst erfolversprechendes MCR abgeleitet werden können.

Im Wesentlichen lassen sich die diversen Faktoren in sechs Hauptkategorien einteilen: Rahmenbedingungen, Leistungserbringende, Leistungsbefähigende, Leistungsabnehmende, Mitbewerber:innen / potenzielle Partner:innen, weitere Stakeholder:innen / Öffentlichkeit. Die Kategorien sind farblich voneinander abgetrennt nach organisationalen Rahmenbedingungen (in rot), organisationsinternen Bezugsgruppen (in blau) und organisationsexternen Bezugsgruppen (in grau). Manche Bezeichnungen erscheinen etwas holprig, was der Tatsache geschuldet ist, dass die gängigen Termini der profitorientierten Welt nicht problemlos auf den missionsorientierten Bereich übertragen werden können: Die „Kundschaft“ beschreibt im konventionellen und vereinfachten Sinn eine Gruppe von Personen (Business to Consumer) oder Organisationen (Business to Business), die die Leistung eines Unternehmens<sup>196</sup> in Anspruch nehmen und dafür eine

<sup>192</sup>Vgl. Meyer et al. 2013, S. 234.

<sup>193</sup>Vgl. ebd., S. 232, S. 237.

<sup>194</sup>Vgl. Mirzaei et al. 2021, S. 186ff.; vgl. Veluchamy et al. 2021, S. 116.

<sup>195</sup>Vgl. Kylander und Stone 2012, S. 40ff.; vgl. Meyer et al. 2013, S. 150-151; vgl. Symblème n. d.

<sup>196</sup>Es gibt weitere Formen der Transaktion, wie die von Privatperson zu Privatperson (Consumer to Consumer) oder zwischen Unternehmen und der öffentlichen Hand (Business to Administration), Mitarbeitenden (Business to Employee) oder Investoren (Business to Investor).



| Kategorien  | Subkategorien   | Faktoren  | Herausforderungen für MOs   | Konsequenzen für MCR  |  |
|---|---|---|---|---|--|
| Rahmenbedingungen   | Strukturelle Gegebenheiten  | Wenig Förderung auf staatlicher Ebene   | Notwendigkeit einer komplexen Finanzierungsstruktur   | (externe Ursachen und somit Problem der Einflussnahme)<br>⇒ Erhöhte Notwendigkeit einer realistischen Planung   |  |
|   |   | Erschwerte Administration (Buchführung, Gemeinnützigkeitsrecht etc.)                            | Erhöhter Zeitaufwand, Bürokratie > Mission  |   |  |
|   | Ressourcen  | Begrenzttes Budget, zweckgebundenes Budget und häufig kein Marketing-Fund                       | Wenig Flexibilität bei der Allokation finanzieller Mittel<br>Keine Möglichkeit, sich eine externe Beratung zu leisten<br>Innovation tritt in den Hintergrund                | Druck, viele Dinge in kurzer Zeit zu erreichen<br>Innovation tritt in den Hintergrund   | ⇒ Auf oberster Ebene Budget ausdrücklich für MCR bewilligen lassen<br>⇒ Realistische und rechtzeitige Budget- und Zeitplanung<br>⇒ Mit Spielraum kalkulieren<br>⇒ Rahmen schaffen, der Kreativität und Innovation erlaubt<br>⇒ Priorisierung der Vorhaben  |
|   |   | Begrenzte Zeit  |   |   |  |
|   | Wohltätige Arbeit   | Ausrichtung auf eine wohltätige Mission   | Werte > Zweck, nach innen gerichteter Fokus<br>Fehlende Marktorientierung<br>Fehlender Fokus auf finanzielle Erfolge<br>Tendenziell heterogene Ziele                        | Meist immaterieller, nicht monetärer Wert<br>Ergebnisse liegen außerhalb der Organisation<br>Oft nicht unmittelbare Ergebnisse<br>Ergebnisse von diversen Faktoren abhängig   | ⇒ Umfeldanalyse<br>⇒ Externe Beratung / heterogenes Team für Objektivität<br>⇒ Clustern und Priorisieren der Ziele<br>⇒ Quantitative und qualitative, kurz- und langfristige Ziele setzen und Indikatoren zur Kontrolle festlegen<br>⇒ Konstante Kontrolle des MCR und der Umweltdynamiken<br>⇒ Entwicklungsverläufe aufzeichnen   |
|   |   | Schwere Messbarkeit   |   |   |  |
|   | Organisationskultur   | Demokratische Struktur, flache Hierarchien  | Einigkeit zu erzielen ist schwierig da diverse Entscheidungsträger<br>Erhöhter Zeitaufwand  | Wenig Bereitschaft zur Innovation und Veränderung<br>Widerstand bei radikalen Änderungen (wie Umbenennung der Unternehmensmarke)<br>Ablehnung des Branding als „kommerzieller Trend“  | ⇒ Verantwortlichkeiten festlegen, Mitarbeitende priorisieren<br>⇒ Offen kommunizieren<br>⇒ Wertschätzung ausdrücken für Mitarbeitende und bisherige Unternehmensmarke, nicht grundlos Anker lichten<br>⇒ Widerstände ernstnehmen und aushalten<br>⇒ Gründe für MCR erläutern<br>⇒ Chancen darlegen, Risiken nicht verleugnen<br>⇒ MCR-Befürwortende einsetzen<br>⇒ Transparente, verständliche Ziele setzen<br>⇒ Maßnahmen abschließen, sodass sie nicht mehr geändert werden können<br>⇒ Fristen festlegen und einhalten  |
|   |   | Tendenziell traditionsreich   |   |   |  |
|   |   | Informelle Regeln   | Schwer zu durchblicken, begünstigt Missverständnisse und erschwert Kommunikation  |   |  |
|   | Leistungserbringende (Mitarbeitende, Führungskräfte, Vorstand, Inhabende)   | Diversität  | Unterschiedliche Vergütung (bezahlt / unbezahlt) und Beschäftigungsdauer (projektbezogen / langfristig)   | Mangelndes Interesse an Themen abseits des operativen Tagesgeschäfts  | ⇒ Einrichten einer dedizierten Abteilung für MCR<br>⇒ Heterogene Teamzusammensetzung zur Repräsentation<br>⇒ Konflikte erwarten, Ansprechpartner:in beauftragen<br>⇒ Dauer realistisch planen und kommunizieren<br>⇒ Kontinuierliche Kontrolle<br>⇒ Regelmäßige Meetingformate einführen<br>⇒ Agile, digitale Methoden verwenden (Kanban, Intranet)<br>⇒ Schulungen, Trainings und Markenguide etablieren  |
| Mangelnder Weitblick für langfristige Erfolge                             |   |   |   |   |  |
| Problem der Konsistenz und Einheitlichkeit                                |   |   |   |   |  |
| Schwierigkeit der Koordination  |   |   |   |   |  |
| Kenntnisse und Fähigkeiten  |   | Beschäftigung auf Basis von Werten und Leidenschaft statt Kompetenz                             | Ehrenamtliche Führung / Vorstand  | Wenig Verständnis für MCR   | ⇒ Gründe für MCR erläutern<br>⇒ Oberste Führungsebene und wichtige Schlüsselfunktionen involvieren<br>⇒ Nicht (nur) auf Basis kurzfristiger Erfolge honorieren<br>⇒ Stab für MCR auf Basis von Kompetenz wählen<br>⇒ MCR-Befürwortende einsetzen<br>⇒ Erwartungen an MCR-Team klar kommunizieren<br>⇒ Auf externe Beratung zurückgreifen<br>⇒ Durch Trainingsformate auf MCR vorbereiten<br>⇒ Verantwortung abgeben und vertrauen  |
|   |   |   |   | Mangelnder Weitblick  |  |
|   |   |   |   | Geschwächte Vorbildfunktion, sofern wenig Verständnis und Bereitschaft für MCR  |  |
| Selbstidentität   |   | Idealisierung der Organisation („Wir sind die Guten“)   | Idealisierung der Tätigkeiten („Wir tun Gutes“)   | Aufkommende Irritation und Frustration  | ⇒ Gründe für MCR erläutern<br>⇒ Sinnhaftigkeit, sprich Bezug von MCR und Mission, hervorheben<br>⇒ Realistische Chancen / Risiken erarbeiten<br>⇒ Benchmarking, Vergleiche mit ähnlichen MCR-Vorhaben<br>⇒ Großzügige Um- und Innenfeldanalysen<br>⇒ Evaluation der Organisationsstruktur<br>⇒ Externe Beratung für mehr Objektivität beauftragen<br>⇒ Einrichten einer dedizierten Abteilung für MCR<br>⇒ Offen und konstante kommunizieren<br>⇒ Ziele und Maßnahmen greifbar machen<br>⇒ Zunächst kleine Ziele setzen und dann steigern<br>⇒ Widerstände erwarten und ernstnehmen<br>⇒ Maßnahmen für gesteigertes Buy-in, enge Zusammenarbeit mit Mitarbeitenden<br>⇒ Kommunikation der Erfolge für Motivation und Vertrauen |
|   |   |   |   | Schwierigkeit der Einheitlichkeit und Kommunikation   |  |
|   |   |   |   | Hinderliches Selbstverständnis („Ich bin kein Leader / Marketer“, „Wir sind keine Marke“)<br>Fehlende Wahrnehmung des Wettbewerbs<br>Fehlende Marktorientierung<br>Ablehnung herkömmlicher Management- und Marketinglehren  |  |
| Hohe Identifikation der Einzelnen mit Mission                             | Mangelndes Interesse an Themen, die nicht unmittelbar auf Mission einzahlen<br>MO soll (gemeinsame) Werte nicht verändern<br>Fehlende Objektivität bei Entscheidungen |   |   |   |  |
|   |   |   |   |   |  |
| Leistungsbefähigende (Partner:innen, Fördernde, Fördernde, Spender:innen) | Diversität  | Komplexe Struktur der Fördernden (Unternehmen, staatliche Behörden, Privatpersonen)             | Aufwendige Kommunikationspolitik  | ⇒ Segmentieren und Priorisieren beim MCR<br>⇒ Gezielte Ansprache / Kommunikation der neuen Marke<br>⇒ Zunächst Kernpartner:innen für MCR gewinnen   |  |
|   | Machtposition   | Zweckgebundenheit ihrer Zuwendungen   | Mittel dürfen oft nicht für Marketing ausgegeben werden   | ⇒ Gründe für MCR erläutern<br>⇒ Transparente Kommunikation über Mittelverwendung<br>⇒ Realistische und messbare Erfolgsaussichten vorlegen  |  |
| Leistungsabnehmende   | Diversität  | Komplexe Struktur (z. B. Ruby Cup: Menstruierende in Industrienationen und Entwicklungsländern) | Aufwendige Kommunikations- und Distributionspolitik   | ⇒ Segmentieren und Priorisieren für ein gezielte Ansprache und Vertrieb der neuen Unternehmensmarke   |  |
|   | Erfahrungen   | Meist gesättigte Märkte   | Hoher Wettbewerbsdruck, hohe Erwartungen der Abnehmer:innen   | ⇒ Differenzierungsmerkmale, emotionalen Nutzen zeigen<br>⇒ Zielgruppe informieren und sensibilisieren für Mission<br>⇒ Persönliche und emotionale Ansprache<br>⇒ Wahrheitsgetreuer Content, keine Übertreibungen  |  |
|   |   | Skepsis und sog. Compassion Fatigue   | Imagetransfer anderer Organisationen auf MOs  | ⇒ Erreichbare und messbare Ziele darlegen<br>⇒ Co-Creation mit der Zielgruppe und Testphase einhalten<br>⇒ Erfolge kommunizieren gegen Compassion Fatigue<br>⇒ Wertschätzung und Dankbarkeit ausdrücken   |  |
| Geringes Engagement der Zielgruppe  |   |   |   |   |  |
| Mitbewerber:innen, potenzielle Partner:innen                              | Verbundenheit   | Netzwerkstruktur, kein klassisches Wettbewerbsverständnis                                       | Imagetransfer unter Organisationen<br>Reaktionen anderer Organisationen<br>Müssen u. U. einbezogen werden   | ⇒ Umfeldanalyse<br>⇒ Differenzierungsmerkmale herausarbeiten<br>⇒ Co-Branding oder andere Möglichkeiten für ihren Einbezug abwägen, offene Kommunikation  |  |
| Weitere Stakeholder:innen, Öffentlichkeit                                 | Wahrnehmung   | Skepsis und Compassion Fatigue  | Generell erhöhte Aufmerksamkeit für MOs (u. A. durch Öffentlichkeit der Spenden)<br>Imagetransfer und allgemeiner Ruf von MOs<br>Geringes Interesse für eigentliche Mission | ⇒ Transparente, konsistente, einheitliche Kommunikation<br>⇒ Differenzierungsmerkmale hervorheben, Positionierung<br>⇒ Risiken prognostizieren, Krisenstab einrichten, PR-Arbeit<br>⇒ Werteorientierter, emotionaler und persönlicher Ausdruck<br>⇒ Erfolge kommunizieren (ggf. über Markenbotschafter) |  |

Tabelle 1: Herausforderungen beim missionsorientierten Corporate Rebranding (MCR). Eigene Darstellung. Höhere Auflösung in Anhang F.



(in der Regel monetäre) Gegenleistung erbringen. Eine derart lineare Transaktion findet bei MOs oft nicht statt, bspw., weil jene Zielgruppe, die eine Leistung in Anspruch nehmen soll, nicht zahlungsfähig ist oder es sich dabei nicht um Personen oder Institutionen, sondern um die Natur (wie bei *Greenpeace*) oder Vergleichbares handelt. Um dennoch das eigene Bestehen zu sichern, sind MOs meist darauf angewiesen, von dritter Seite Mittel zu beziehen – die Rede ist von Unternehmen (bspw. im Rahmen sog. Corporate-Giving-Maßnahmen), Privatpersonen oder der öffentlichen Hand. Die MO erbringt dafür nicht zwangsläufig eine Gegenleistung.<sup>197</sup> Die vorliegende Arbeit unterscheidet somit zwischen leistungsabnehmenden und -befähigenden Zielgruppen. Abbildung 5 verdeutlicht die Zusammenhänge.

Die beiden Zielgruppen können in sich ebenso divers sein, wie das Beispiel *Ruby Cup* zeigt: Das Social Enterprise spendet für jede gekaufte Menstruationstasse eine weitere an eine afrikanische Frau.<sup>198</sup> Somit erbringt ein Teil der Leistungsabnehmenden (die Käufer:innen) eine monetäre Gegenleistung, wohingegen ein weiterer Teil (die Afrikanerinnen) ohne Gegenleistung begünstigt wird.

Auch bei der Personalstruktur zeigt sich eine wesentliche Besonderheit gegenüber profitorientierten Unternehmen: MOs beschäftigen sowohl bezahlte als auch nicht-bezahlte Arbeitskräfte.<sup>199</sup> Diese können weiter unterteilt werden in festangestellte oder projektbezogene Mitarbeitende, Führungskräfte, Vorstände und Inhabende. Die Bezugsgruppen stellen also durchaus diverse Zielgruppen dar, die aufgrund des Umfangs der Forschungsarbeit tabellarisch nicht genauer differenziert werden.

Eine weitere Kategorie organisationsexterner Bezugsgruppen bezieht sich auf die „Mitbewerber:innen, potenzielle Partner:innen“. Im Zusammenhang mit MOs lehnt die vorliegende Arbeit die Termini „Wettbewerber:innen“ oder „Konkurrent:innen“ ab, um das v. a. in der kommerziellen Welt vorherrschende Denkmuster einer Rivalität um Marktanteile zu durchbrechen. Stattdessen wird die Bezeichnung um den Zusatz „potenzielle Partner:innen“ ergänzt, um zu verdeutlichen, dass MOs grundsätzlich andere Personen oder Institutionen, die an der gleichen oder einer verwandten Mission bzw. Problemlösung beteiligt sind, als mögliche Alliierte anerkennen.<sup>200</sup> In manchen Tätigkeitsbereichen, wie der Katastrophenhilfe, sind derartige Kooperationen essenziell. Zuweilen etablieren sich richtige Netzwerkstrukturen zwischen den MOs.<sup>201</sup>

Nach der erfolgten Begriffsklärung werden nun aus den verschiedenen, organisationsinternen und -externen Katego-

rien insgesamt vier Faktoren und ihre Auswirkungen auf das MCR genauer untersucht. Sämtliche Faktoren, die in Tabelle 1 aufgeführt sind, werden in der Regel mehrfach in der Literatur genannt. Anhang G listet die Autoren:Authorinnen inkl. Seitenangaben auf.

Es wird sich zeigen, dass die Faktoren inner- und außerhalb ihrer Kategorien miteinander verwoben sind und somit nicht trennscharf abgegrenzt werden können.

### **Faktor „Wohltätige Arbeit“ (Rahmenbedingungen)**

Dieser erste Faktor ergibt sich aus der Daseinsberechtigung einer jeden MO – ihrer sozialen bzw. ökologischen Mission. Es lässt sich beobachten, dass MOs zu einer Innenzentrierung und Werterationalität neigen. Im Umkehrschluss bedeutet das, dass ihnen häufig Marktorientierung und Zweckrationalität fehlen.<sup>202</sup> Drucker schildert, dass man schließlich so davon überzeugt sei, etwas Gutes zu tun, dass die Außenwirkung – das Resultat der eigenen Maßnahmen – häufig heruntergespielt wird.<sup>203</sup> Laut Ebarb richten MOs ihren Fokus lediglich auf die Nöte und Krisen in ihrem Umfeld und können sich keineswegs vorstellen, dass Umweltfaktoren sie von ihren noch so ehrbaren Zielen abhalten könnten.<sup>204</sup> Selbst wenn man der Annahme folgt, dass MOs ohnehin einen Markt haben, so können sich dessen Bedürfnisse natürlich über die Zeit ändern und die Erfüllung der Mission beeinflussen.<sup>205</sup> Die Behauptung von Stride, dass eine missionsorientierte Marke als Linse fungieren soll, die die Unternehmenswerte nach außen projiziert, wohingegen eine kommerzielle Marke als Spiegel die Bedürfnisse ihrer Zielgruppe reflektiert,<sup>206</sup> wird vor diesem Hintergrund sehr kritisch bewertet;<sup>207</sup> viel eher muss MOs die Balance gelingen. Eine Mission, die nicht von einer zweck- bzw. marktorientierten Strategie begleitet wird, bleibt eben doch nur eine gute Intention.<sup>208</sup> Eine Außenzentrierung ist nicht nur in Bezug auf die unmittelbare Missionserfüllung, sondern auch die finanzielle Bestandssicherung der Organisation (und somit die langfristige Missionserfüllung) notwendig.

Es ist also zu beobachten, dass MOs heterogenen, sogar widersprüchlichen Ziele nachgehen. Das wird auch beim oftmals konfliktären Zusammenspiel der so diversen internen und externen Bezugsgruppen deutlich.<sup>209</sup> Ein Beispiel ist die Frage, ob die Interessen der zahlungsunfähigen Begünstigten oder die der Zuwendenden verfolgt werden sollten. Die MO kann Gefahr laufen, sich zwischen mangelnder Wirtschaft-

<sup>202</sup>Vgl. ebd., S. 216, S. 227, S. 235; vgl. Ebarb 2019; vgl. Pope et al. 2009, S. 186-187.

<sup>203</sup>Vgl. Drucker 1990, S. 87, S. 107.

<sup>204</sup>Vgl. Ebarb 2019.

<sup>205</sup>Vgl. Drucker 1990, S. 33; vgl. Meyer et al. 2013, S. 228, S. 231, S. 239.

<sup>206</sup>Vgl. Weisenbach Keller und Conway Dato-On 2009, S. 109.

<sup>207</sup>Wohl bemerkt sollten sich auch profitorientierte Unternehmen zwischen Innen- und Außenzentrierung bewegen, um weder Gefahr zu laufen, als „kopfloses Huhn“ sich jedem Gesellschaftstrend zu unterwerfen noch als „arroganter Bastard“ externe Bedürfnisse zu verleugnen [Schultz und Hatch 2003, S. 19-20].

<sup>208</sup>Vgl. Drucker 1990, S. 45.

<sup>209</sup>Vgl. Chapleo 2015, S. 15 vgl. Meyer et al. 2013, S. 153, S. 228, S. 421; vgl. Pope et al. 2009, S. 192ff.

<sup>197</sup>Vgl. Chad 2016, S. 11ff.; vgl. Drucker 1990, S. 41; vgl. Kamp et al. 2004, S. 8; vgl. Kiefl et al. 2022, S. 43; vgl. Meyer et al. 2013, S. 150, S. 239.

<sup>198</sup>Vgl. Ruby Life Ltd. 2022a.

<sup>199</sup>Vgl. ebd., S. 148; vgl. Chad 2016, S. 11ff.; vgl. Kamp et al. 2004, S. 8; vgl. Dathe und Priller: Der dritte Sektor in der Arbeitsmarkt- und Beschäftigungspolitik, in: Olk et al. 2010, S. 525; vgl. Pope et al. 2009, S. 187, S. 193-194.

<sup>200</sup>Vgl. IQ Consult GmbH und Evers & Jung GmbH 2018, S. 11 vgl. Meyer et al. 2013, S. 231.

<sup>201</sup>Vgl. Meyer et al. 2013, S. 211-212.

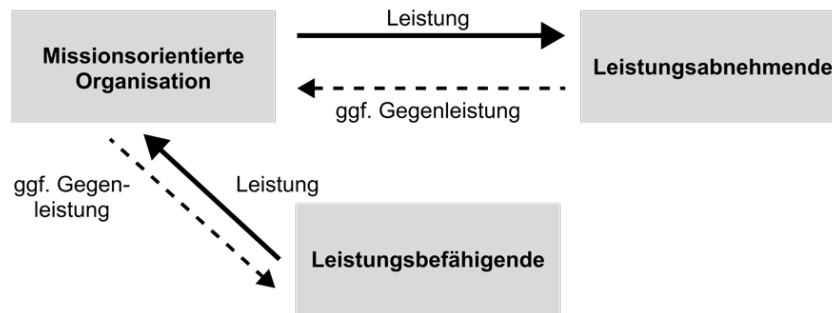


Abbildung 5: Zusammenspiel von MOs, leistungsabnehmenden und leistungsbefähigenden Zielgruppen. Eigene Darstellung.

lichkeit und der Verdrängung ihrer wohltätigen Motive (sog. Mission Drift/Displacement) zu bewegen.<sup>210</sup>

Diese Diversität von Zielen erschwert die Kontrolle der eigenen Arbeit. Die schwierige Messbarkeit ist ebenso der Immaterialität und Zeitspanne der Leistungen geschuldet: Schlussendlich sind MOs tätig, um einen gesellschaftlichen bzw. ökologischen Wandel herbeizuführen – wie die Enttabuisierung der Menstruation und die Steigerung von Hygienestandards in Entwicklungsländern im Fall von *Ruby Cup* oder der Schutz von Artenvielfalt und Frieden am Beispiel von *Greenpeace*.<sup>211</sup> Ihre Missionen sind somit auf Dauer angelegt und werden von qualitativen und externen Ergebnissen abgebildet, während sich kommerzielle Unternehmen prinzipiell an der eigenen, finanziellen Bilanz orientieren können.<sup>212</sup> Auch MOs können auf ähnlich konkrete, zählbare Werte zurückgreifen – wie die Anzahl der verkauften Menstruationstassen oder ausgefüllter Spendenformulare – dennoch bilden diese oftmals nicht die eigentliche, gesellschaftliche bzw. ökologische Wirkung der Arbeit ab. Nicht alles, was wichtig ist, ist messbar, schreiben Meyer et al.<sup>213</sup> Das erschwert auch die Kommunikation mit Leistungsbefähigenden. Zudem ergeben sich viele Errungenschaften – wie ein gestiegener Artenbestand – im Zusammenspiel mit komplexen Umweltbedingungen und sind nicht nur von einem Faktor (der eigenen Tätigkeit) abhängig.<sup>214</sup>

Damit sich die genannten Herausforderungen nicht zu unüberwindbaren Barrieren des MCR entwickeln, sollten MOs frühzeitig Verantwortung übernehmen und gegenlenken. Es können also Konsequenzen für das MCR abgeleitet werden, die Tabelle 1 in der jeweils letzten Spalte aufführt.

Eine essenzielle Aufgabe kommt der Zielsetzung zu, um an dieser Stelle nur ein Beispiel zur Interpretation der Tabelle zu liefern: Da MOs vielseitige Abhängigkeiten aufweisen und Funktionen erfüllen, müssen sie ihre Ziele unbedingt clustern und priorisieren (gerade aufgrund ihrer Ressourcenknappheit; siehe Faktor „Ressourcen“). Das gilt für ihren betrieblichen Alltag ebenso wie für das MCR. Der Fokus muss dabei

auf zweckorientierten Zielen liegen. Maßnahmen, die rechtlich und moralisch sind, aber voraussichtlich kaum Resultate erzielen, müssen vernachlässigt werden. Laut Drucker stellt gerade das eine Schwierigkeit unter MOs dar.<sup>215</sup> Die Mission der MO gibt selbstverständlich die Richtung der Zielsetzung vor, wenngleich sie nicht eine Restriktion sein soll. Für das MCR müssen Ziele definiert werden, die die hochkomplexe, unternehmerische Realität abbilden. Das bedeutet, dass verschiedene Arten von Zielen – darunter quantitative und qualitative, finanzielle und Lernziele – festgelegt werden müssen. Bspw. kann sich eine MO das Ziel setzen, die Markenbekanntheit innerhalb einer bestimmten Zielgruppe in den nächsten fünf Jahre zu verdoppeln. Da davon auszugehen ist, dass viele Ergebnisse erst nach einiger Zeit erzielt werden können, müssen langfristige Ziele heruntergebrochen und damit frühzeitig ablesbar werden. Es könnte ein Ziel sein, dass es Mitarbeitenden gelingt, aufgrund des neuen Branding-Guides die Social-Media-Beiträge in der Hälfte der Zeit fertigzustellen oder dass die Rate wiederholter Spenden im ersten Quartal nach Relaunch der Unternehmensmarke um 10% ansteigt.<sup>216</sup> Es müssen also verschiedene, wertgenerierende Ziele definiert und möglichst messbaren Indikatoren zugeordnet werden. Das gilt auch für qualitative Ziele: sie müssen sich nicht zwangsläufig in Zahlen abbilden lassen und doch in irgendeiner Form (wenn auch subjektiv) beurteilbar sein.<sup>217</sup> Daraus erschließt sich auch die Konsequenz, die Markencontroller:innen, dazu zu befähigen, die Erfolge des MCR nach teils subjektiven Maßstäben zu bewerten.<sup>218</sup>

#### Faktor „Selbstidentität“ (Leistungserbringende)

Eng mit den Faktoren „Wohltätige Arbeit“, „Organisationskultur“ und „Kenntnisse und Fähigkeiten“ verbunden ist die Selbstidentität der Leistungserbringenden. Es zeigt sich eine besondere Verbundenheit der Arbeitskräfte mit der Unternehmensmarke einer MO.<sup>219</sup> Vermutlich gerade deswe-

<sup>215</sup>Vgl. Drucker 1990, S. 8.

<sup>216</sup>Vgl. Durham 2015. Im besten Fall werden Indikatoren festgelegt, mit denen sich der Einfluss von externen Bedingungen auf die Spender:innenbindungsrate möglichst (rechnerisch) ausgrenzen lässt, sodass die Erfolge des MCR besser sichtbar werden.

<sup>217</sup>Vgl. Drucker 1990, S. 47-48; vgl. Meyer et al. 2013, S. 180.

<sup>218</sup>Vgl. Meyer et al. 2013, S. 180.

<sup>219</sup>Vgl. ebd., S. 248.

<sup>210</sup>Vgl. Meyer et al. 2013, S. 231-232.

<sup>211</sup>Vgl. Drucker 1990, S. 39 vgl. Greenpeace International 2022; vgl. Ruby Life Ltd. 2022b.

<sup>212</sup>Vgl. Drucker 1990, S. 34, S. 107-108.

<sup>213</sup>Meyer et al. 2013, S. 180.

<sup>214</sup>Vgl. Finisterra do Paço et al. 2014, S. 18.

gen, weil ein großer Teil von ihnen aus intrinsischen, nicht-monetären Beweggründen der Tätigkeit nachgeht. Damit einher geht der Anspruch, dass die Organisation ihre persönlichen Werte vertritt, was wiederum zur Ablehnung des MCR führen kann; schließlich soll die vertraute Unternehmensmarke einen strategischen Wandel durchlaufen und u. U. ihre Werte und Ausrichtung verändern.<sup>220</sup> Gerade unter MOs zeigt sich das Phänomen, dass die interne Einstellung gegenüber vermeintlich kommerziellen Paradigmen – und gerade gegenüber dem Corporate Rebranding – zur größten Herausforderung im Prozess wird.<sup>221</sup> Eine grundsätzliche Skepsis sowie hohe Ansprüche an Mitbestimmung und Konsensorientierung (siehe Faktor „Organisationskultur“) sind mindestens zu erwarten.<sup>222</sup>

Der Einbezug von Mitarbeitenden ist ebenso notwendig wie herausfordernd, gerade weil ihnen betriebswirtschaftliche Kenntnisse (siehe Faktor „Kenntnisse und Fähigkeiten“) und Außenorientierung fehlen. Das macht sich z. B. dadurch bemerkbar, dass Ausgaben prinzipiell eher als Verschwendung, statt als Investition betrachtet werden, dass Marketing den schlechten Ruf von „Werbung“ genießt, dass der technologische Fortschritt kaum genutzt wird, dass (insb. ehrenamtliche) Führungskräfte ihre Rolle als Führungspersonlichkeiten ablehnen und dass generell die Meinung vertreten wird, die eigene MO sei ja keine Marke, die gemanagt werden muss, oder „Wohlätigkeit“ sei Marke genug.<sup>223</sup>

Aufgrund der persönlichen Bindung an eine MO fehlt den Beteiligten u. U. die nötige Objektivität, um das MCR erfolgreich auszugestalten – bspw. bei der Um- und Innenfeldanalyse oder der Überarbeitung ihrer Markenpersönlichkeit. Ihnen kann der Abstand fehlen, eine Botschaft, die sie selbst betroffen macht, marktkonform zu kommunizieren.<sup>224</sup> Zum Beispiel indem der soziale Missstand und die Rolle der Spender:innen übertrieben dargestellt werden. *Hirsh und Schmulowitz* nutzen den Begriff „Poverty Porn“.<sup>225</sup> Ein anderes Beispiel ist die Verwendung von urheberrechtlich geschütztem Material, weil es ja der wohlthätigen Mission zugute kommt.<sup>226</sup> Die fehlende Sachlichkeit kann auch gerade dann in Erscheinung treten, wenn eine externe Agentur aus dem gleichen Grund mit dem MCR beauftragt wird und Veränderungen ankündigt. Insb. Mitarbeitenden, die seit vielen Jahren Teil der Organisation sind, dürfte es schwerfallen, die Kontrolle abzugeben.<sup>227</sup>

<sup>220</sup>Vgl. Aaker 1991, S. 222 vgl. Chapleo 2015, S. 15-16.

<sup>221</sup>Vgl. Chad 2016, S. 10.

<sup>222</sup>Vgl. Meyer et al. 2013, S. 145, S. 153.

<sup>223</sup>Vgl. ebd., S. 235; vgl. Chad 2016, S. 11; vgl. Drucker 1990, S. 34, S. 39; vgl. Ebarb 2019; vgl. Kylander und Stone 2012, S. 38-39; vgl. Pope et al. 2009, S. 186-189ff., S. 192-193, S. 195ff.; vgl. Weisenbach Keller und Conway Dato-On 2009, S. 107-108. Zu diesem letzten Punkt schreibt Drucker treffenderweise: „It's much easier to sell the Brooklyn Bridge than to give it away.' Nobody trusts you if you offer something for free.“ [Drucker 1990, S. 39].

<sup>224</sup>Vgl. Hirsh und Schmulowitz 2021; vgl. Kylander und Stone 2012, S. 39-40.

<sup>225</sup>Vgl. Hirsh und Schmulowitz 2021.

<sup>226</sup>Vgl. ebd.

<sup>227</sup>Vgl. Schultz und Hatch 2003, S. 20ff; vgl. Vinjamuri 2004, S. 10ff.

### **Faktor „Machtposition“ (Leistungsbefähigende)**

In der Praxis zeigt sich, dass Leistungsbefähigende eine Zuordnung ihrer Mittel fordern und dabei manche Zwecke der MO, die in ihren Augen nicht eindeutig der Mission zugute kommen, systematisch ausgrenzen. Besonders davon betroffen sind Marketingaktivitäten, somit auch das MCR.<sup>228</sup> Eventuell besteht ein Zusammenhang mit der Besonderheit, dass MOs von ihren Leistungsbefähigenden oft ohne Gegenleistung Unterstützung beziehen; das versetzt die Geber:innen in eine deutliche Machtposition und räumt ihnen Mitspracherecht ein. Zudem ergibt sich eine klare Überschneidung mit dem Faktor „Ressourcen“, weil Mittel, die der MO zur Verfügung stehen, dedizierten, internen Budgettöpfen zugeordnet sind und nicht flexibel (bspw. für Branding-Maßnahmen) allokieren werden können.<sup>229</sup>

### **Faktor „Wahrnehmung“ (Weitere Stakeholder:innen, Öffentlichkeit)**

In Kapitel 1.1 wurde erwähnt, dass unter kommerziellen Unternehmen der Trend zu beobachten ist, einen gemeinnützigen Zweck zur Gewinnung neuer Zielgruppen und schlussendlich zur Profitmaximierung zu verfolgen. Das hat zu einem gewissen Misstrauen unter Verbrauchenden geführt, das sich u. U. auf MOs auswirkt.<sup>230</sup> Ein sog. „Image Spillover“ macht sich außerdem unter den wohlthätigen Organisationen bemerkbar; hier tritt das Phänomen auf, dass die öffentliche Wahrnehmung einer individuellen MO durch das durchschnittliche Image vergleichbarer Organisationen bestimmt wird.<sup>231</sup> Die erwähnten Netzwerkstrukturen begünstigen das zusätzlich. Das macht MOs ausgesprochen abhängig von den Handlungen ihrer Mitbewerber:innen und Partner:innen.

Hinzu kommt, dass MOs grundsätzlich mehr öffentliches und mediales Interesse als vergleichbare, profitorientierte Unternehmen auf sich ziehen, weil sie schließlich im Namen des Allgemeinwohls tätig sind. Das versetzt sie häufiger in die Lage, ihr Handeln zu rechtfertigen – vor der Gesellschaft, sowie den Regierungsbehörden, die ebenso zu ihren Bezugsgruppen zählen.<sup>232</sup> Selbstverständlich bringt diese erhöhte Aufmerksamkeit auch Vorteile mit sich; sie dient als Bühne, um die Mission und Tätigkeiten der Organisation leichter nach außen zu tragen. Aber auch hier stoßen MOs auf eine große Herausforderung, die sich durch die eigenen Handlungen kaum beeinflussen lässt – nämlich eine prinzipielle Abwehrhaltung der Gesellschaft gegenüber sozialen bzw. ökologischen Missständen. Bei *Drucker* taucht die Bezeichnung „Compassion Fatigue“ auf: Das viele Elend der Welt härtet die Menschen einerseits ab, andererseits macht es sie hoffnungslos, sodass sie wenig Interesse an den Bestrebungen von MOs zeigen.<sup>233</sup>

<sup>228</sup>Vgl. Pope et al. 2009, S. 187-188, S. 192-193.

<sup>229</sup>Vgl. ebd., S. 187-188; vgl. Chapleo 2015, S. 16.

<sup>230</sup>Vgl. Mirzaei et al. 2021, S. 187.

<sup>231</sup>Vgl. Ritchie et al. 1999, S. 6.

<sup>232</sup>Vgl. ebd., S. 7, S. 14.

<sup>233</sup>Vgl. Drucker 1990, S. 42.

Resümierend lässt sich feststellen, dass MOs auf diversen Ebenen komplexen und teils verstrickten Herausforderungen begegnen, die das MCR erschweren. Einige von ihnen sind inkomparabel in Bezug auf profitorientierte Unternehmen und nur schwer zu steuern. Die meisten von ihnen jedoch können gemeistert werden, sofern die Organisation folgerichtige Konsequenzen zieht. Aus jedem der 13 übergeordneten Faktoren in Tabelle 1 können Konsequenzen abgeleitet werden. Sie werden im Folgenden in einen handlungsleitenden Prinzipienkatalog zusammengetragen.

### 3. Das MCR-Modell

„Without strategy, execution is aimless.  
Without execution, strategy is useless.“ – Chang.<sup>234</sup>

#### 3.1. Prinzipienkatalog für MCR

Aus den gesammelten Konsequenzen können insgesamt 18 Prinzipien für erfolgreiches MCR formuliert werden. Anhang H verdeutlicht die Zuordnung von Konsequenzen zu diesen Prinzipien. Einzelne Konsequenzen (wie „Gründe für MCR erläutern“) können mehreren Prinzipien (in diesem Fall „Sinnhaftigkeit hinterfragen“ und „Kommunizieren und integrieren“) zugewiesen werden. Zudem sind die Prinzipien miteinander verbunden (bspw. „Kommunizieren und integrieren“ und „Motivation erhalten“).

Die 18 Prinzipien lauten:

1. **Sinnhaftigkeit hinterfragen:** Die Entscheidung für MCR wird bewusst und ausgehend von der Markenidentität getroffen.
2. **Ausgangssituation ermitteln:** Das MCR wird durch eine ausgiebige und ehrliche Um- und Innenfeldanalyse eingeleitet.
3. **Chancen-Risiken abwägen:** Externe wie interne Chancen und Risiken werden frühzeitig prognostiziert.
4. **Anker würdigen:** Das MCR blickt demütig auf die Markengeschichte zurück und lernt von ihr.
5. **Ziele setzen:** Realistische und wertgenerierende Ziele, die sich hinsichtlich ihrer Tragweite und Dauer unterscheiden, werden festgelegt und priorisiert.
6. **Erfolgskennzahlen festlegen:** Es werden möglichst messbare, eventuell auch subjektive Indikatoren bestimmt, damit künftige Erfolge erkennbar werden.
7. **Rahmen einhalten:** Finanzielle und zeitliche Vereinbarungen werden in Hinblick auf potenzielle Überschreitungen (insb. aufgrund von Kreativität und Innovation) getroffen und eingehalten.
8. **Rückhalt gewinnen:** Personen, die intern oder extern eine Schlüsselfunktion erfüllen, werden frühzeitig als Befürwortende des MCR gewonnen.
9. **Objektivität gewährleisten:** Durch externe Beratung und/oder ein heterogenes, repräsentatives MCR-Team wird eine gewisse Objektivität bei Entscheidungen gewährleistet.
10. **Dedizierte Abteilung einrichten:** Auf Basis von Kompetenz und Erfahrung wird eine Abteilung mit der Umsetzung, Kommunikation und Überwachung des MCR beauftragt und entsprechend ausgebildet.
11. **Weitere Ressourcen bereitstellen:** Neben den personellen Ressourcen werden auch Finanz- und Sachmittel für das MCR allokiert.
12. **Kommunizieren und integrieren:** Die relevanten Bezugsgruppen werden über alle Phasen des MCR hinweg durch eine offene und einheitliche Kommunikationskultur informiert und ggf. aktiv in den Prozess integriert.
13. **Markt-Mission Balance halten:** Die neue Unternehmensmarke überzeugt durch eine konsequente Ausrichtung am Markt sowie ihrer Identität.
14. **Widerstände bewältigen:** Interne wie externe Widerstände, die sich gegen das MCR richten, werden frühzeitig erkannt und souverän gehandhabt.
15. **Testphase durchlaufen:** Die entscheidenden MCR-Maßnahmen werden vorab einem relevanten Testmarkt präsentiert und Erkenntnisse unmittelbar eingearbeitet.
16. **Beteiligte schulen:** Die internen Bezugsgruppen werden mithilfe eines MCR-Leitfadens geschult, um die neue Unternehmensmarke einheitlich und eigenständig nach außen zu tragen.
17. **Kontrollieren:** Sowohl die Durchführung des MCR als auch die Umweltdynamiken werden fortlaufend beobachtet und Entwicklungsverläufe für die Steuerung aufgezeichnet.
18. **Motivation erhalten:** Durch die Kommunikation von Erfolgen des MCR, sowie Wertschätzung und Dankbarkeit an alle Bezugsgruppen, bleibt die Motivation im Prozess erhalten.

Interessanterweise ist beim Lesen dieser Prinzipien kein wesentlicher Unterschied zu den Voraussetzungen von Corporate Rebranding in konventionellen, profitorientierten Unternehmen erkennbar. Mit Blick auf die Hintergründe und Umsetzung dieser Prinzipien wird jedoch die Ausrichtung auf MOs ersichtlich. Um das zu verdeutlichen und dennoch nicht dem nachfolgenden Prozessmodell vorwegzueilen, wird an dieser Stelle nur das Prinzip Nummer 12 genauer erläutert: „Die relevanten Bezugsgruppen werden über alle Phasen des MCR hinweg durch eine offene und einheitliche Kommunikationskultur informiert und ggf. aktiv in den Prozess integriert.“

<sup>234</sup>Chang, Morris, zitiert nach Dess et al. 2021, S. 13.



Dabei handelt es sich um ein komplexes Prinzip, das sich aus verschiedenen Faktoren, sogar allen übergeordneten Kategorien in Tabelle 1, speist: Es wurde bereits dargelegt, dass die Leistungsbefähigenden aufgrund ihrer emotionalen Verbundenheit, sowie der Idealisierung von Organisation und Tätigkeit das MCR grundsätzlich ablehnen könnten. Hinzu kommt, dass Mitarbeitende und Führungskräfte häufig auf Basis von Leidenschaft, nicht Kompetenz, beschäftigt werden (u. a. da es sich um eine unentgeltliche Arbeit handeln kann)<sup>235</sup> und vermutlich nicht über die Kenntnis verfügen, den Wert des MCR zu beurteilen. Um sie dennoch von Anfang an in das MCR zu involvieren, mindestens eine breite Akzeptanz für den Prozess (Buy-in) zu gewinnen, sollte eine MO ihre sorgfältig eruierten Gründe für das MCR anschaulich darlegen. Im besten Fall kann auch der Rahmen, in dem der Prozess stattfinden soll (bspw. die Dauer) mitgeteilt werden.

Eine Kommunikation über die Gründe empfiehlt sich auch gegenüber den relevanten Leistungsbefähigenden. Diese könnten einerseits um eine für das Branding zweckgebundene Zuwendung gebeten werden, andererseits soll sichergestellt werden, dass sie nicht die wohlthätige Ausrichtung der von ihnen geförderten Organisation prompt infrage stellen und u. U. ihre Mittel zurückziehen.<sup>236</sup>

Die Kommunikation – und damit verbunden Buy-in und Motivation – der internen Bezugsgruppen über das MCR hochzuhalten, kann sich für MOs schwierig gestalten. Das ist insb. der Diversität ihrer Arbeitskräfte geschuldet: Neben Lohnarbeitern:arbeiterinnen werden MOs zu einem erheblichen Teil von Volontären:Volontärinnen in sämtlichen Funktionen und Hierarchiestufen getragen, die meist nur auf Teilzeit und oft nicht dauerhaft beschäftigt sind.<sup>237</sup> Demgegenüber steht das MCR als ein ausgesprochen komplexer Prozess, der einen Ressourceneinsatz – darunter den von Arbeitskräften – über einen längeren Zeitraum und hohe Kohäsion erfordert.<sup>238</sup> Das wirft einerseits die Frage auf, wie über die Dauer des MCR hinweg einheitlich kommuniziert werden kann (bspw. aufgrund der zu erwartenden unterschiedlichen Arbeitszeiten) und andererseits, wie anschließend die neue Unternehmensmarke konsequent von den Mitarbeitenden gelebt werden soll (sofern gerade die unbezahlten Arbeitskräfte häufig rotieren).

Chad schildert einen Praxisfall aus der nicht-profitorientierten Welt, bei dem nicht alle Mitarbeitenden zugleich über das geänderte Markenerscheinungsbild informiert wurden und dieses Fehlverhalten für großen Unmut sorgte.<sup>239</sup> Gerade weil sich die Arbeitskräfte so eng mit ihrer Organisation verbunden fühlen, können eine mangelnde Kommunikation und fehlende Rücksichtnahme zu großer Frustration und Ablehnung des gesamten MCR-Prozesses, vielleicht sogar der

Organisation, führen. MCR kann nicht über Command and Control durchgesetzt werden. Es müssen also Kommunikationsformate etabliert werden, die den Charakteristika der MO und ihren Arbeitskräften gerecht werden – wie regelmäßige, virtuelle Meetings an den Tagen, an denen sich die meisten Schnittstellen unter den Beschäftigten ergeben, Einträge im Intranet und die Nutzung agiler Methoden wie Kanban-Tafeln. Zusätzlich sollten Maßnahmen – wie Workshops – etabliert werden, die das Buy-in und die interne Kohäsion fördern.<sup>240</sup>

Je nach Organisationsgröße und Vertraulichkeitsaspekten können nicht alle Arbeitskräfte aktiv am MCR beteiligt werden. In diesem Fall empfiehlt sich ihre Segmentierung und Priorisierung. Wie bereits erläutert, muss Schlüsselfunktionen eine besondere Rolle im Prozess zuteil werden.<sup>241</sup> Das trifft auch auf externe Bezugsgruppen, darunter die Leistungsbefähigenden, zu: Es ist nicht zu erwarten, dass einmalige Spender:innen das gleiche Interesse wie langjährige Geschäftspartner:innen am MCR zeigen. Auch sie sollten gezielt angesprochen und ggf. eingebunden werden. U. U. sollten sie über die Mittelverwendung im Rahmen des MCR sowie die Prozessziele und Errungenschaften fortlaufend informiert werden.<sup>242</sup> Eventuell können so über den Prozessverlauf hinweg sogar noch weitere Mittel für das Unterfangen generiert werden.

Abhängig von der Organisationsstruktur können auch andere MOs, darunter Mitbewerber:innen, am MCR beteiligt werden (ggf. durch ein Co-Branding). Mindestens aber sollten sie – je nach Grad der Verbundenheit und Tragweite des MCR – über das Vorhaben informiert werden. *Kylander und Stone* merken an, dass das Rebranding ein Machtungleichgewicht unter MOs hervorbringen kann. Schlussendlich aber sollte derartigen Organisationen daran gelegen sein, kollektive – nicht individuelle – Interessen zu verfolgen.<sup>243</sup>

Zuletzt umfasst das zwölfte Prinzip auch die Kommunikation mit den Leistungsabnehmenden, weiteren Stakeholder:innen und der Öffentlichkeit: Die Mitteilung über das MCR und schließlich die Präsentation der neuen Unternehmensmarke sind ein zweiseitiges Schwert: Auf der einen Seite sind MOs aufgrund der allgemeinen Skepsis gegenüber (ursprünglich) kommerziellen Disziplinen, der genannten Compassion Fatigue und des öffentlichen Drucks<sup>244</sup> gut darin beraten, ihr Vorhaben möglichst proaktiv und transparent zu kommunizieren. Zudem können sie so unmittelbar mehr Aufmerksamkeit und Begeisterung für ihre Unternehmensmarke generieren. Auf der anderen Seite aber laufen sie Gefahr, gerade ihre bisherigen Leistungsabnehmer:innen zu verlieren. In der Literatur finden sich Ansätze, das Rebranding diskret durchzuführen, sodass externe Zielgruppen die Änderungen lediglich als Modernisierung auffassen.<sup>245</sup> Sofern ein offenkundigerer Ansatz gewählt wird, kann es von

<sup>235</sup>Vgl. Pope et al. 2009, S. 193-196; vgl. *Symblème n. d.*

<sup>236</sup>Vgl. Ritchie et al. 1999, S. 22.

<sup>237</sup>Vgl. Drucker 1990, S. 130ff.; vgl. Meyer et al. 2013, S. 148, S. 247; vgl. Dathe und Priller: Der dritte Sektor in der Arbeitsmarkt- und Beschäftigungspolitik, in: Olk et al. 2010, S. 526; vgl. Pope et al. 2009, S. 187ff.

<sup>238</sup>Vgl. Deutscher Markenmonitor 2021a; vgl. Ritchie et al. 1999, S. 23-25; vgl. Webster 2002.

<sup>239</sup>Vgl. Chad 2016, S. 23-24.

<sup>240</sup>Vgl. Chapleo 2015, S. 11-12; vgl. Deutscher Markenmonitor 2021a.

<sup>241</sup>Siehe Kap. 2.1.2.

<sup>242</sup>Vgl. Drucker 1990, S. 43.

<sup>243</sup>Vgl. Kylander und Stone 2012, S. 39-40.

<sup>244</sup>Siehe Kap. 2.2.2.

<sup>245</sup>Vgl. Daly und Moloney 2005, S. 32-33; vgl. Todor 2014.

Vorteil sein, vorab insb. die Sinnhaftigkeit des MCR zu belegen und das Versprechen für eine gleichbleibende Qualität der Angebote oder den Fortbestand der Unternehmenswerte zu garantieren.<sup>246</sup>

Dem aufmerksamen Leser wird nicht entgangen sein, dass die 18 Prinzipien in einer bewussten Reihenfolge angeordnet wurden. Sie orientieren sich am Ablauf des nachfolgenden MCR-Prozessmodells. Einige Prinzipien, darunter die hier ausführlich beschriebene Kommunikation, können jedoch nicht den einzelnen Prozessschritten zugeordnet werden, da sie über alle Phasen hinweg von der MO eingehalten werden sollten.

### 3.2. Entwicklung eines Prozessmodells für MCR unter Berücksichtigung vergleichbarer Modelle und anhand eines Praxisbeispiels

Es wird deutlich, dass sich diese 18 Prinzipien unterschiedlichen Phasen des MCR zuordnen lassen. Sofern man sie sinngemäß clustert<sup>247</sup> werden grundsätzlich fünf Phasen deutlich: Hinterfragen, Planen, Umsetzen, Leben und das simultane Kontrollieren. Die ersten vier Phasen überschneiden sich zwar und können stellenweise zeitgleich und wechselseitig ablaufen, grenzen im Wesentlichen aber in der genannten Reihenfolge aneinander an. Das trifft auch auf die ihnen untergeordneten 25 Prozessschritte zu.

Eine genaue Zuordnung der Prinzipien zu den Prozessschritten findet sich in Anhang I.

Dieser Prozess ist nicht linear, sondern zyklisch – wie das nachfolgende Schaubild verdeutlicht. Das Prozessmodell ist eine Interpretation der Kapitel 1.1 und 2, vorangegangener Theoriemodelle und des entwickelten Prinzipienkatalogs.

Es sollte ein Schaubild entwickelt werden, das alleinstehend nutzbar ist und die hohe Komplexität des MCR verständlich abbildet. Das macht es zu einem umfangreichen Modell, das im Rahmen dieser Forschungsarbeit nicht vollumfassend und exakt beschrieben werden kann. Nichtsdestotrotz werden alle Prozessschritte so weit ausgeführt, dass sie eine Anwendung des Modells unter Praktikern:Praktikerinnen, Sachkundigen und Forschenden ermöglichen und ihnen dennoch den gewollten Interpretationsspielraum einräumen. Aus dem gleichen Grund wurden die 25 Prozessschritte nicht nummeriert oder als Flowchart dargestellt; es soll damit signalisiert werden, dass bei einer Nutzung des Modells der einzigartige, betriebliche Kontext beachtet werden muss. U. U. fallen einzelne Prozessschritte weg oder werden in einer anderen Reihenfolge ausgeführt.

Das Schaubild wird im Uhrzeigersinn durchlaufen und beginnt idealtypisch mit dem Prozessschritt „Ist analysieren“. Dass es sich bei dem Modell um eine Idealvorstellung des

MCR handelt, machen auch die Phasen „Planen“ und „Umsetzen“ deutlich: In der Praxis korrelieren sie miteinander, weil sich nicht alle Pläne umsetzen lassen und ggf. Kursänderungen und Neuplanungen erfordern. Das Schaubild skizziert diese verwobenen Abläufe jedoch nicht.

Um das Modell einerseits möglichst anschaulich zu erläutern und andererseits auf eine grundsätzliche Praxistauglichkeit zu untersuchen, werden einzelne Prozessschritte anhand der Organisation *Kiserem Epilepsy Awareness Foundation* (KEAF) beschrieben.

Die KEAF wurden 2016 von ihrem gleichnamigen Gründer und Geschäftsführer *Fred Kiserem* als NPO ins Leben gerufen und ist seitdem in Kiambu, Kenia, ansässig.<sup>248</sup> Die Organisation verfolgt die Vision, das gesellschaftliche Bewusstsein für Epilepsie zu schärfen und vorherrschende Missverständnisse in der afrikanischen Kultur – wie etwa das Gleichsetzen von Epilepsie mit einer dämonischen Besessenheit – auszuräumen. Dafür hat sich die KEAF zur Aufgabe gemacht, die Interessen von Epileptikern:Epileptikerinnen durch Aufklärungsarbeit, Ausbildungsprogramme und Zugang zu Medikamenten zu vertreten. Das geschieht u. a. durch Schulbesuche und Medienauftritte des vierköpfigen Vorstands, sowie Computer-, Entrepreneurship- und Kosmetologiekurse, die sich speziell an die Betroffenen, aber auch an Ortsansässige richten und sie für den Arbeitsmarkt qualifizieren sollen.<sup>249</sup> Nach eigenen Angaben trägt sich die KEAF ausschließlich durch Spenden und Beiträge der Kursteilnehmer:innen und nicht durch Zuwendungen der öffentlichen Hand, medizinischen Einrichtungen oder kommerziellen Unternehmen.<sup>250</sup> Sie ist unabhängiges Mitglied der *Epilepsy Connections Affiliated* (ECA), einer internationalen Datenbank und zentralen Anlaufstelle für Organisationen, die im Bereich der Epilepsie tätig sind. Die ECA ermöglicht kostenlose Dienstleistungen wie Website Hosting, Social Media Management und die Vernetzung zu vergleichbaren Einrichtungen.<sup>251</sup> Die KEAF und verwandte kenianische Organisationen werden durch das *National Epilepsy Coordination Committee* (NECC) koordiniert und betreut – darunter auch die *Kenya Association for the Welfare of People with Epilepsy* (KAWE), die ebenfalls Aufklärungsarbeit leistet und Medikamente verteilt<sup>252</sup> und somit als Mitbewerberin der KEAF betrachtet wird. Anhang K vermittelt einen ersten Eindruck über die inhaltliche und visuelle Ähnlichkeit der Organisationen.

Nachdem die grundlegenden Organisationsstrukturen, Abhängigkeiten und Zielgruppen geklärt wurden, werden weitere Ausführungen zur *Kiserem Epilepsy Awareness Foundation* fortan nur gemacht, sofern sie der Veranschaulichung des Modells dienen.

<sup>246</sup>Vgl. Chad 2016, S. 23.

<sup>247</sup>Wie bereits erläutert, lassen sich manche Prinzipien nicht klaren Prozessphasen zuordnen, andere hingegen können mehreren zugeordnet werden. Als eine Einheit clustern lassen sich bspw. „Sinnhaftigkeit hinterfragen“, „Ausgangssituation ermitteln“ und „Chancen-Risiken abwägen“, da sich alle drei auf den Zeitraum vor der Planung und Umsetzung des MCR beziehen. Diese Periode wird als „Hinterfragen“ bezeichnet.

<sup>248</sup>Vgl. Kiserem Epilepsy Awareness Foundation 2019a, 2022.

<sup>249</sup>Vgl. ebd.; vgl. ebd. Kiserem Epilepsy Awareness Foundation 2019b, 2019c, 2019d.

<sup>250</sup>Vgl. Kiserem Epilepsy Awareness Foundation 2019d, 2019e.

<sup>251</sup>Vgl. Epilepsy Connections Affiliated n. d.; vgl. Kiserem Epilepsy Awareness Foundation 2019c.

<sup>252</sup>Vgl. Kenya Association for the Welfare of People with Epilepsy n. d. a, n. d. b; vgl. National Epilepsy Coordination Committee n. d.

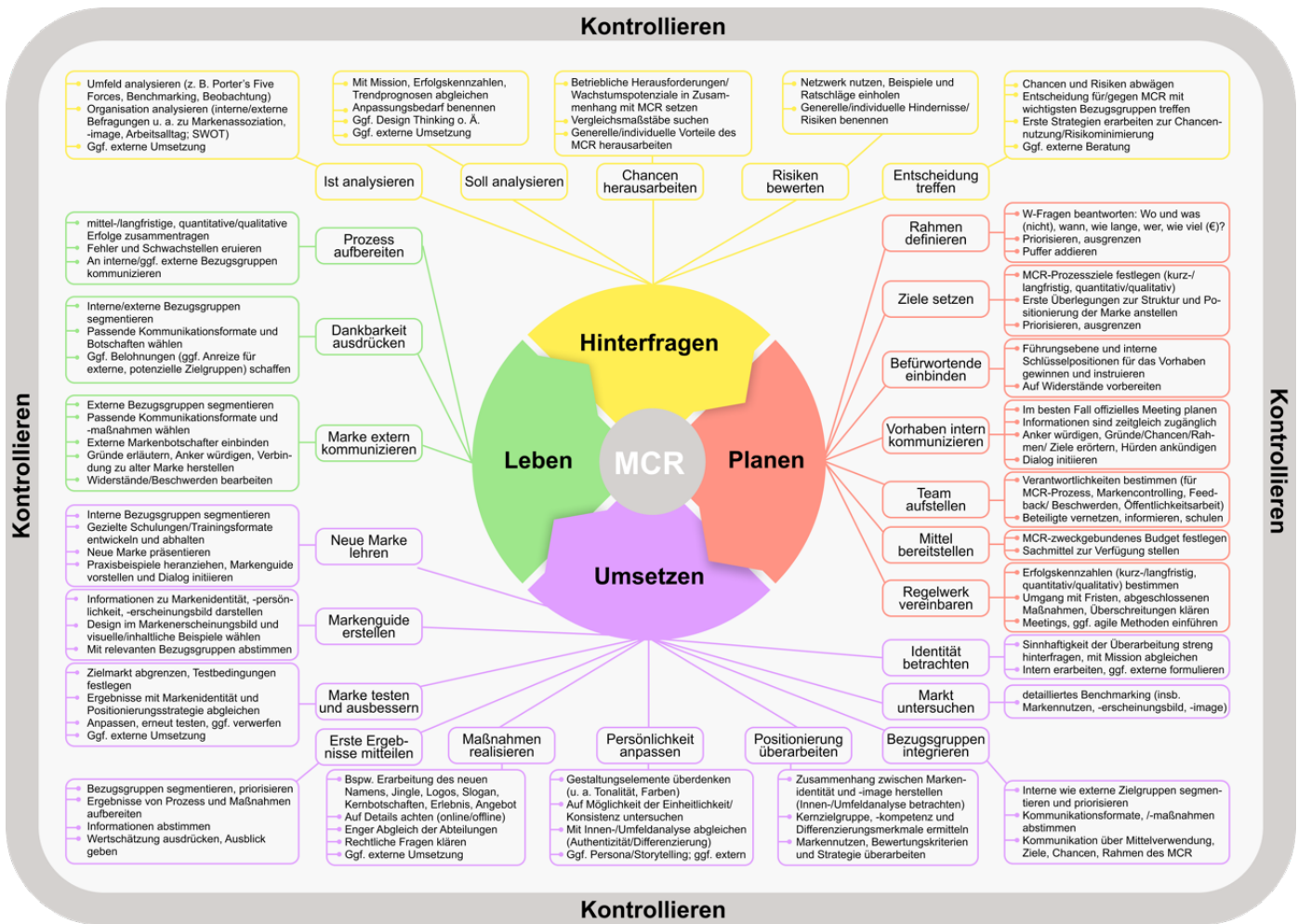


Abbildung 6: Das MCR-Prozessmodell. Eigene Darstellung. Höhere Auflösung in Anhang J.

Hinterfragen

Beinahe jedes der in Kapitel 1 herangezogenen Theoriemodelle erwähnt einen Stimulus, der dem MCR vorangeht. Bei Ahonen handelt es sich dabei um Entscheidungen, Ereignisse oder Prozesse, die einen Wandel bewirken.<sup>253</sup> Muzellec und Lambkin führen einen Wechsel auf struktureller, strategischer oder externer Ebene an.<sup>254</sup> Da nicht davon ausgegangen werden kann, dass sich eine Gelegenheit zum MCR unaufgefordert ankündigt, empfiehlt diese Arbeit, zuerst eine Untersuchung des Umfelds und der eigenen Organisation unter Abgleich mit dem Sollzustand vorzunehmen. Ziel dieser ersten Phase ist, herauszufinden, wie mit der Unternehmensmarke verfahren werden soll – ob sie unverändert bleiben kann, gravierende oder einzelne Änderungen durchlaufen soll (Rebranding bzw. Brand Refresh/Renewal) oder aufgegeben werden muss. Diese anfänglichen Schritte werden auf oberster Führungsebene und in regelmäßigen Perioden – bspw. alle drei Jahre, sofern keine akute Notwendigkeit besteht – durchgeführt.

Das Einbeziehen einer externen Beratung kann schon in diesem frühen Stadium hilfreich sein, da MOs der Abstand für eine derart fundamentale Entscheidung fehlen könnte.

Die Analyse nimmt je nach Detaillierungsgrad und Methode einzelne Tage oder mehrere Wochen in Anspruch. Dennoch stellt sie die kürzeste Phase im MCR-Prozess dar.

Zuerst sollten Organisationen ihr **Ist analysieren**: Mit bekannten Werkzeugen, wie PESTEL und Porter's Five Forces, können sie zunächst einen Überblick über die allgemeine Marktstruktur, Branchenkräfte, und makroökonomische Entwicklungen gewinnen. Die Spastics Society konnte im Rahmen ihrer Umfeldanalyse feststellen, dass der Terminus „Spastiker“ als überholt und stigmatisierend empfunden wurde und Vorbehalte gegenüber der gleichnamigen Organisation auslöste.<sup>255</sup>

Um solche Einschläge zu lokalisieren, empfiehlt sich für die KEAF ein Blick auf die Handlungen des verwandten Vereins KAWE und der Dachverbände ECA und NECC. Dann sollte auch eine Feldbeobachtung oder Zielgruppenbefragung in Erwägung gezogen werden. So lassen sich die aktuellen Pro-

<sup>253</sup>Siehe Ahonen 2008, S. 35.

<sup>254</sup>Siehe Muzellec und Lambkin 2006, S. 820.

<sup>255</sup>Vgl. Lomax et al. 2002, S. 4.



bleme und Bedürfnisse von Epileptikern: Epileptikerinnen identifizieren und mit den Leistungen der Organisation abgleichen. Zudem können Erkenntnisse zur Markenassoziation und dem Image der KEAF gewonnen werden. Die Organisation könnte teilstandardisierte Fragebögen an die Kursteilnehmer:innen aushändigen. Dieses Forschungsverfahren lässt sich auch auf die eigenen Mitarbeitenden anwenden, um Rückschlüsse auf die Organisationsabläufe zu ziehen, aber auch um Diskrepanzen zwischen Unternehmensvision, -image und -kultur aufzudecken.

Eine besondere Rolle bei der Situationsanalyse kommt der Überprüfung des Geschäftsmodells zu. Dieses beschreibt, wie die Unternehmensstrategie verwirklicht wird; u. a. wie die MO Wert für ihre Zielgruppen generiert (bspw. durch Kursangebote), welche Kooperationen (bspw. zur ECA) und Ressourcen (bspw. Computer) genutzt werden und wie sie Einnahmen erzielt (bspw. durch den Verkauf der Kurserzeugnisse).<sup>256</sup>

Ein derart ganzheitlicher Ansatz wäre für ein Produktrebranding eher nicht notwendig.

Wie schon dargelegt, weisen MOs nicht-lineare und komplexere Abhängigkeiten als profitorientierte Organisationen auf, was die Abbildung ihrer betrieblichen Zusammenhänge erschwert. Vorlagen wie das *Business Model Canvas* und seine Adaptionen, die sich gezielt an MOs richten,<sup>257</sup> erweisen sich hier als hilfreich.

Bei genauerer Betrachtung des Geschäftsmodells der KEAF zeigt sich, dass die Einrichtung Tätigkeiten nachgeht, die nicht erkennbar auf ihre Mission einzahlen; wie z. B. die Ausgabe von Hygieneartikeln oder die Unterstützung anderer Organisationen beim Fundraising.<sup>258</sup> Hier wird das in Kapitel 2.2.2 geschilderte Problem der Priorisierung unter MOs deutlich: Auf Kosten von Arbeitszeit und Fokus verfolgen sie Maßnahmen, die zwar ehrenwert sind, aber für die eigentliche Mission wohl kaum Resultate erzielen. Zudem begünstigt eine zweckfremdete Ausrichtung die sog. Markenverwässerung.<sup>259</sup>

Um festzustellen, welche Ressourcen, Aktivitäten, Zielgruppen, Kommunikations- und Vertriebskanäle eine Überarbeitung erfordern, folgt ein Abgleich mit der Mission, einst festgelegten Erfolgskennzahlen oder den Jahresplänen. MOs werden nun also ihr **Soll analysieren**: Wie viele Epileptiker:innen möchte KEAF in den nächsten fünf Jahren bei ihrem Einstieg in die Berufswelt begleiten? Sollen Kurse auch außerhalb der Region Kiambu oder digital angeboten werden, damit mehr Betroffenen geholfen wird? Die Organisation beantwortet, wohin sie sich entwickeln möchte. Auf dieser Grundlage lässt sich einschätzen, welche Rolle das MCR dabei spielt. Es wird beurteilt, welche Wachstumspotenziale oder Rückschläge das MCR bergen kann und inwiefern

der betriebliche Kontext auf diesen Prozess einwirkt. Organisationen müssen also generelle und individuelle **Chancen herausarbeiten** und **Risiken bewerten**. Dabei sollten Vergleichsmaßstäbe zum Einsatz kommen; bspw. können Mitbewerber:innen mit ähnlichen Vorhaben oder frühere Rebranding-Versuche der eigenen Organisation als Anhaltspunkte dienen.

Für die KEAF verspricht ein Corporate Rebranding eine verbesserte Differenzierung gegenüber dem Verein KAWE, eine professionellere Wahrnehmung unter Dauerspender:innen, die ggf. deswegen bereit sind, künftig höhere Summen zu investieren, und eine besser automatisierte Bewerbung um Förderausschreibungen. Ein Vorteil bei der Umsetzung stellt der betriebswirtschaftliche Hintergrund ihres Vorstands und der Kursleiter:innen dar.<sup>260</sup> Es ist zu erwarten, dass sie mit strategischen Aufgaben – wie der Markenrepositionierung – betraut werden können. Im Gegensatz zur Ausgestaltung des Markenerscheinungsbildes; ihre Website und Social-Media-Auftritte legen die Vermutung nahe,<sup>261</sup> dass kreative Fähigkeiten im Team nicht vorhanden sind oder nicht genutzt werden. Das vermittelt einen ersten Eindruck davon, welche nachfolgenden Prozessschritte u. U. ausgelagert werden müssen (Outsourcing) – falls denn ein MCR durchgeführt werden soll. „Sailing against a current is difficult, especially with a craft not designed for that.“, schreibt Aaker.<sup>262</sup> Es muss abgewogen werden, ob die betrieblichen Herausforderungen unüberwindbare Barrieren darstellen oder steuerbar sind. Eventuell können langjährige Mitarbeiter:innen in einer angestoßenen Debatte den Erfolg des MCR in ihrem Organisationskontext besser einschätzen als rotierende Führungskräfte.

Sofern die **Entscheidung getroffen** wird, gilt das MCR hiermit als eingeläutet. Nur wenige Theoriemodelle und Autoren: Autorinnen – darunter *Vinjamuri* und *Khosravizadeh et al.* – erwähnen den Abgleich dieser Argumente und die bewusste Entscheidung für den Prozess.<sup>263</sup>

### Planen

Auch verwandte Konzepte in der Literatur sehen als nächstes die Planungsphase vor. Ausnahmen finden sich bei *Tevi und Otubanjo* und *Lomax et al.*, die keine grundsätzliche Abgrenzung zur Umsetzungsphase treffen.<sup>264</sup> *Khosravizadeh et al.* stellen der strategischen Neuausrichtung jedoch die Umbenennung und -gestaltung der Unternehmensmarke voran, auch bei *Ahonen* erscheint die Zuordnung der einzelnen Prozessschritte zu ihren übergeordneten Phasen willkürlich.<sup>265</sup>

<sup>260</sup>Vgl. Kiserem Epilepsy Awareness Foundation 2019a.

<sup>261</sup>Insb. negativ auffallend sind Satzbau, sprachlicher Ausdruck sowie Rechtschreibfehler, Bildauflösung und inkonsequente Nutzung von Logo(s) und Farben. Siehe auch Anhang K.

<sup>262</sup>Aaker 1991, S. 219.

<sup>263</sup>Siehe Khosravizadeh et al. 2021, S. 958ff. und Vinjamuri 2004, S. 6ff.

<sup>264</sup>Siehe Lomax et al. 2002, S. 9 und Tevi und Otubanjo 2013, S. 89-92.

<sup>265</sup>Siehe Ahonen 2008, S. 33-36 und Khosravizadeh et al. 2021, S. 958ff. Wie in Kap. 2.1.3 erläutert, führt Ahonen sowohl Prozesse der Umstrukturierung und -positionierung als auch der Umgestaltung unter der Planungsphase an und er benennt lediglich den Relaunch als Bestandteil der Implementierungsphase.

<sup>256</sup>Vgl. Blenko et al. 2019; vgl. Fueglistaller et al. 2019, S. 141, S. 159; vgl. Hahn 2021, S. 28ff.

<sup>257</sup>Ein Beispiel ist das Social Entrepreneurship Canvas von Hahn [siehe Hahn 2021, S. 57ff.].

<sup>258</sup>Vgl. Kiserem Epilepsy Awareness Foundation 2019a.

<sup>259</sup>Vgl. Schmidt 2020a, S. 85-88.



Die vorliegende Forschungsarbeit ordnet dieser zweiten Phase mehrere Schritte zu, die in keinem der anderen Theorie-Modelle ausdrücklich zur Sprache kommen: Befürwortende einbinden, Team aufstellen, Mittel bereitstellen, Regelwerk vereinbaren.<sup>266</sup>

Für die Umsetzung dieser Phase ist das obere und mittlere Management hauptverantwortlich. Es ist von einem mehrwöchigen Zeitraum auszugehen.

Als erstes sollte die Organisation den **Rahmen definieren**, in dem sie das MCR ausführen möchte. Lomax et al. heben unter diesem Punkt hervor, dass es Managern:Managerinnen gelingen muss, Umfang und Komplexität des Vorhabens sowie Fachkenntnisse und Fertigkeiten ihrer Teams realistisch einzuschätzen und Unvorhersehbares einzuplanen.<sup>267</sup> Das MCR-Prozessmodell orientiert sich an diesen Grundzügen und schlägt vor, die W-Fragen zu beantworten: „Wo und was (nicht)?“ bezieht sich auf die Bereiche und Elemente der Unternehmensmarke, die ein Rebranding durchlaufen sollen. Globale Marken halten an dieser Stelle fest, welche Länderzweige betroffen sind. Tendenziell gelten etablierte und erfolgreiche Marken als risikoscheuer, große Veränderungen einzuläuten.<sup>268</sup> Vielleicht kann bereits hier eine Einschätzung getroffen werden, was vom Rebranding verschont bleiben soll – wie etwa der Markenname.

„Wann?“ beantwortet, zu welchem Zeitpunkt das MCR stattfinden soll. Grundsätzlich erzielen Organisationen, die das Rebranding von einer personellen Veränderung begleiten lassen, eine höhere Erfolgsquote.<sup>269</sup> Sofern ohnehin ein Führungswechsel ansteht, empfehlen Durham und Duffet, diesen vor Prozessbeginn durchzuführen und die neuen Arbeitskräfte direkt in das MCR einzubinden.<sup>270</sup> Das greift der Frage „Wer?“ vorweg und doch sei nochmals angemerkt, dass langjährige und freiwillige Mitarbeiter:innen einen unschätzbaren Einfluss auf die Prozessergebnisse und interne Akzeptanz der neuen Unternehmensmarke nehmen und gleichermaßen beteiligt werden sollten. Weitere Aussagen zur Teamaufstellung werden unter den nachfolgenden Punkten gemacht.

Außerdem werden unter diesem Prozessschritt Gedanken zum Outsourcing, Co-Branding und anderen strategischen Kooperationen ausgeführt.

Der Zeitraum („Wie lange?“) und das Budget („Wie viel?“) werden festgelegt und mit dem zuvor beschriebenen Vorhaben („Wo und was?“) in Einklang gebracht. Für

<sup>266</sup>Wenngleich dort die Bedeutung des Buy-in und der Finanzmittel angeschnitten werden: Ahonen [S. 35-36], Lomax et al. [S. 1, S. 5-7], Muzellec und Lambkin [S. 814-815, S. 820] und Tevi und Otubanjo [S. 89-92] erwähnen zwar (sinngemäß) die Co-Creation der Unternehmensmarke mit den Mitarbeitenden und die Bedeutung von Zielen und Mitteln, jedoch nicht das Einrichten einer dedizierten Abteilung, Budgets oder von Erfolgskennzahlen. Es macht zudem den Anschein, als würden Lomax et al. Mitarbeitende aus der Strategiefindung ausgrenzen und nur an der Umsetzungsphase beteiligen [siehe S. 5-7]. Vinjamuri erwähnt lediglich, dass die organisationsinternen Marketeers mit dem Branding beauftragt werden könnten oder dass die wichtigsten Stakeholder:innen der Neupositionierung zustimmen sollten [siehe S. 7, S. 12].

<sup>267</sup>Vgl. Lomax et al. 2002, S. 9.

<sup>268</sup>Vgl. Kylander und Stone 2012, S. 41.

<sup>269</sup>Vgl. Durham und Duffett 2014, S. 24-25.

<sup>270</sup>Vgl. ebd.

MOs, die über kein Kapital verfügen können, muss das nicht zwangsläufig das Ende ihres MCR bedeuten: ihnen stehen dennoch zahlreiche, kreative Maßnahmen zur Verfügung.<sup>271</sup> Sie werden in den nachfolgenden Prozessschritten angedeutet.

Zuletzt werden sowohl zeitliche als auch finanzielle Spielräume einkalkuliert, damit Innovation und Lerneffekte möglich werden.

Wie in Kapitel 2.2.2 erläutert, werden Führungskräfte nun für den bevorstehenden Prozess sowohl kurz- und langfristige, als auch quantitativ oder subjektiv messbare, qualitative **Ziele setzen** und dokumentieren. Sie können bspw. nach Muss-/Soll-/Kann-Zielen priorisieren. Das Bestimmen von Erfolgsindikatoren erfolgt zu einem späteren Zeitpunkt unter Einbeziehen der Beschäftigten, denen schließlich die Umsetzung des MCR obliegt

Bevor das Vorhaben intern und offiziell angekündigt wird, sollten MOs **Befürwortende einbinden**, die als Fürsprecher:innen die Akzeptanz des MCR unter den Mitarbeitenden ankurbeln, Widerstände abfangen und künftig auch die neue Markenidentität vorleben.

Am Beispiel der KEAF könnte der vierköpfige Vorstand, allen voran *Fred Kiserem*, die Fürsprache übernehmen. Ein großer Vorteil der Organisation ist, dass die Führungskräfte so eng am operativen Alltag beteiligt sind.<sup>272</sup> Dennoch sollten auch Mitarbeitende der unteren Hierarchieebenen, die vielleicht aufgrund ihrer Erfahrung oder Dauer ihrer Tätigkeit eine Schlüsselfunktion erfüllen, eingebunden werden.

Die Befürwortenden sind nicht mit Markenbotschaftern:botschafterinnen gleichzusetzen; diese werden erst zu einem deutlich späteren Zeitpunkt relevant, wenn es darum geht, die neue Unternehmensmarke auf dem externen Zielmarkt zu präsentieren.

Der nächste Prozessschritt birgt einige Herausforderungen: Organisationen müssen ihr **Vorhaben intern kommunizieren**, und zwar auf eine Weise, die dem betrieblichen Kontext gerecht wird, Motivation erzeugt und eine realistische Erwartungshaltung herstellt. Die Forschungsarbeit empfiehlt daher, wie folgt vorzugehen: Es wird ein offizielles und organisationsweites (u. U. digitales oder hybrides) Meeting angekündigt, seine Inhalte werden bis dahin zurückgehalten. Zur Vorbereitung kann ein Fragenkatalog erarbeitet werden. Zu Beginn der Versammlung werden die Herkunft und das Vermächtnis der Unternehmensmarke gewürdigt und Hintergründe des Rebranding ausführlich dargelegt. Der Zusammenhang zur Mission wird hergestellt und Vorurteile gegenüber derartig kommerziellen Marketingpraktiken abgefangen. Es darf in Aussicht gestellt werden, welche Erfolge die neue Marke verzeichnen soll und welche Bereiche, Elemente oder Werte keiner Änderung unterliegen werden. Indem die Organisation bereits in einem so frühen Stadium die zu erwartenden Hürden benennt, stellt sie Vertrauen

<sup>271</sup>Vgl. Chapleo 2015, S. 1, S. 13, S. 18; vgl. Parker und Parker 2013, Kap. „Preface“.

<sup>272</sup>Vgl. Kiserem Epilepsy Awareness Foundation 2019a, 2019b; vgl. Lang 2019.

unter ihren Arbeitskräften her und kann Einfluss auf die spätere Frustrationstoleranz nehmen. Es muss ein Dialog eröffnet werden, in dem die Mitarbeitenden ihre Sorgen und Vorschläge einbringen können. Widerstände werden ernstgenommen und von den Führungskräften oder Befürwortenden beantwortet. Im Anschluss an das Meeting folgt eine schriftliche Zusammenfassung, auch um Spekulationen unter den Nicht-Anwesenden vorzubeugen.

Erst jetzt sollten Organisationen ein **Team aufstellen**, das weitgehend für die Umsetzung, Kontrolle sowie interne und externe Kommunikation des MCR zuständig ist. Diese dedizierte Abteilung kann eine Ergänzung zur externen Beratung – sofern eine beauftragt wird – darstellen. Die Aufgabe des Teams ist es nicht, das Rebranding alleinverantwortlich durchzuführen, viel eher vertritt es die Unternehmensmarke. Damit keine Einzelinteressen verfolgt werden und Synergien entstehen können, sollte es heterogen zusammengesetzt werden. Die Aufgaben werden zugeteilt und ihre Träger:innen geschult.

Bei der KEAF könnte es schwierig werden, die Rolle von *Fred Kiserem* zu definieren, weil die Unternehmensmarke sehr eng an ihn gebunden ist. Das wirft auch die Frage auf, wie andere Teammitglieder von ihrem Mitspracherecht unvoreingenommen Gebrauch machen können. Ergänzend zu *Kiserem* sollten funktionsübergreifend ehrenamtliche und bezahlte Mitarbeitende auch außerhalb von Vorstand und Management eingebunden werden – bspw. aus den Entrepreneurship- und Computerkursen.

Die Führungskräfte werden Sach- und finanzielle **Mittel bewilligen**, damit sowohl strategische als auch kreative Aufgaben des MCR realisierbar werden.

Die KEAF könnte Kursräume, sowie Tafeln, Computer und EDV-Programme bereitstellen. Eine Software, mit der später Grafiken kostenlos, ohne Vorkenntnisse und zeitgleich im Team erstellt werden können, ist *Figma*.<sup>273</sup> Es gibt weitere Ressourcen, auf die MOs umsonst oder über kooperierende Institutionen – wie die ECA – zugreifen können.

Die Organisationen müssen ein **Regelwerk vereinbaren**, das Fragen zur Zusammenarbeit unter den Prozessbeteiligten, zur Erfolgsmessung und zum Umgang mit Problemen und Fristen beantwortet. U. a. wird festgehalten, in welchem Rhythmus und Setting Meetings stattfinden, wie oft an die Führungsebene und andere Mitarbeitende berichtet wird, was bei Überschreitungen des festgelegten Rahmens passiert, wie langfristige Ziele heruntergebrochen und qualitative Ziele messbar gemacht werden können.

Die KEAF ist zu einem Großteil von Spenden abhängig und es mag naheliegen, den Erfolg des MCR hiernach zu messen. Der Einfluss von Branding auf Fundraising darf jedoch nicht überschätzt werden; in den meisten Fällen gibt es keinen direkten Zusammenhang oder er lässt sich aufgrund der Vielzahl von Faktoren, die auf das Spendenverhalten einwirken, nicht herausarbeiten.<sup>274</sup> Eine deutlich größere Errungenschaft könnte sein, dass Epileptiker:innen ihren Zustand

als eine unverschuldete und behandelbare Krankheit begreifen. Neben diesem langfristigen Ziel können kurz- und mittelfristige Erfolge, wie die Markenassoziation über Befragungen unter Kursteilnehmenden und Ortsansässigen, gemessen werden.

### Umsetzen

Die Zeitspanne zwischen offiziell dem Startschuss für das MCR und Relaunch der Unternehmensmarke wird als „Umsetzung“ bezeichnet. Sie kann Arbeitskräfte sämtlicher Hierarchieebenen involvieren. Sie stellt die aufwendigste Phase im Prozess dar und kann mehrere Monate, u. U. sogar Jahre, in Anspruch nehmen. Länger dauert nur der sich anschließende Abschnitt „Leben“, der aber deutlich passiver von der Organisation gestaltet wird, und das zu jeder Phase simultan verlaufende „Kontrollieren“.

Charakteristisch für die Umsetzungsphase sind die hohe Einbindung interner und externer Stakeholder:innen in den Schaffensprozess, die Entwicklung des Markenerscheinungsbildes und die Schulung des Personals, um die neue Marke nach außen zu tragen. Diese Aspekte tauchen auch bei *Ahonen, Khosravizadeh et al., Lomax et al., Muzellec und Lambkin, Tevi und Otubanjo* und *Vinjamuri* auf.<sup>275</sup> Auch andere Prozessschritte – z. B. der Markttest – sind erfolgsentscheidend für das MCR, sie werden aber von den wenigsten Autor:innen genannt. Lediglich *Vinjamuri* hebt die Testphase hervor, jedoch soll diese bereits vor der Umgestaltung und Entwicklung der Kernbotschaften stattfinden,<sup>276</sup> sodass ein essenzieller Teil der Marke gar nicht vom Testmarkt beurteilt wird.

Als erstes werden die MCR-Verantwortlichen die **Identität betrachten**, die ihre Unternehmensmarke einzigartig macht. Auch dieser Prozessschritt kann herausfordernd sein, weil der Spagat zwischen Herkunft und Loyalität gegenüber der Marke und Relevanz für den aktuellen und künftigen Zielmarkt gelingen muss. Gerade in der heutigen Zeit, in der externe Bezugsgruppen immer größeren Einfluss auf die Marke nehmen, kann eine Anpassung notwendig sein.<sup>277</sup> Sofern es zu einer Neuformulierung kommen soll, wird diese aus der Mission abgeleitet und schlägt im besten Fall eine Brücke zwischen Altem und Neuem. Die Identität kann – so auch am Beispiel der KEAF – eng mit den Werten ihres:ihres Gründers:Gründerin verwurzelt sein und lässt sich nicht autonom von neuen Mitarbeitenden oder Agenturen umsetzen.<sup>278</sup>

Es folgt eine erneute Analyse; die MOs sollten ihren **Markt untersuchen** – dieses Mal jedoch, um konkrete Schritte zur Markenpositionierung und -persönlichkeit abzul-

<sup>275</sup>Lomax et al. unterteilen die Stakeholder:innen weiter nach Projekt Leadership, Mitarbeitenden, Kunden:Kundinnen und Agenturen [2002, S. 5-9]. Khosravizadeh et al. erwähnen u. a. das Logo-Design [2021, S. 958] und Tevi und Otubanjo ordnen allen Prozessschritten grafisch das Internal Branding über [2013, S. 91].

<sup>276</sup>Siehe *Vinjamuri* 2004, S. 9.

<sup>277</sup>Vgl. Kap. 2.1.1 sowie *Schultz und Hatch* 2003, S. 20.

<sup>278</sup>Vgl. *Iftekharruddin* 2011, S. 68-69. *Chad* spricht auch von „Corporate Memory“ [*Chad* 2016, S. 20].

<sup>273</sup>Vgl. *Figma, Inc.* n. d.

<sup>274</sup>Vgl. *Durham* 2015; vgl. *Finisterra do Paço et al.* 2014, S. 14.

ten. Dafür richten sie den Blick auf ihre Zielgruppen, Mitarbeiter:innen, und andere Vergleichsmaßstäbe (wie vorbildliche Organisationen).

Bei einem Vergleich der KEAF mit KAWÉ kann festgestellt werden, dass beide Organisationen sehr ähnliche Zielgruppen, Angebote und Gestaltungselemente haben. Ähnlichkeiten sind sogar bei Ansprache, Design und Farbwahl auffallend; bspw. verwenden beide NPOs lilafarbene Uniformen, Flyer und Webauftritte.<sup>279</sup> Ein Vorteil der Ähnlichkeit liegt darin, dass die KAWÉ als Referenzpunkt dienen kann und sich ihre Abläufe studieren lassen: Wie werden die Mitglieder auf die Organisation aufmerksam gemacht? Wie kommuniziert die KAWÉ ihren Markennutzen, welche Veranstaltungen initiiert sie und wie pflegt sie ihre Beziehungen zu den Spendern:Spenderinnen? Gute Einblicke erhält eine MO vielleicht, indem sie gegenüber einer anderen als Interessentin auftritt oder sie bezuschusst. Auf all diesen Erfahrungswerten lässt sich aufbauen.

Ein weiterer Baustein sind die Leistungsabnehmer:innen: Bei der KEAF wird deutlich, dass die Organisation verschiedene Logos, Wortlaute und sogar Namen nutzt.<sup>280</sup> Über eine Befragung des Zielmarkts lässt sich herausfinden, welche Assoziationen diese Elemente erwecken. Eine globale Marke muss in diesem Punkt sehr sorgfältig vorgehen und je nach kulturellem Hintergrund ihre Märkte einzeln untersuchen.<sup>281</sup>

Ein Vorteil ist, dass sich die KEAF aufgrund ihrer Kursangebote sehr nah an den Leistungsabnehmenden bewegt, was auch dem nächsten Schritt zugute kommt: MOs sollten ihre internen und externen **Bezugsgruppen integrieren**. Je nach Grad der Abhängigkeit können hierunter sogar Partner:innen und Förderer:Förderinnen zählen, obwohl das zu einem zunehmend komplexeren Unterfangen führt. Es muss ein Kompromiss zwischen Marken-Diktatur und -Anarchie gefunden werden, durch den weder die Marktausrichtung noch -identität verleugnet wird. Dafür müssen die Bezugsgruppen unbedingt priorisiert werden. Manchen darf mehr Mitspracherecht eingeräumt werden. Die Co-Creation kann eher passiv (bspw. durch Feedback-Schleifen) oder aktiv (bspw. durch Ideenwettbewerbe oder bei der gemeinsamen Entwicklung einer neuen Dienstleistung) stattfinden. Unter diesem Prozessschritt sollten auch Kommunikationswege vereinbart werden – wie Meetings, Intranets und E-Mail-Verteiler. Es muss u. a. berücksichtigt werden, ob die Bezugsgruppen über einen Internetzugang verfügen und wo sie ansässig sind. Wie sich zeigt, können die Mitglieder der KEAF insb. über Social Media erreicht werden.

Als nächstes müssen MOs ihre **Positionierung überarbeiten**. Laut *Vinjamuri* geht es darum, zu betonen, welche Kernkompetenzen die Organisation hat, was sie von ihren Mitbewerbern:Mitbewerberinnen unterscheidet und wie die

Differenzierungsmerkmale an die Zielgruppe kommuniziert werden können. All diese Aspekte bringt das *Brand Positioning Statement* zum Ausdruck: „[Marke X] ist die beste [Kontext] für [Kernzielgruppe] um [wesentlicher Unterschied], weil [Begründung für den Unterschied].“<sup>282</sup> *Schmidt* merkt an, dass ein solches Statement nur zur internen Nutzung dienen und grafisch ergänzt werden soll<sup>283</sup> – zum Beispiel durch ein Netzdiagramm, das die wichtigsten funktionalen und emotionalen Nutzenbündel der eigenen MO und vergleichbarer Organisationen bewertet. Mehrere Quellen warnen aber vor dem Versuch, für jede:n (potenzielle:n) Kundin:Kunden alles sein zu wollen. Der Erfolg liegt in der Reduktion: „Would you rather get a large number of people vaguely aware that you exist - or get a smaller number of people to actually make a donation?“<sup>284</sup> *Es* kommt auf die Intensität, nicht auf die Quantität der Kunden:Kundinnenbeziehungen an. Organisationen sollten zudem nur wenige Attribute, diese dafür einprägsam, kommunizieren.

Am Beispiel der KEAF könnte das Statement wie folgt lauten: „Die *Kiserem Epilepsy Awareness Foundation* ist die Ausbildungs- und Anlaufstelle für Epilepsie-Kranke in Kiambu, um persönliche, maßgeschneiderte Kurse und Gesundheitsleistungen in Anspruch zu nehmen und ein Leben in der Community aufzubauen, weil die Angebote der Organisation von Menschen, die den selbstbewussten Umgang mit Epilepsie vorleben, entwickelt und umgesetzt werden.“ Beim Vergleich zur KAWÉ zeigt sich nämlich gerade das: Ein Alleinstellungsmerkmal ist es, dass *Fred Kiserem* und ein Teil seines Teams selbst an Epilepsie erkrankt sind. Die Mitarbeitenden der KAWÉ hingegen scheinen zwar einen unternehmerischen Hintergrund, aber kaum einen persönlichen Bezug zur Krankheit zu haben.<sup>285</sup> Dieser Vorteil ihnen gegenüber darf herausgearbeitet werden und sämtliche Maßnahmen vorgeben. Er zeigt auch auf, welche Leistungen der Organisation hintenangestellt werden sollten – wie die Fundraising-Betreuung anderer MOs, die keineswegs auf den im Statement geschilderten Markennutzen einzahlt.

Durch die Persönlichkeit tritt die Identität der Unternehmensmarke nach außen. Wenn Organisationen nun ihre **Persönlichkeit anpassen**, achten sie darauf, dass sie der erarbeiteten Markenpositionierungsstrategie gerecht werden. Das lässt sich gut anhand der KEAF erklären: Es wurde erarbeitet, dass die NPO einen sehr persönlichen und individuellen Ansatz im Umgang mit Epileptikern:Epileptikerinnen verfolgt. Es wäre also hinderlich, standardisierte Angebote, eine sachliche, distanzierte oder automatisierte Ansprache, einen hochtrabenden Wortschatz und kühle Farben zu wählen.

Um sich einen Eindruck davon zu verschaffen, wie die Zielgruppe fühlt, denkt und handelt, sollte eine Persona entwickelt werden. Mit ihr wird ein:e Kernkunde:kundin – bspw.

<sup>279</sup>Siehe Kenya Association for the Welfare of People with Epilepsy n. d. a, n. d. b; Kiserem Epilepsy Awareness Foundation 2019a, 2019c, 2022. Siehe auch Anhang K.

<sup>280</sup>Es tauchen zusätzlich auf: Kiserem Epilepsy Foundation, Kiserem Foundation, Kiserem Epilepsy Center [siehe *FemmeHub* 2021 und Kiserem Epilepsy Awareness Foundation 2019c, 2019e].

<sup>281</sup>Vgl. Aaker 1991, S. 229.

<sup>282</sup>Vgl. *Vinjamuri* 2004, S. 7-8.

<sup>283</sup>Vgl. *Schmidt* 2020a, S. 23-26.

<sup>284</sup>*Brooks* 2013. Vgl. auch *Albisser* 2022, S. 44; *Parker und Parker* 2013, Kap. 2 „Ignition Points“ ff. und *Schmidt* 2020a, S. 83.

<sup>285</sup>Siehe Kenya Association for the Welfare of People with Epilepsy n. d. a und Kiserem Epilepsy Awareness Foundation 2019a.

eine Spenderin oder ein Nutzer – detailliert beschrieben. Der Steckbrief enthält Angaben zu Geschlecht, Alter, Wohnort, Ausbildung, Einkommen, Vorlieben u. m.<sup>286</sup> Es ist einfacher, mit einem Blick auf die Persona, Kommunikationsmaßnahmen und Preise festzulegen oder Markenerlebnissen zu kreieren, statt hypothetische Annahmen zu treffen.

Beim sog. emotionalen Branding geht es darum, menschliche Marken zu entwickeln, damit sich ihre Zielgruppen bestmöglich mit ihnen identifizieren und erwiesenermaßen langfristige Beziehungen aufbauen können.<sup>287</sup> Die KEAF ist fürsorglich, vertrauenswürdig, integer, sympathisch, zugänglich und erfahren. Nachdem ihre Persönlichkeit formuliert wurde, müssen alle Touchpoints, an denen sie erlebbar wird, untersucht werden: Wäre unsere Persona an den Kursen interessiert? Sind sie bezahlbar? Welchen Zahlungsvorgang wünschen sich unsere Spender:innen? Sollten wir unseren Service eher über *WhatsApp*, statt per E-Mail anbieten? Sind die Informationen auf unserer Webseite angemessen? Unter dieser letzten Frage wäre auch zu beurteilen, ob die Verwendung von urheberrechtlich geschützten *Shutterstock*-Videos im Blog oder die explizite Darstellung von Gewalt gegenüber einem KEAF-Mitglied wirklich in Einklang mit dem angegebenen Wert „Integrität“ steht.<sup>288</sup> Die Markenpersönlichkeit macht sich eben nicht nur in schnell formulierten Leitbildern, sondern im Detail und über eine Reihe von Ereignissen bemerkbar. Alle Touchpoints müssen aufeinander abgestimmt und die Kernbotschaften über einen langen Zeitraum hinweg kommuniziert werden können. Es muss geprüft werden, ob es sinnvoll ist, in diesem oder den anschließenden Prozessschritten externe Hilfe in Anspruch zu nehmen: Welchen Wert liefert schließlich eine Agentur, die Flyer druckt, einen Markenguide erarbeitet oder Social-Media-Beiträge vorformuliert, wenn die MO nicht über die Ressourcen verfügt, diese Maßnahmen im Anschluss auch selbstständig und über die Jahre hinweg umzusetzen?

Es wird die Verzahnung mit dem nächsten Punkt deutlich: Organisationen werden nun ihre geplanten **Maßnahmen realisieren**. Dabei handelt es sich um den umfangreichsten Schritt im Prozessmodell. Die Möglichkeiten, die den MOs zur Auswahl stehen, sind so individuell wie ihre Persönlichkeiten. Es lassen sich nicht alle erfassen, weshalb nur einzelne Optionen am Beispiel der KEAF geschildert werden:

Storytelling ist ein wesentlicher Bestandteil des emotionalen Marketing und ein erfolgsversprechender Ansatz, um die persönlichen und praxisnahen Leistungen der KEAF zu betonen. Mit Storytelling gelingt es, Fakten zur Organisation in eine narrative Struktur einzubetten, um das Engagement sowie Identifikations- und Lernprozesse der Zielgruppe zu fördern.<sup>289</sup> Das könnte z. B. so aussehen, dass aus den über hunderttausend Epilepsie-Kranken in Kenia<sup>290</sup> drei Schicksa-

le, denen die KEAF einen Berufseinstieg ermöglicht hat, herausgegriffen und mit Bildern und Interviews auf der Webseite und in den Kursräumen abgebildet werden. Das kann nicht nur einer Compassion Fatigue vorbeugen, sondern verdeutlicht den Fördernden die Mission und Erfolge der Organisation und drückt gegenüber den Betroffenen Verständnis und Annahme aus.

Eine weitere Möglichkeit könnte es sein, jedem: jeder Spender:in eine Paten:Patinnenschaft mit einem erkrankten KEAF-Mitglied anzubieten, dessen Ausbildungskosten übernommen werden sollen. Über die Dauer der Förderung wird die Beziehung über Fortschrittsberichte zur betreuten Person und den persönlichen Austausch hochgehalten.

Die Beziehung zu den Mitgliedern auf der anderen Seite kann durch Markenerlebnisse in der sog. Brand Community gepflegt werden – bspw. durch kursübergreifende Spieleabende und Wettbewerbe oder online in Foren.<sup>291</sup> Hierfür können auch Up- oder Cross-Selling-Strategien zum Einsatz kommen – bspw. durch Paketpreise mehrerer Kurse.

Um die Organisation neuen Zielgruppen näher zu bringen, eignen sich Tage der offenen Tür, Podiumsdiskussionen oder Social-Media-Lifestreams, bei denen *Fred Kiserem* persönlich auftritt. Dass die KEAF inhaltlich und namentlich so eng mit ihm verwurzelt ist, trägt maßgeblich zu ihrer Wahrnehmung als vertraute und vertrauensvolle Organisation und Kooperationspartnerin bei. Daher sollte keine Maßnahme – etwa die Umbenennung – ergriffen werden, die diese Assoziation zwischen KEAF und *Kiserem* beeinträchtigt.

Unter dem vorliegenden Prozessschritt könnte auch das Markenerscheinungsbild überarbeitet werden. Fehlerhafte Logos und irrtümliche Nennungen der Organisation sollten entfernt werden. Bislang ist das kenianische Logo grundsätzlich in Einklang mit der oben erarbeiteten Positionierungsstrategie, wenngleich es das Alleinstellungsmerkmal der KEAF – ihren persönlichen Ansatz – besser unterstreichen könnte; bspw. durch abstrakte Silhouetten oder Profile der Afrikaner:innen. Sollte die Organisation eine Globalisierung anstreben, stünde das Logo vor einer grundsätzlichen Überarbeitung.

Auch die Webseite müsste dringend und insb. auf Usability, Wortlaut und Rechtschreibfehler geprüft werden.<sup>292</sup>

Zuletzt könnte es auch sinnvoll sein, (erstmalig) einen Slogan zu kreieren, der die Tätigkeitsfelder oder Zielgruppen der KEAF eingrenzt, da der Name der Organisation allein nur wenig aussagekräftig ist; bspw. „Empowering individuals. Educating society.“ oder „We give people living with epilepsy a voice and a future.“.

Es zeigt sich, dass MCR auch ohne KI, Augmented Reality Apps und andere technische Errungenschaften oder den Einsatz von viel Budget möglich ist.

<sup>286</sup>Vgl. Parker und Parker 2013, Kap. 10 „Demographically yours“.

<sup>287</sup>Vgl. Mirzaei et al. 2021, S. 188, S. 195; vgl. Schmitt 2012, S. 10-12.

<sup>288</sup>Siehe Kiserem und Lang 2019 und Kiserem Epilepsy Awareness Foundation 2019c.

<sup>289</sup>Vgl. Serrat 2008, S. 1.

<sup>290</sup>Dabei handelt es sich um eine veraltete Dunkelziffer, da die Angaben zu

Epilepsie-Kranken zwischen 10.000 und einer Million schwanken. Nur ein Bruchteil der Betroffenen ist registriert [vgl. Kariuki 2017; vgl. World Health Organization Africa (WHO) 2014].

<sup>291</sup>Vgl. Schmitt 2012, S. 11, S. 13

<sup>292</sup>Siehe z. B. „(...) empower our members to become better people“, die Satzabbrüche, fehlenden Quellenangaben und Auswahl der Zahlungsmittel [siehe Kiserem Epilepsy Awareness Foundation 2019c, 2019d].



Da Organisationen die Motivation ihrer Mitarbeitenden über den langwierigen Prozess aufrechterhalten wollen und ohnehin nicht lange auf die frühen Erfolge des MCR warten müssen,<sup>293</sup> sollten sie ihre **ersten Ergebnisse mitteilen**, Wertschätzung ausdrücken und einen Ausblick auf die letzten Meter bieten. Dies kommunizieren sie nicht nur gegenüber den Beteiligten, sondern auch den übrigen Arbeitskräften, Partnern:Partnerinnen, vielleicht sogar Großspendern:spenderinnen. Nichtsdestotrotz muss beachtet werden, dass die entwickelten Maßnahmen noch keinen Markttest überstanden haben und ggf. vor einer Anpassung stehen. Statt des vermeintlich neuen Logos könnte bspw. mitgeteilt werden, dass bereits jetzt eine höhere Produktivität und Kohäsion oder ein gestiegenes Interesse der Mitarbeitenden an den Unternehmenszielen erkennbar werden.

Dann folgt die Reifepfung des MCR: Organisationen werden ihre entwickelte **Marke testen und ausbessern**, um herauszufinden, ob ihre Zielgruppe u. a. die Kernbotschaften, das neue Portfolio oder Logo versteht und sie glaubwürdig und ansprechend findet.<sup>294</sup> Organisationen grenzen dafür ihre Zielmärkte ab, legen Testbedingungen fest und wählen eine geeignete quantitative oder qualitative Forschungsmethode aus. Dieser Schritt kann professionell über eine Marktforschungsagentur, aber auch im kleinen, internen Rahmen umgesetzt werden.<sup>295</sup> Die Kursleiter:innen der KEAF könnten bspw. im Anschluss an ihren Unterricht das neue Leitbild und den Slogan an die Wand projizieren und eine Fokusgruppe initiieren. Ergänzen lässt sich diese um eine Umfrage unter *Facebook*-Abonnenten:Abonnentinnen, aber auch Personen auf der Straße, die in keinem Bezug zur KEAF stehen.

Sofern der Markttest nicht die erhofften Erfolge des MCR widerspiegelt, sollten sich MOs an *Druckers* Daumenregel orientieren: „If at first you don't succeed, try once more. Then do something else“. Neue Strategien funktionieren meist nicht auf Anhieb, ergänzt *Drucker*, die Herausforderung bestehe darin, zu hinterfragen, warum dem so ist und es besser machen zu können. Manche Erfolge stellten sich erst nach zahlreichen Anläufen ein, das aber sei die Ausnahme und stünde in Konflikt mit den begrenzten Ressourcen.<sup>296</sup>

Damit die realisierten Maßnahmen ihre Wirkung entfalten und die Unternehmensmarke in den nächsten Monaten und Jahren konsistent über sämtliche Touchpoints hinweg gelebt wird, sollten MOs einen **Markenguide erstellen**. Dabei handelt es sich um ein digitales oder physisches Dokument, das alle Markenwerte und Richtlinien u. a. zur Nutzung von Layout, Farbschemata, Schriftarten, Tonfall und zum angestrebten Verhalten im Service zusammenfasst. Jeder:jede Mitarbeiter:in erhält Zugang zum Markenguide und damit auch zu den wichtigsten Materialien – bspw. Logos in Graustufen und Mustertexte.

Ein Teil des MCR-Teams wird für die Einhaltung dieser Richtlinien beauftragt und evaluiert in regelmäßigen Abständen

den die Umsetzung im Unternehmen. Auf potenzielle Unstimmigkeiten wird reagiert.<sup>297</sup>

Für die KEAF könnten die Lehrer:innen der Computerkurse den Markenguide grafisch umsetzen. Im besten Fall spiegelt er das Design der Unternehmensmarke selbst wider. Besonders wichtig wäre die Erstellung von Templates für Social-Media-Beiträge oder Spendenausschreibungen und Förderöpfe.

Der Markenguide dient auch der Verdeutlichung, wenn MOs nun ihre **neue Marke lehren**. Durch diesen Prozessschritt wird sichergestellt, dass die Mitarbeitenden ein klares Bild der Marke haben und dazu befähigt sind, im Sinne dieser zu denken und zu handeln. Nichtsdestotrotz wird dieser Schritt in deutschen Unternehmen häufig übergangen und die so ausführlich erarbeitete Strategie bleibt schlussendlich in der Schublade liegen.<sup>298</sup>

*Fred Kiserem* mag zwar eine entscheidende Rolle als Vertreter der Organisation zukommen, aber auch Lehrkräfte, Fundraiser:innen und die übrigen Mitarbeitenden verkörpern die Marke. Auch sie sollen lernen, wie sie diese in ihren unterschiedlichen Funktionen zum Leben erwecken können. Ob die gängigen Formate – darunter Intranet, Newsletter und Mitarbeiter:innenzeitschriften –<sup>299</sup> den Aufwand für die KEAF rechtfertigen, sei dahingestellt, ein persönliches Training erscheint jedoch umsetzbar: Innerhalb des Trainings wird zunächst die neue Unternehmensmarke inhaltlich als auch visuell vom MCR-Team präsentiert. Erneut werden die genauen Gründe zu den einzelnen Überarbeitungen und Erfolge hervorgehoben und die Wertschätzung an die Mitarbeitenden ausgedrückt. Mit den Teilnehmern:nehmerinnen wird anhand von Praxisbeispielen das Handlungsspektrum der Marke abgesteckt. Es geht also nicht darum, die Richtlinien um jeden Preis durchzusetzen, sondern den Organisationsmitgliedern ein Verständnis für die Marke zu vermitteln und den Umgang mit den Materialien – wie dem Markenguide – zu erleichtern. Damit entfällt auch die Notwendigkeit, jeden ihrer Außenkontakte, jeden Social-Media-Beitrag und jede Grafik zu kontrollieren. Es soll eine partizipative Form der Markenführung angestrebt werden, die auf Vertrauen aufbaut.<sup>300</sup>

### Leben

Diese vierte Prozessphase wird in keiner der herangezogenen Quellen ausreichend gewürdigt: *Vinjamuri* zählt nach der genannten Schulung keine weiteren Schritte mehr auf, *Ahonen* beschreibt, dass nach dem Relaunch lediglich die Evaluation folge und *Tevi* deutet grafisch an, dass sich aufgrund des Rebranding quasi unmittelbar ein neues Markenimage manifestiere.<sup>301</sup> Durch diese Phase aber beweist die MO, dass sie ihr

<sup>297</sup>Vgl. Chad 2016, S. 24; vgl. Kylander und Stone 2012, S. 40; vgl. Schmidt 2020a, S. 15.

<sup>298</sup>Vgl. Deutscher Markenmonitor 2021e.

<sup>299</sup>Vgl. Deutscher Markenmonitor 2021c.

<sup>300</sup>Vgl. Kylander und Stone 2012, S. 40-41.

<sup>301</sup>Siehe Ahonen 2008, S. 35 *Tevi* und Otubanjo 2013, S. 90-92 und Vinjamuri 2004), S. 11-12. Es sei auch erneut darauf verwiesen, dass die Imagebildung nicht so direkt beeinflusst werden kann [vgl. Kap. 2.1.3].

<sup>293</sup>Vgl. Durham und Duffett 2014, S. 20-21.

<sup>294</sup>Vgl. Vinjamuri 2004, S. 8-9.

<sup>295</sup>Vgl. ebd.

<sup>296</sup>Vgl. Drucker 1990, S. 54. Zitat auf Seite 54.

Markenversprechen einlöst und die neue Unternehmensmarke nicht nur eine schöne Hülle ist. Nur sofern ihr das gelingt, können Loyalität und langjährige Kunden:innenbeziehungen aufgebaut und erhalten werden.<sup>302</sup>

Insofern kann diese Phase mehrere Jahre dauern, bis nämlich der MCR-Prozess von neuem beginnt. Branding ist schließlich die konstante Einflussnahme auf die Wirkungsperspektive der Marke und somit wohl nie gänzlich abgeschlossen.<sup>303</sup>

Es handelt sich bei ihr um die erste Phase, die absolut jeden:jede Mitarbeiter:in betrifft.

Da ihre Ausgestaltung hochindividuell ist, bildet das Prozessmodell nur die drei Schritte ab, die jede MO durchlaufen sollte – begonnen mit dem Relaunch:

Wie in Kapitel 3.1 erläutert, kann ein mehr oder weniger offensiver Ansatz gewählt werden, mit dem Organisationen ihre neue **Marke extern kommunizieren**.

Da davon auszugehen ist, dass die externen Bezugsgruppen der KEAF bereits vom MCR erfahren haben – aufgrund ihrer Beteiligung am Prozess oder der engen Beziehung untereinander und zur Organisation (siehe „Bezugsgruppen integrieren“) – sollten die Prozessergebnisse proaktiv präsentiert werden. Für die KEAF wurden eher subtile Rebranding-Maßnahmen empfohlen – wie die Slogan-Entwicklung, Website-Überarbeitung und Ausgestaltung von Markenerlebnissen. Nichtsdestotrotz könnte die Neupositionierung der Organisation insb. Fragen der Vertraulichkeit unter Mitgliedern aufwerfen: Die KEAF will persönlicher werden und dafür u. a. Tage der offenen Tür und Medienauftritte initiieren, Spender:innen mit Erkrankten vernetzen und Leidens- wie Erfolgsgeschichten der Epileptiker:innen zugänglich machen. Somit können sich auch die Wahrnehmung der einzelnen Mitglieder in der Öffentlichkeit und ihr enger Bezug zur KEAF verändern. Ihnen muss unbedingt vermittelt werden, dass die KEAF, obwohl sie neue Zielgruppen erschließen und sich professionalisieren will, dem engen und individuellen Austausch mit ihren Mitgliedern treu bleiben, ihn sogar ausbauen wird. Es muss kommuniziert werden, dass die Öffentlichkeitsarbeit den Anliegen von Epileptikern:innen zugute kommt und dass Datensicherheit gewährleistet wird; kein Mitglied wird unwillentlich zur Schaubühne. Der Relaunch gegenüber Mitgliedern könnte im Rahmen von Unterrichtseinheiten oder Community-Events stattfinden. Vielleicht lässt sich ein „Launch Day“ in der Schule organisieren, um einzelne Maßnahmen vorzuführen und die für die Teilnehmenden relevanten Veränderungen zu erläutern. Der Dialog wird angeregt und Beschwerden und Widerstände gegen die neue Marke angenommen.

Für Organisationen, die aufgrund ihrer Bekanntheit und der Umsetzung weniger subtiler Maßnahmen – wie der Umbenennung oder internationalen Expansion – mehr Öffentlichkeitsinteresse erwecken, stellt die externe Kommunikation des MCR eine größere Herausforderung dar: Sie sollten ihren früheren Namen und die daran geknüpften Werte

nicht abrupt verbannen, sondern die Bezugsgruppen allmählich mit dem neuen Look vertraut machen und signalisieren, dass die Markenversprechen erhalten bleiben. Dafür können Markenbotschafter:innen zum Einsatz kommen – wie Kunden:Kundinnen, die sich stark mit der Marke identifizieren und sie gegenüber Dritten empfehlen. Durch Programme wie *SparkToro* können Organisationen ihre Botschafter:innen im Netz ausfindig machen und sie mit den neuen Informationen zur Marke versorgen.<sup>304</sup> In der Literatur finden sich auch Beispiele zu ausschweifenden Launch-Paraden, Gebäudeverkleidungen und Werbegeschenken,<sup>305</sup> die für zahlreiche MOs aber unerschwinglich sein dürften.

Damit die Motivation nicht abreißt und der Weg für künftige Rebranding-Vorhaben geebnet wird, sollten Organisationen ihre **Dankbarkeit ausdrücken** und mit etwas Abstand zum Relaunch auch den **MCR-Prozess aufbereiten**.

MOs sollten mindestens verbal ihre Wertschätzung gegenüber allen Mitarbeitenden, Partnern:Partnerinnen und Leistungsabnehmern:abnehmerinnen, die in den letzten Monaten ungeachtet ihrer Beteiligung am Rebranding, Vertrauen und Loyalität zur Organisation bewiesen haben, zum Ausdruck bringen. So könnten für sie Anreize – wie Rabatte – geschaffen werden, die zusätzlich das Interesse unter bislang unerschlossenen Zielgruppen an der neuen Unternehmensmarke wecken.

MOs dürfen ihre mittel- und langfristigen Erfolge kommunizieren, müssen aber auch Schwachstellen des Prozesses eruieren. Befragungen unter den KEAF-Mitarbeitenden und Kursteilnehmer:innen können hilfreich sein. Jede Marke macht Fehler und nicht immer verläuft das MCR erfolgreich. Organisationen, die Schwächen verbergen oder herunterspielen, können an Glaubwürdigkeit einbüßen.<sup>306</sup>

### Kontrollieren

Der letzte Schritt „Prozess aufbereiten“ soll nicht andeuten, dass die Evaluation des MCR nur abschließend und einmalig erfolgt. Stattdessen findet sie parallel zu den übrigen vier Phasen statt. Das wird lediglich bei *Lomax et al.* deutlich: Sie erwähnen die kontinuierliche Überwachung der Reaktionen von Stakeholdern:Stakeholderinnen und marktlicher Veränderungen. Außerdem empfehlen sie Organisationen, sich für das Monitoring externe Unterstützung zu suchen.<sup>307</sup>

Wie die Umsetzung des MCR gemessen wird, gibt das zuvor vereinbarte Regelwerk vor. Manche Erfolgsindikatoren – wie die flächendeckende Wahrnehmung von Epilepsie in der lokalen Bevölkerung – können am besten über Marktforschungsagenturen gemessen werden. Andere hingegen können intern erhoben werden – wie die Kunden: Kundinnenabwanderungsrate, die gestiegene Anzahl von Kursteilnehmer:innen oder die verkürzte Dauer bei der Bewerbung um Förderetats.

<sup>304</sup>Vgl. Brand Trust GmbH n. d.; vgl. Schmidt 2020a, S. 56-58.

<sup>305</sup>Siehe bspw. Daly und Moloney 2005, S. 33-34.

<sup>306</sup>Vgl. Schmidt 2020a, S. 74-75.

<sup>307</sup>Vgl. Lomax et al. 2002, S. 7-9.

<sup>302</sup>Vgl. Aaker 1991, S. 28ff., S. 44ff; vgl. Schmidt 2020a, S. 64.

<sup>303</sup>Vgl. Kap. 2.1.2.

Es fällt auch in den Aufgabenbereich der Markencontroller, zu überprüfen, ob die ergriffenen Maßnahmen tatsächlich in Einklang mit der Mission stehen, ob sie gleichermaßen der Markenidentität und den dynamischen Marktbedürfnissen gerecht werden. Ursprüngliche Ziele und Entscheidungen dürfen hinterfragt werden. Das mikro- und makroökonomische Umfeld der MO kann sich verändern und neue Chancen wie Risiken für das fortschreitende MCR offenbaren.

Zusammenfassend lässt sich sagen, dass auf Grundlage des Prinzipienkatalogs und unter Berücksichtigung vorangegangener Kapitel und Rebranding-Modelle ein dediziertes und ganzheitliches Prozessmodell für MCR entwickelt werden konnte. Obwohl es ihm besser als anderen Schaubildern und Darlegungen gelingt, den Anforderungen von MOs zu begegnen, birgt es Unzulänglichkeiten und Herausforderungen für Anwender:innen, die nachfolgend ausgeführt werden.

#### 4. Diskussion der Ergebnisse und kritische Würdigung der Forschungsarbeit

*„Your brand is a gateway  
to your true work.“ – Buck.<sup>308</sup>*

Bei der Anwendung auf das Praxisbeispiel wurden keine wesentlichen Schwachstellen des Prozessmodells sichtbar, die bereits jetzt eine Überarbeitung des Schaubilds erfordern. Allerdings konnten aufgrund des begrenzten Umfangs der Arbeit und ihrer Zielsetzung nicht alle Prozessschritte detailliert betrachtet und auf die KEAF angewandt werden. Manche dieser Schritte (bspw. Maßnahmen realisieren) stellen selbst so umfangreiche Prozesse dar, dass sie in eigenen, ergänzenden Schaubildern abgebildet werden sollten. Andere Themen (bspw. die Klärung rechtlicher Fragen), die in der Praxis viel Raum einnehmen, mussten gänzlich ausgeklammert werden. Obwohl das Modell den inhaltlichen Ansprüchen mancher Prozessabläufe nicht gerecht wird, nimmt es bereits jetzt eine Dimension an, die auf Praktiker:innen überwältigend wirken könnte. Das ist selbstverständlich der unternehmerischen Realität von MOs, der Komplexität des Branding und den Herausforderungen einer jeden strategischen Handlung, geschuldet.

An dieser Stelle soll auch die Bedeutung der strategischen Planung in Frage gestellt werden: Vor dem Hintergrund einer zunehmend digitalen und volatilen Welt und Wirtschaft durchlaufen viele Strategien einen aufwendigen Entwicklungsprozess in der Gegenwart und bewähren sich doch nicht in der Zukunft. Zudem fehlt vielen Führungskräften, die mit der Strategieplanung beauftragt sind, ein Bezug zum operativen Alltag und ihre Maßnahmen bleiben undurchführbar.<sup>309</sup> In beiden Fällen jedoch verschafft das entwickelte Modell etwas Abhilfe: durch eine konstante und übergeordnete Kontroll-Phase und den Einbezug diverser Bezugsgruppen in den Prozess.

Das Praxisbeispiel beweist, dass das MCR zwar nicht trivial, aber dennoch umsetzbar ist. Es wurde eine kleine, regionale NPO gewählt, die bereits auf den ersten Blick Schwächen im Geschäftsmodell und dessen Umsetzung aufweist und über keine große Reichweite oder Budget verfügt. Dadurch kann sie als Vergleichsmaßstab für viele weitere MOs dienen. Die Ausführungen zur KEAF wurden auf Grundlage frei zugänglicher und ggf. überholter Internetquellen gemacht, weil sie lediglich der Veranschaulichung des Schaubilds dienen sollten. Sofern das Modell unter den Realbedingungen der KEAF getestet werden soll, müssen ergänzende Tiefeninterviews mit den Führungskräften und Mitarbeitenden der Organisation geführt werden, um die mutmaßlichen Angaben und Empfehlungen auf ihre Plausibilität und Aktualität zu untersuchen.

Ohnehin wurde der MCR-Prozess nur anhand dieser Organisation durchlaufen und es kann keine Aussage zur Repräsentanz der Ergebnisse getroffen werden. Es ist zu erwarten, dass insb. globale Organisationen zahlreichen Herausforderungen beim MCR begegnen, die von dem Modell und auch dem Prinzipienkatalog nicht beantwortet werden. Dies war nicht Zielsetzung der Forschungsarbeit. Um diese Anforderungen zusammenzutragen, muss ein entsprechend größerer Literaturumfang gewählt werden. Dennoch wurden bereits beim vorliegenden Literatur Review zahlreiche Mehrfachnennungen identifiziert (wie Anhang G verdeutlicht). Die Recherche wurde eingestellt, da keine neuen Ansätze mehr erkannt wurden und es zu häufigen Dopplungen kam.

Da nur die Autorin für die Literaturrecherche und Interpretation der Ergebnisse verantwortlich war, konnten Kausalzusammenhänge nicht intersubjektiv hergestellt werden. Folglich kann durchaus ein Mangel an Objektivität in Hinblick auf den Prinzipienkatalog und das Prozessmodell geltend gemacht werden. Manche Faktoren, die Einfluss auf das MCR nehmen können, wurden nicht angemessen gewürdigt, weil ihre Erörterung nicht dem Zweck der Forschungsarbeit entspricht. Ohnehin konnten aufgrund des vorgegebenen Umfangs nur vereinzelt die interpretierten Herausforderungen für MOs und MCR-Prinzipien erläutert werden.

Es wurde hervorgehoben, dass es sich bei dem entwickelten Schaubild um eine Idealvorstellung des MCR handelt und seine Aussagekraft strittig bleibt. Das liegt nicht nur am Forschungsverfahren, sondern auch an der Tatsache, dass der dritte Sektor ausgesprochen heterogen ist und viele Abläufe des Rebranding hochindividuell sind. Um eine gewisse Allgemeingültigkeit des Modells zu unterstreichen, wurden externe Fallbeispiele und internationale, praxisnahe Literatur herangezogen und Ausführungen über den Kontext der KEAF hinaus gemacht. Das Modell eignet sich nicht nur für Organisationen einer bestimmten Branche, Größe oder Nationalität. Vielleicht können sich sogar profitorientierte Unternehmen die Forschungsergebnisse zunutze machen. Das Modell mag zwar auf Herausforderungen von MOs aufbauen, denen Unternehmen vielleicht gar nicht erst begegnen, nichtsdestotrotz könnten ihnen die abgeleiteten Prinzipien und Prozessschritte dabei helfen, mehr Partizipation, Motivation und Kommunikation für ihr Rebranding zu generieren;

<sup>308</sup>Buck, Dave, zitiert nach Khara 2017.

<sup>309</sup>Vgl. Schneider et al. 2007, S. 49-57.

bspw. weil ein großer Fokus auf die Erläuterung der Gründe für das MCR gelegt wird und Maßnahmen nicht diktatorisch vorgegeben, sondern durch Co-Creation erarbeitet werden. In anderen Worten: Herkömmliche Unternehmen werden bei Anwendung des Modells keinen Schaden nehmen, viel eher einen Nutzen davontragen.

Ein großer Vorteil ist, dass das Schaubild aufgrund seiner Darstellung Flexibilität bei der Nutzung suggeriert: Es gibt einen Überblick über alle wesentlichen Bestandteile des MCR und veranschaulicht, wie die Phasen ineinandergreifen, ohne Organisationen einen genauen Ablauf aufzudrängen. MOs mit einem sehr kleinen Personenstamm könnten bspw. im Kreise aller Mitarbeitenden die Entscheidung für das MCR treffen und sind so nicht darauf angewiesen, zu späterer Stelle Befürwortende einzubinden oder das Vorhaben intern zu kommunizieren. Vielleicht lassen sich erste Ergebnisse auch deutlich früher im Prozess mitteilen oder es kann in Zusammenarbeit mit der Agentur von vornherein ein Team aufgestellt werden, das dann für die nachfolgende Rahmenvereinbarung und Zielsetzung verantwortlich ist. Viele Schritte sind ohnehin nicht klar voneinander abgegrenzt oder ergänzen sich: Die Marktuntersuchung im Rahmen der Umsetzungsphase stellt möglicher Weise eine Dopplung zur frühen Ist-Analyse dar. Das Modell hebt diese Zusammenhänge grafisch nicht hervor. Es setzt die einzelnen Prozessschritte auch nicht hinsichtlich ihres Umfangs und ihrer Dauer zueinander in Relation: Manche Schritte sind so umfangreich, dass sie mehrere Monate in Anspruch nehmen, während andere (bspw. Entscheidung treffen) innerhalb weniger Stunden durchlaufen werden können. Das Modell bildet auch keine Wechselwirkungen ab, die u. a. durch das simultane Kontrollieren oder durch gleichzeitige Branding-Maßnahmen auf einer anderen Unternehmensebene (bspw. Produktrebranding) auftreten. Es soll keineswegs angedeutet werden, dass MCR in einem Vakuum stattfindet, unabhängig von externen Einflüssen – sei es aus anderen Abteilungen, Unternehmenszweigen oder der Außenwelt. Genauso wenig liegt der Erfolg einer Organisation rein in ihrer Marke begründet. Corporate Rebranding ist lediglich ein Türöffner. Sollten sich Organisationen auf den Prozess einlassen, obliegt es ihnen, selbst zu entscheiden, welche Schritte und Abfolgen für den eigenen, betrieblichen Kontext Sinn machen, und mit welcher Akkuratess diese durchgeführt werden sollen. Das Prozessmodell ist keine Patentlösung, sondern ein Hilfsmittel. Für Anwender:innen führt kein Weg daran vorbei, sich genauestens mit dem MCR auseinanderzusetzen, damit das Modell seinen Wert entfalten kann. Die vorliegende Arbeit unterstützt dies durch eine vereinfachte Darstellung hochkomplexer Vorgänge und ihrer begleitenden Beschreibung mit Praxisbeispielen. Um einerseits die künftige Nutzung des Modells noch intuitiver und erfolgsversprechender zu machen und um andererseits die Forschungserkenntnisse auch außerhalb des eruierten Gültigkeitsrahmens zu validieren, werden im Folgenden Handlungsempfehlungen abgeleitet.

## 5. Zusammenfassung und Ausblick

*„A great brand is a story that's never completely told.“ – Bedbury.<sup>310</sup>*

Branding gehört seit vielen Jahrzehnten zum Standardrepertoire der kommerziellen Unternehmensführung. Vor dem Hintergrund des gesellschaftlichen Wandels und den technologischen Errungenschaften unserer Zeit bricht eine Ära an, in der Unternehmensmarken als noch einflussreicher angesehen und mit neuen Ansätzen und Werkzeugen ausgerüstet werden. Dieser Fortschritt zeichnet sich jedoch nicht unter missionsorientierten Organisationen (MOs) ab – sprich jenen, die eine Profitmaximierung nicht als zentrale Handlungsmaxime verfolgen: Vielen von ihnen fehlt ein grundlegendes Verständnis für Branding oder die Bereitschaft, eine so umstrittene Disziplin auszuüben. Schließlich genießt Branding den Ruf einer kommerziellen Praktik, mit der Unternehmen ihr Image aufpolieren, Fehlritte vertuschen und sich zu mehr Marktanteilen verhelfen wollen.

Dass profitorientierte Unternehmen als das Maß aller Dinge gelten, verdeutlicht auch der Mangel an Brandingmethoden für MOs: Ihnen stehen Modelle zur Verfügung, die sich auf die Logiken der Privatwirtschaft stützen. Organisationen des dritten Sektors weisen jedoch einzigartige Charakteristika auf, die alternative Instrumente für die Entwicklung und Neuausrichtung ihrer Unternehmensmarken (Corporate Branding bzw. Rebranding) legitimieren. Zwar gibt es Instrumente, die vermeintlich einer Anwendung auf MOs standhalten, doch handelt es sich dabei eher um selbst-legitimierende Konstrukte oder vereinzelte Faktoren und Abläufe, die keine ganzheitliche Strategie darstellen. Folglich sollte ein wissenschaftlich fundiertes und praxistaugliches Prozessmodell für missionsorientiertes Corporate Rebranding (MCR) entwickelt werden, das die Anforderungen von MOs abbildet und seinen Nutzern:Nutzerinnen dennoch einen Interpretationsspielraum für die Anwendung auf den individuellen, betrieblichen Kontext gewährt.

Nachdem die Notwendigkeit und die Vorteile von MCR erörtert und den Unzulänglichkeiten bisheriger Theoriemodelle gegenübergestellt wurden, erfolgte eine grafische Abgrenzung des Untersuchungsgegenstands zu verwandten Disziplinen. Durch diese Darstellung konnten der Umfang und die Zielsetzung der Forschungsarbeit begründet und Suchoperatoren für das nachfolgende Literatur Review abgeleitet werden.

Da es sich beim MCR um ein ausgesprochen spezifisches und unzureichend erforschtes Thema handelt, wurde der Wissensstand aus zwei Forschungsfeldern zusammengeführt: „Corporate Rebranding“ und „Missionsorientierte Organisationen“.

Zunächst wurden generelle Zuständigkeiten, Bestandteile und Abläufe des Corporate Rebranding beschrieben, die später als Bauteile des Prozessmodells dienten; wie etwa das Buy-in der Mitarbeitenden, die Bedeutung einer langfristigen

<sup>310</sup>Bedbury, Scott, zitiert nach Peters 2001, S. 8.



Zielsetzung und das Zusammenspiel von Markenneupositionierung und -persönlichkeit. Es wurde aufgezeigt, dass Corporate Rebranding ohnehin ein komplexes Konzept ist, das für MOs umso mehr Herausforderungen bereithält.

Diese Herausforderungen wurden durch eine länderübergreifende Literaturdurchsicht identifiziert und in sechs Hauptkategorien geclustert. Neben den offensichtlichen Unterschieden von MOs gegenüber profitorientierten Unternehmen (wie etwa ihre Personal- oder Einkommensstruktur) konnten auch weniger signifikante Merkmale von MOs (bspw. die Zweckgebundenheit ihrer Zuwendungen, die Selbstidentität der Mitarbeitenden und das Phänomen „Compassion Fatigue“) als relevant für das Corporate Rebranding eingestuft werden. Obwohl manche Faktoren außerhalb der Kontrolle einer Organisation liegen, können die meisten beeinflusst werden. Dafür wurden Konsequenzen abgeleitet und in 18 Prinzipien für erfolgreiches MCR übersetzt. Interessanterweise lässt sich anhand der allein stehenden Prinzipien kein wesentlicher Unterschied zum herkömmlichen Corporate Rebranding feststellen.

Auf ihrem Fundament konnte schließlich das MCR-Prozessmodell entwickelt werden. Der Prozess ist zyklisch und setzt sich aus fünf Phasen zusammen, die ineinandergreifen und stellenweise simultan, sogar wechselseitig, ablaufen. Ihnen können 25 Schritte untergeordnet werden. Diese benennen die Hauptaufgaben im Prozess. Das Modell stellt eine Abstraktion des MCR dar; es bietet einen Überblick über die komplexen Abläufe und Zusammenhänge. Zur Erweiterung und Erklärung des Modells wurden hypothetische Aussagen zum Corporate Rebranding einer kenianischen, nicht-profitorientierten Organisation (NPO) gemacht. Diese eignet sich aufgrund ihrer Struktur und ihrer Entwicklungspotenziale als Vergleichsmaßstab für andere MOs.

Jede der fünf Prozessphasen wurde erst in Bezug auf ihre Dauer und Verortung in der Unternehmenshierarchie beschrieben und mit den Abläufen anderer profit- und nicht-profitorientierter Theoriemodelle verglichen. Dann folgte die Erläuterung der Prozessschritte anhand des Praxisbeispiels und weiterer, fiktiver Szenarien. Es wurde belegt, dass sich das Modell auf diverse Organisationskontexte anwenden lässt. Außerdem wurden Wege zur Umsetzung des MCR ohne großen Kapitaleinsatz aufgezeigt.

Das entwickelte Modell hat zwar bislang keine markanten Schwachstellen, allerdings stellt es den Anspruch, dass sich Anwender:innen genaustens mit seiner Komplexität auseinandersetzen und Prozessabläufe gedanklich zu Ende zu bringen, die in der vorliegenden Arbeit nur angeschnitten wurden. Es wurden weitere Grenzen des Modells und der zugrundeliegenden Prinzipien erörtert, die vor allem auf den Umfang und das Forschungsverfahren der Arbeit zurückzuführen sind.

Diese Forschungsarbeit dient als explorativer Ausgangspunkt für künftige Untersuchungen. Es bieten sich zahlreiche Möglichkeiten, die Ergebnisse zu verifizieren und den größten Nutzen aus dem MCR-Modell zu ziehen:

- Alle Prozessschritte sollten unter den Realbedingungen des Praxisbeispiels durchlaufen und beschrieben werden.
- Um einerseits die theoretische Grundlage des Modells zu untermauern und andererseits seine Praxistauglichkeit zu überprüfen, sollte es mit weiteren Theoriemodellen verglichen und auf mehrere MOs angewendet werden. Für letzteres bietet sich die Zusammenarbeit mit Branding-Agenturen und die Übersetzung des Schaubilds und des Prinzipienkatalogs ins Englische an.
- Der Prinzipienkatalog kann um zusätzliche Herausforderungen, denen MOs im operativen Alltag begegnen, erweitert werden. Ergänzungen für globale Organisationen sollten gemacht werden. Womöglich lassen sich kulturelle Unterschiede beim MCR erkennen und herausarbeiten.
- Aufbauend auf der Modellbeschreibung kann eine Begleitbroschüre erarbeitet werden, die für die Anwender:innen Templates, Fragenkataloge und Checklisten bereithält. Dadurch können Prozessschritte und -maßnahmen noch anschaulicher abgebildet werden – wie etwa die Entwicklung einer Persona oder des Markenguides.
- Der Prinzipienkatalog und das Prozessmodell sollten auf eine Anwendbarkeit bei profitorientierten Unternehmen und öffentlichen Einrichtungen kontrolliert werden.
- Es kann untersucht werden, ob das Modell durch Umformulierung der Prozessschritte auch für Corporate Branding-Vorhaben eingesetzt werden kann.
- Durch weitere Abstraktion könnte das Modell in ein Instrument des Lean Management umgewandelt werden, mit dem es Organisationen gelingt, ihre MCR-Prozesse zu verschlanken und Unternehmensmarken agiler und rascher aufzubauen.

Dieser letzte Punkt ist gerade deshalb interessant, weil sich unser Markenverständnis auch in Zukunft weiterentwickeln und neue Chancen und Anforderungen für Unternehmensmarken eröffnen wird. Es ist zu hoffen, dass MOs zunehmend mit eigenen Marketinglehren ausgestattet werden, damit sie den künftigen Szenarien mit Zuversicht begegnen können.

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## A Cost-Effective Future for Electricity Storage - An Examination of LCOS Studies on Stationary Applications

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### Abstract

As the global energy transition gains momentum and the demand for electrical energy storage rises, decision-makers face the challenge to select the most suitable storage technology. This thesis presents a comprehensive techno-economic analysis of electrical energy storage technologies for stationary applications, focusing on the levelized cost of storage (LCOS) as a key metric for evaluating economic viability. Through a systematic review of several LCOS studies, the most cost-effective storage technologies were identified for various use cases. While the results show significant heterogeneity across studies, the findings still indicate that lithium-ion batteries and pumped hydro storage are generally the most viable and cost-effective technologies. However, unique considerations are observed for specific applications, such as flywheels for primary response. Future projections reveal that lithium-ion is most likely to dominate all applications except for seasonal storage, where hydrogen energy storage is expected to induce the lowest LCOS. The following pages provide valuable insights for decision-makers, policymakers, and industry stakeholders in selecting suitable and economically viable storage solutions. This thesis highlights the significance of storage technologies in supporting the global energy transition and emphasizes the importance of investment and rapid deployment to drive progress and achieve a sustainable energy future.

**Keywords:** cost-effectiveness; energy storage; energy transition; levelized cost of storage (LCOS); storage technologies

### 1. Introduction

It is a sunny summer day, and the entire country is powered by clean and sustainable renewable energy sources (RES). Suddenly, a storm hits. Windmills have to be shut down and clouds cover the sun, reducing the amount of electricity generated by photovoltaic (PV) systems. At the same time, factories keep operating and people continue to run their air conditioners and turn on the stove to cook dinner. Given the fluctuating character of renewable energy, how can we prevent blackouts and ensure a reliable and continuous electricity supply? The answer lies in effective energy storage (Behabtu et al., 2020, p. 1). Through storing excess

energy during periods of high generation and unleashing it when needed, it represents an essential link, connecting renewable energy generation and consistent power availability. In today's context, as we face significant global challenges such as climate change, we urgently need to transition to clean energy systems. Electrical energy storage (EES) is a central pillar for achieving this. It unlocks the full potential of RES and enables their integration into the existing grid infrastructure (He et al., 2021, p. 1). However, this raises the question of which storage technology to choose.

Selecting the optimal energy storage technology for a given application is complex due to the diversity of the technologies and varying application requirements. To address this challenge, numerous studies have identified the Levelized Cost of Storage (LCOS) as a key metric for evaluating the economic viability of different storage technologies (Xu et al., 2022, p. 2). By estimating the cost of each unit of discharged energy, it promises to increase the compar-

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bility among technologies for a given application, thereby facilitating the selection of the most cost-effective EES option. However, methodological discrepancies and varying assumptions across these LCOS studies have led to divergent and sometimes conflicting results (Schmidt et al., 2019a, pp. 81-82). Consequently, reading different studies can lead to confusion rather than enlightenment, preventing stakeholders from making informed choices.

To mitigate this problem, this thesis aims to identify the most cost-effective EES technologies for various applications. Using a systematic review, it analyzes and compares different LCOS studies to reveal patterns and highlight differences in methodologies and recommendations. This provides valuable insights for decision-makers in determining the most appropriate EES technology for a specific application. The systematic review approach thereby reduces the risk of potential bias and strengthens the reliability of results. The pressing need to address climate change and the transition to renewable energy (International Renewable Energy Agency [IRENA], 2022) underscores the relevance of this research. EES technologies play a central role in successfully integrating RES into the grid and reducing carbon emissions (Aneke & Wang, 2016, pp. 350-351). This further increases the importance of choosing the most appropriate technologies. As climate change and the resulting energy transition are global issues, this thesis aims to provide a general view that can be applied universally. Therefore, it does not focus on specific countries or regions. This thesis ultimately contributes to a more resilient and sustainable future by reducing confusion and facilitating the selection of EES technologies.

The structure of this thesis is organized as follows. Chapter 2 lays the theoretical foundation, providing essential knowledge to understand the subsequent analysis of LCOS studies. This chapter presents the leading applications of EES (Section 2.1), explains the basic operating principles and characteristics of established EES technologies (Section 2.2), and introduces the concept of LCOS (Section 2.3). The analytical part of this thesis is included in Chapter 3. It starts with a detailed description of the overall methodology employed in this thesis, presented in Section 3.1. This section provides a comprehensive outline of the specific approach used to examine and compare diverse LCOS studies, encompassing data sources, selection criteria, and analytical frameworks. Next, Section 3.2 covers the key findings derived from reviewing and comparing these LCOS studies. These results are presented and visualized to highlight underlying trends and patterns. This forms the basis for the subsequent discussion in Section 3.3, where the results are critically examined, interpreted, and contextualized to identify underlying implications and draw conclusions. Building on this discussion, this section answers the central research question of this thesis by identifying the most cost-effective EES technologies for each application. Finally, Chapter 4 summarizes the main conclusions drawn from the analysis and highlights the essential findings and implications for technology selection. In addition, an outlook into the future

is provided, exploring potential avenues for further research and development in the field of EES.

## 2. Theoretical Foundation

As described above, this chapter lays the theoretical foundation to understand the following analysis and comparison of LCOS studies. It utilizes several technical terms and concepts, such as power, discharge duration, or redox reactions. While many of these are widely known, some may be unfamiliar and are therefore defined in Appendix A.

### 2.1. Applications of Electrical Energy Storage (EES)

One of the critical challenges in maintaining a functional energy grid is ensuring a balance between power supply and demand. The voltage and frequency of the grid are very sensitive to power imbalances. As a result, a mismatch between supply and demand can cause deviations from their expected levels, resulting in power outages. This threatens the stability and reliability of the entire grid. Without the ability to store electricity, the power generated would have to equal the power drawn from the grid. The global energy transition further exacerbates this challenge, as the generation capacity of RES is often dependent on uncontrollable factors like weather conditions. Therefore, EES is essential to enhance the reliability of the grid. It can be used in several ways to overcome this and other problems (Hoff, 2022, p. 26). While EES is employed in diverse contexts, such as powering electric vehicles (EVs), this thesis focuses solely on large-scale<sup>1</sup> stationary applications, such as frequency response services or seasonal storage, as they play a crucial role in achieving the transition to a carbon-free grid (Soloveichik, 2011, p. 504). Moreover, off-grid applications and hybrid systems, such as batteries combined with PV, are beyond the scope of this thesis.

#### 2.1.1. Frequency Control

Today, most of the world's electricity grids rely on alternating current (AC). As a result, most electrical equipment and appliances operate only when the voltage is supplied at a fixed frequency of 50 or 60 Hz (Hoff, 2022, p. 53). Frequency control aims to maintain the grid's stability by keeping its frequency within an acceptable range, usually a narrow corridor of less than 1 Hz (Greenwood et al., 2017, pp. 115-116).

Conventional power grids are characterized by having many rotating masses, such as turbines and generator rotors, which spin at synchronized frequencies. The kinetic energy stored in these masses (inertia) can uphold the synchronization of all generators for a few seconds, thus compensating for minor frequency disturbances. Today, the increasing decarbonization of the grid is leading to a growing share of inertialess power generators, like PV, which reduce the grid's self-stabilizing capability. This presents a challenge that can be

<sup>1</sup> In this thesis, "large-scale" refers to applications with mean power ratings of 1 MW or more.

addressed by applying EES technologies (Hoff, 2022, pp. 26–31; Long Duration Energy Storage Council [LDES Council], 2021, p. 20). To be suitable for this inertial support application, EES technologies must respond quickly to grid fluctuations (Hoff, 2022, pp. 30–31). While inertial support can stabilize minor disturbances over short periods, more extensive disruptions, such as the collapse of central power plants, require other services known as frequency response. EES technologies demonstrate superior performance in delivering these services (Hoff, 2022, p. 32).

Frequency response assets are classified as primary, secondary, and tertiary reserves based on reaction speed (Hoff, 2022, pp. 31–36). Primary response covers the first seconds or minutes after a sudden frequency and voltage change occurs in the grid. The storage technologies must respond within milliseconds, providing or storing power until secondary response takes over (Hoff, 2022, pp. 35–36). Technologies used in secondary response take a few seconds to start up. Their job is to smooth out imbalances between demanded and supplied power for several minutes. In some countries, such as the UK, a new service called Enhanced Frequency Response (EFR) has been introduced, consolidating the functions of primary and secondary response (Greenwood et al., 2017, p. 117). Tertiary response shares similarities with secondary response but operates with longer reaction times in the order of minutes. It must sustain continuous service for extended periods, reaching up to several hours (Hoff, 2022, p. 35–36). Frequency containment reserve and frequency restoration reserve are other similar concepts to secondary and tertiary response (Ralon et al., 2017, p. 46). As the adoption of RES increases, the importance of frequency control becomes more pronounced. The inherent variability of energy supplied by RES can introduce imbalances in the grid's frequency, highlighting the need for effective frequency control mechanisms.

### 2.1.2. Power Quality

Power quality is similar to frequency control services. However, instead of focusing on maintaining a stable frequency on the grid, the goal here is to maintain the quality of the voltage and current waveforms. This includes smoothing out voltage fluctuations (flicker), harmonics, or notches. In addition, power quality also ensures a stable amplitude of the wave by counteracting disturbances, such as sudden voltage dips or swells, as well as overvoltage and undervoltage (Tesařová, 2011, p. 96, 98). Again, the increasing use of fluctuating RES reduces the power quality in the grid. EES can be used to effectively address these disturbances (Das et al., 2018, pp. 1213, 1223). Power quality services require a quick response time from EES technologies, often with storage durations of less than one minute (Behabtu et al., 2020, p. 3). Overall, response time is the most critical factor determining EES technologies' technical suitability for short-term storage services such as frequency control or power quality (Aneke & Wang, 2016, p. 365).

### 2.1.3. Time Shifting

As the name suggests, the basic idea of time shifting is to store energy and use it in later periods. In this respect, any use case of EES technologies could be assigned to this category (Hoff, 2022, p. 40). However, specific applications are centered around this idea. Energy arbitrage is a notable example. EES technologies used in this application do not need to respond rapidly. The goal is to purchase cheaply and store energy during off-peak times to sell it later during high-price periods, typically after a few hours of storage (He et al., 2021, pp. 8, 13). Thus, energy arbitrage helps offset the increased risk of price volatility associated with the energy transition (Long Duration Energy Storage Council, 2022, pp. 3–4).

The energy produced by generation technologies cannot always match the demand on the grid. This is especially true for RES technologies. RES energy supply relies on external and uncontrollable factors such as weather conditions and time of day. For instance, while electricity demand tends to rise in the evening when everyone comes home, RES generation, such as PV, declines during nighttime. Therefore, EES plays a critical role in storing excess electricity during periods of surplus and supplying it during times of decreased energy generation, enabling the balancing of daily fluctuations in electricity demand. This strategy is known as energy shifting (Hoff, 2022, pp. 40–42).

### 2.1.4. Peak Shaving

One problem that utilities and consumers face is that the peak demand for electricity is typically much higher than the average demand. This necessitates oversized power plants and infrastructure, which are only needed during rare peak times. (Hoff, 2022, p. 42) Peak shaving addresses this issue by reducing demand peaks and redistributing the load to later periods, narrowing the gap between maximum and average demand (Viernstein & Witzmann, 2020, p. 4). Using EES technologies, utilities can defer the need for further transmission and distribution (T&D) network expansions, commonly referred to as T&D investment deferral. Charging these technologies during off-peak hours to store electricity that can be released during peak demand reduces the required infrastructure capacity, minimizing the need for significant grid investments (He et al., 2021, p. 9; Ralon et al., 2017, pp. 10–11). Another way utilities try to reduce the need for overcapacity in power plants and infrastructure is by charging their customers extra fees if their demand for electricity is too high at any given time. EES technologies help customers to mitigate their peak power demand, resulting in cost savings by preventing these demand charges (demand charge management) (Hoff, 2022, p. 43–45).

### 2.1.5. Resiliency

ESS technologies can improve a grid's reaction to unanticipated events (resiliency) (Hoff, 2022, p. 47). There are several specific applications to achieve this objective. Providing backup power is one of them: Many electricity generation technologies require external energy to start up. This can be problematic during a blackout, as the generators cannot

restart by drawing power from the grid. EES technologies can offer a solution by supplying power to restart generators (black start). In addition, they can provide emergency backup power or uninterruptible power supply (UPS) for critical equipment and infrastructure, such as servers or hospitals (Hoff, 2022, pp. 47–48, 153).

Even without a total blackout, events always cause disruptions in power generation. EES technologies ensure a reliable power supply by balancing the difference between demanded and generated electricity. The term power reliability summarizes services that achieve this (Schmidt et al., 2019b, Table S1). Nowadays, they are even more vital due to the variable nature of RES technologies. Wind turbines or PVs heavily rely on weather conditions. In extreme weather, windmills may have to be shut down, and clouds may cover the sun, preventing PV from creating enough electricity to meet the power demand. EES can mitigate this problem by providing power for hours or even days during severe weather conditions. Given the expected increase in unusual and extreme weather events due to climate change, the importance of long-duration EES as a critical enabler of power reliability will continue to grow (Long Duration Energy Storage Council, 2022, pp. 22–23).

#### 2.1.6. Seasonal Storage

Seasonal storage is similar to time shifting, but the storage duration can be several weeks or months. This approach aims to smooth out seasonal differences in power generation capacity, such as the variation between solar energy in summer and winter. Additionally, annual peaks in demand, such as vacation periods, can be met without overbuilding the grid (He et al., 2021, pp. 8-9). Again, the energy transition further emphasizes the need for seasonal storage. For instance, the reduced power supply from photovoltaic systems in winter can be supported by long-term energy storage, which can be recharged during periods of high power generation in summer. EES technologies for this application share similarities with those employed for time shifting services. However, the discharge durations must be much longer, so a higher energy capacity is required. Self-discharge becomes crucial in seasonal storage as it accumulates over long storage durations and should therefore be as low as possible (de Barros Gallo et al., 2016, p. 815).

In conclusion, this section highlights the diverse range of stationary applications for EES technologies, each with its specific technical requirements. Understanding the operating principles and resulting characteristics of different EES technologies is essential to determine their suitability for particular applications. Thus, the subsequent section will provide an overview of the most significant EES technologies.

## 2.2. EES Technologies

Storing electricity poses a significant challenge since electrical energy cannot be readily stored but first must be converted into another form of energy. It can then be converted back to electrical energy later in time (Aneke & Wang, 2016,

p. 355). EES technologies do just that. Generally, they can be classified as mechanical, electro-chemical, electrical, chemical, and thermal storage technologies based on the form of energy the electricity transforms into (de Barros Gallo et al., 2016, p. 800).

This thesis focuses on standalone technologies that use electricity as both the input and output form of energy (Power-to-Power) (Schill, 2020, p. 2059). In addition, this thesis relies on the availability of LCOS studies on the compared storage technologies. Therefore, the focus will be on more mature technologies with real large-scale applications. Thermal storage technologies are primarily used in hybrid systems to support other storage or generation technologies. In addition, the stored energy is often released in the form of thermal energy, for example, for heating purposes. While some Power-to-Power storage solutions exist, they are still in relatively early stages of development (Hoff, 2022, p. 137). Consequently, thermal energy storage is not included in this thesis. Similarly, electrical storage technologies are not analyzed. Supercapacitors and superconducting magnetic energy storage, the two most popular technologies in this category, are still rather immature (Das et al., 2018, p. 1209; de Barros Gallo et al., 2016, p. 816) and have limited LCOS studies available.

#### 2.2.1. Mechanical Storage Technologies

Mechanical storage is one of the most popular and common ways to store electricity. Here, electrical energy is converted into potential or kinetic energy, which is then used to regenerate electricity later in time (Hoff, 2022, p. 55). Pumped hydro storage (PHS), compressed air energy storage (CAES), and flywheel energy storage (FES) are the most popular and mature examples of mechanical storage. These three technologies will be further explained in the following.

PHS is by far the most widely used storage technology, making up around 95% of global EES deployments (Hoff, 2022, p. 97). It stores electricity by pumping water or another liquid from one reservoir to another higher reservoir. When electricity is needed, the process is reversed, and the potential energy of the water drives turbines to generate power (Hoff, 2022, p. 77). While PHS historically mainly used rivers to create water reservoirs, nowadays, the focus moved to so-called closed-loop PHS that could also use different fluids and be built underground, helping to reduce geographical constraints and the overall cost of this technology (He et al., 2021, pp. 2–4). PHS requires significant space and is only suitable for specific geographies where large bodies of water or other fluids at different heights can be created. In addition, the technology may cause adverse environmental consequences, such as the loss of natural habitats (Hoff, 2022, p. 79). However, this thesis aims to provide a universal overview of different storage technologies and their suitability for individual use cases. Therefore, the analysis excludes geographical, environmental, and social factors that could differ from region to region. Nevertheless, decision-makers should always reflect on them when determining the most suitable EES technology for their specific circumstances. PHS



is a versatile technology used for short- to long-term energy storage. Initially, it mainly shifted large amounts of energy to later times of the day. However, it is also used for seasonal storage and short-term applications like response services (Hoff, 2022, pp. 88–89).

CAES compresses air using electricity and stores it in tanks or underground reservoirs such as salt caverns. At discharge, it recovers electricity using turbines and generators as the air is expelled. To do this, the air must first be heated and expanded. This can be done either by using fossil fuels such as natural gas (diabatic compressed air energy storage (D-CAES)) or by taking waste heat from the compression process that is stored using thermal energy storage (adiabatic compressed air energy storage (A-CAES)). There is also a third technology (isothermal compressed air energy storage (I-CAES)) that is similar to A-CAES but keeps the temperature of the air constant throughout the entire process (He et al., 2021, p. 4). The basic principle of CAES is similar to that of PHS, and the two technologies share their suitability for various applications (Das et al., 2018, p. 1210). Generally, most mechanical storage technologies apart from FES can achieve high power levels while reaching discharge durations of more than one hour. On the negative side, these technologies respond relatively slowly and require much space due to their comparatively low energy densities, which may make them less attractive for some applications (He et al., 2021, pp. 7–8).

Instead of potential energy, FES stores electricity in the form of kinetic energy in a rotating mass (flywheel). Charging and discharging are done by a device that is a combination of a motor and a generator that accelerates and decelerates the wheel. The flywheel spins in a vacuum chamber and is held in place by magnetic bearings to reduce energy losses due to friction. However, this also consumes some energy and therefore takes up some of the available capacity of a flywheel (Hoff, 2022, p. 59). Depending on the rotational speed, FES technologies are categorized as low-speed flywheels (<10,000 rpm) and high-speed flywheels (>10,000 rpm) (Nadeem et al., 2019, p. 4558). Unlike PHS and CAES, FES is unsuitable for long-term applications (Aneke & Wang, 2016, pp. 355–356). Like other mechanical storage technologies, FES has significantly longer lifetimes and higher cycle lives than other forms of energy storage. Conversely, they have lower energy densities than electrochemical or chemical storage technologies. FES can still achieve high power densities and has some of the highest round-trip efficiencies (RTEs) of any mechanical storage technology. The fast reaction times render it suitable for short-term use cases such as frequency control or power quality (He et al., 2021, pp. 7–8).

### 2.2.2. Electrochemical Storage Technologies

Electrochemical storage is one of the oldest forms of EES (Hoff, 2022, p. 3). This technology uses electrochemical reactions to convert electrical energy into chemical energy or vice versa (He et al., 2021, p. 2). According to China Energy Storage Alliance (CNESA) (2020), just four technologies account for more than 99 % of the world's installed electro-

chemical storage capacity (see Figure 1). All of them belong to the group of battery energy storage (BES) (Zakeri & Syri, 2015, p. 579).

These four technologies are lead-acid (PbA), lithium-ion (Li-ion), sodium-sulfur (NaS), and flow batteries, while vanadium redox flow batteries (VRFBs) are the most common chemistry of flow batteries, according to Aneke and Wang (2016, p. 372). Although numerous other chemistries exist, most available LCOS studies often focus on these four BES technologies. Therefore, PbA, Li-ion, NaS, and VRFB are the only electrochemical storage technologies considered here.

PbA batteries, invented over 150 years ago, are a well-established and mature rechargeable battery technology. They are made up of a lead dioxide (PbO<sub>2</sub>) anode and a lead (Pb) cathode that are covered by an electrolyte consisting of a sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) solution. Charging and discharging rely on reversible redox reactions known as the double sulfate reaction. PbA can be categorized into two main types: vented (flooded) lead-acid batteries (VLA) and valve-regulated (sealed) lead-acid batteries (VRLA/SLA). These batteries find applications in various fields, such as emergency backup power and different types of grid services (Nadeem et al., 2019, pp. 4564–4565). A major drawback of a PbA battery is its rapid capacity degradation. To mitigate this problem, it is common practice to discharge the battery only partially. Consequently, PbA batteries exhibit a comparably low depth of discharge (DoD). As a result, a PbA system's rated energy must be considerably higher than the required energy as the actual usable capacity is much lower than the theoretical capacity of the system. Moreover, the rapid capacity degradation also leads to a relatively short cycle life for PbA batteries (Hoff, 2022, pp. 156, 162).

The name Li-ion stems from the operating principle of this technology: during charging or discharging, Li<sup>+</sup> ions migrate between a cathode, typically composed of lithium metal oxide, and an anode, most commonly consisting of graphite. Like PbA batteries, these two electrodes are covered by an electrolyte that facilitates the movement of the Li<sup>+</sup> ions (He et al., 2021, p. 5). Li-ion battery performance can vary depending on the choice of materials and cell design, offering great flexibility and suitability for various applications such as frequency services, energy shifting, and energy arbitrage. However, this variability often involves trade-offs between different performance characteristics. Despite this, Li-ion batteries have gained significant recognition among the general public, primarily due to their popularity in the EV industry (He et al., 2021, p. 5). The high energy density allows for compact designs, making them space-efficient. While Li-ion only accounted for about 5% of the global storage capacity in 2020, this EES technology will likely become the market leader, overtaking PHS soon (Hoff, 2022, pp. 175, 181, 198).

NaS batteries are a prominent example of high-temperature batteries. These are based on liquid active materials that require a temperature of about 300 °C to remain in a liquid state (Ralon et al., 2017, pp. 95–96). NaS batteries employ liquid electrodes, with the anode consisting of molten sodium and the cathode comprising molten sulfur. A solid

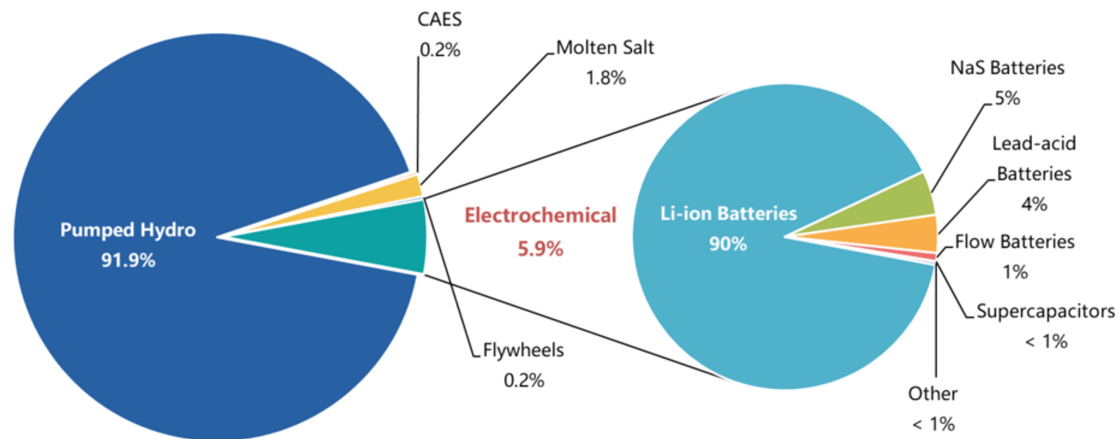


Figure 1: Distribution of Global Storage Capacity (China Energy Storage Alliance (CNESA), 2020)

Note. Molten Salt is a form of thermal energy storage.

beta alumina ceramic serves as both the separator and the electrolyte between the electrodes. During discharge, the molten sodium undergoes oxidation, resulting in the formation of  $\text{Na}^+$  ions. These ions migrate through the solid beta alumina and react with the molten sulfur on the opposite side of the cell. This process reverses when the battery is charged. Being a high-temperature battery, NaS requires unique materials and a thermal management system that adds to the cost of the overall design (Nadeem et al., 2019, pp. 4566–4567). While NaS batteries exhibit lower RTEs than some other batteries and have a lower energy density than Li-ion, they possess minimal self-discharge and can achieve a relatively long lifetime. NaS batteries are often used for applications with cycles on a daily basis, such as peak shaving or energy arbitrage (Hoff, 2022, pp. 201–203).

Redox flow batteries (RFBs) are a distinct type of battery within BES technologies, differing from other BES systems in their design and operation. Unlike conventional batteries with a single cell containing two electrodes and an electrolyte, RFBs store energy in two liquid electrolyte solutions, the catholyte and anolyte (Hoff, 2022, p. 206). These electrolytes are stored in separate reservoirs. They are pumped into the cell during charging or discharging, where redox reactions occur. RFBs have similar advantages to other reservoir-based storage technologies, such as PHS or CAES. Examples include long lifetimes as well as decoupled energy and power storage. Consequently, they are technically well-suited for various large-scale stationary use cases. Furthermore, as BES technologies, RFBs exhibit higher RTEs than mechanical storage technologies (He et al., 2021, p. 6). Among RFBs, VRFBs are the most prevalent type. These batteries employ electrolytes of various vanadium ions dissolved in liquid acid solutions. One drawback of VRFBs is their reliance on pumps to circulate electrolytes between reservoirs and cells. The startup time for these pumps can take a few minutes, resulting in slower response times for the battery. Therefore, if the batteries need to respond quickly and unex-

pectedly, the pumps must run continuously, drawing power from the storage. This characteristic leads to lower RTEs than for other battery types (Hoff, 2022, pp. 205, 208).

### 2.2.3. Chemical Storage Technologies

Chemical storage technologies store electrical energy in chemical bonds (Long Duration Energy Storage Council [LDES Council], 2021, p. ix). These technologies are primarily based on alternative (non-fossil) fuels (He et al., 2021, p. 6). Among these, hydrogen is the most mature option. It can be used independently or in combination with carbon sources to produce methane, hydrocarbon, or methanol. However, these approaches are less developed. Moreover, there are additional energy losses when hydrogen is converted to other alternative fuels, which is why Aneke and Wang (2016, p. 359) suggest that hydrogen may have the highest potential. Therefore, this thesis will only focus on hydrogen energy storage (HES). Hydrogen is typically produced through water electrolysis, where electricity is employed to split water molecules into hydrogen and oxygen. The hydrogen can then be stored in tanks, usually either as a pressurized gas or as a cryogenic liquid (Fuel Cell Technologies Office, 2017), and converted back into electricity later. Fuel cells reverse the electrolysis process, which is the most common way to achieve this conversion. Alternatively, hydrogen can be burned in gas turbines to generate electricity (He et al., 2021, pp. 6–7). Due to its ability to be stored for extended periods, HES is particularly well-suited for seasonal storage or other long-term use cases (Nadeem et al., 2019, p. 4562). Chemical storage boasts higher energy densities compared to other storage technologies. Alternative fuels such as hydrogen are easily moveable from one location to another, and storage capacity can be increased independently of power generation (Gür, 2018, p. 2732). However, substantial energy losses are involved in converting electricity to hydrogen and back to electricity. Consequently, HES has an RTE of only 10–40%, which is lower than that of mechanical storage and BES technologies (often about 45–95

%, depending on the specific technology) (He et al., 2021, p. 8).

### 2.3. Levelized Cost of Storage (LCOS)

With the increasing importance of energy storage, there has been a rise in studies analyzing the cost of storage. Many of these studies compare the total investment required for different storage technologies (Schmidt et al., 2019a, p. 81). While this metric may be relatively straightforward to calculate, it overlooks essential aspects that can significantly affect the economic suitability of a particular technology for a specific use case. For instance, the total investment cost fails to fully consider factors such as the RTE of a technology, the time value of money, or the expenses associated with operating and maintaining the storage system. This becomes particularly problematic when investment costs decrease due to experience or economies of scale, making them a smaller portion of the total cost (Schmidt et al., 2019a, p. 86). Therefore, there is a growing need for a metric that provides a holistic view of all relevant cost types incurred by an EES technology throughout its lifespan when used for a specific application. This includes taking into account the unique characteristics of each storage technology and the technical requirements of a given use case. The LCOS is one such metric that aims to encompass various factors to determine the actual cost of a particular technology. Therefore, it has gained international recognition as an index for assessing the cost of energy storage (Xu et al., 2022, p. 2) and has been employed in both academic and industrial settings (Beuse et al., 2020a, p. 2175).

#### 2.3.1. General Concept

LCOS is a metric representing an EES technology's total discounted lifetime cost divided by its total discharged energy. Essentially, it provides the average price of released energy required to cover all lifetime costs of the technology such that the resulting net present value (NPV) of the investment would be zero (He et al., 2021, p. 10). LCOS is commonly expressed in dollars per MWh of discharged energy, although the currency and energy unit prefix may vary from study to study. In cases where power output is more significant than total energy released, the unit may be expressed as dollars per MW (Zakeri & Syri, 2015, p. 579). Although there are variations in terminology, such as Levelized Cost of Energy Storage (LCOES) (Comello & Reichelstein, 2019, p. 2) or Levelized Cost of Energy (LCOE) (Zakeri & Syri, 2015, p. 573), these terms generally refer to the same or very similar concepts when applied in the context of energy storage. As mentioned, LCOS accounts for application-specific parameters such as annual cycles or DoD. Consequently, the estimated cost of a particular technology may vary depending on the use case. Therefore, LCOS can only be used to compare the economic suitability of different EES technologies for a specific application but not for comparisons across multiple use cases (Schmidt et al., 2019a, p. 83).

#### 2.3.2. LCOS Formula

There is no universal formula for determining the LCOS of EES technologies. Instead, the specific calculations made in different LCOS studies tend to vary slightly. However, the fundamental structure is consistent across studies, comprising three main aspects in almost every LCOS formula. Equation (1) summarizes these components<sup>2</sup>.

$$LCOS = \frac{\sum_{t=0}^T \frac{CAPEX_t + OPEX_t}{(1+r)^t}}{\sum_{t=0}^T \frac{E_{discharged_t}}{(1+r)^t}} \quad (1)$$

$CAPEX_t$  represents the capital expenditure (CAPEX) incurred in period  $t$  for setting up an EES technology. This includes factors such as equipment, construction materials, transportation, geological surveys, environmental impact studies, and installation costs. Depending on the specific technology, the composition of CAPEX can vary considerably. For example, installation costs are significant for PHS, while batteries may have a larger portion of the investment cost attributed to rare and expensive materials (Hoff, 2022, pp. 244–257). The actual set of factors included in CAPEX varies among LCOS studies. Some assume that CAPEX is only the upfront cost (Cortez et al., 2021, p. 208). In this case, equation (1) simplifies to equation (2). However, other studies also consider replacement cost or end-of-life cost as part of CAPEX that occur in later periods and therefore need to be discounted using the discount rate  $r$  (Jülch, 2016, pp. 1596–1597; Schmidt et al., 2019a, p. 82; Xu et al., 2022, p. 7).

$$LCOS = \frac{CAPEX_0 + \sum_{t=0}^T \frac{OPEX_t}{(1+r)^t}}{\sum_{t=0}^T \frac{E_{discharged_t}}{(1+r)^t}} \quad (2)$$

$OPEX_t$  includes all ongoing operational expenditure (OPEX) required to run an EES system in period  $t$ . It typically contains costs related to plant operation and maintenance (O&M). While CAPEX is usually a more significant cost driver of the LCOS, OPEX is still a vital part of the calculation. This is especially true for technologies with steep learning curves like BES (Hoff, 2022, p. 257–261). Although the cost of charging electricity could be a substantial factor in OPEX, it is not considered in every study (Moradi-Shahrbabak & Jadidoleslam, 2023, p. 1700). Finally,  $E_{discharged_t}$  represents the total energy<sup>3</sup> discharged in period  $t$ . The value of  $E_{discharged_t}$  varies depending on the application and

<sup>2</sup> Equations (1) and (2) are taken from Hoff (2022, p. 244) and slightly adjusted to generalize the LCOS formulas of the analyzed studies in Chapter 3.

<sup>3</sup> As this study focuses on electrical energy storage,  $E_{discharged_t}$  is the total electricity discharged in period  $t$ .

factors such as the number of annual cycles or the required energy capacity of the EES technology (Schmidt et al., 2019a, p. 96).

The input parameters for the LCOS formula are influenced not only by the application under consideration but also by the choice of storage technology. Technical characteristics such as RTE, DoD, self-discharge, annual degradation rate, or cycle life directly affect the abovementioned components (Long Duration Energy Storage Council [LDES Council], 2021, p. 49). For example, a lower RTE increases the amount of energy that needs to be charged, resulting in higher charging costs and, therefore, higher OPEX (if included in the OPEX calculation). At the same time, it reduces the available capacity of an EES technology and, therefore, may require oversizing the rated capacity, driving up the CAPEX. Consequently,  $CAPEX_t$ ,  $OPEX_t$ , and  $E_{discharged}$  are again dependent on several parameters and described by formulas. However, since most studies differ in the choice of factors in their calculations, it is impossible to provide a general formula for these components. After calculating  $CAPEX_t$ ,  $OPEX_t$ , and  $E_{discharged}_t$  for each period  $t$  during the project life  $T$ , they are discounted using the interest rate  $r$  and summed up. Finally, the sum of all discounted  $CAPEX_t$  and  $OPEX_t$  is divided by the total discharged electricity to compute the LCOS of an EES technology for a specific application.

### 3. Systematic Review of LCOS Studies

This thesis analyzes several LCOS studies to answer which technology is the most cost-effective for each stationary application. The goal is to determine whether the studies' suggestions regarding the cheapest EES technology for different use cases are consistent and to identify why studies might deviate from these patterns. To do this, reliable LCOS studies comparing the EES technologies described above for the applications under consideration first had to be identified and reviewed. This process is described in the following section.

#### 3.1. Description of Methodology

To reduce potential bias and to make the identification and analysis of LCOS studies as objective as possible, a systematic review was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) as underlying guidelines (Page et al., 2021). Due to the nature of this thesis, not all PRISMA rules were applicable or necessary and were therefore not considered here.

For a study to be included in this analysis, it must: (1) calculate the LCOS of individual storage technologies<sup>4</sup>, (2) compare at least two of the technologies that are considered in this thesis, (3) examine at least one of the applications

described above<sup>5</sup>, (4) have a publication year of 2019 or later, (5) be written in English or German, and (6) be the most recent version. In addition, to ensure high overall quality, the journals of the considered articles must have a quartile ranking based on the Journal Impact Factor of Q2 or better or have an h-index of more than 30.

After defining the inclusion criteria, potentially relevant literature was identified in three steps. First, the academic database Scopus<sup>6</sup> was used for the literature search. The advantage of this database is that all indexed articles are peer-reviewed, which ensures a high baseline quality of the literature. A search string was developed based on the main aspects of the research question - EES storage and EES technologies, stationary applications, and LCOS - while including several synonyms and related terms in English and German. Two searches with slightly modified search strings were conducted on 4 and 5 May 2023. The exact queries used in Scopus can be found in Appendix B. The results were filtered to exclude review articles and include only records published after 2018 and written in English or German to obtain the most relevant and recent articles. These two searches yielded a total of 108 records, not including duplicates. An initial screening process excluded 79 of these records after applying the inclusion criteria to their titles and abstracts. Finally, the full texts of the remaining documents were reviewed, resulting in eleven studies that met all criteria. Second, a forward and backward search based on the final studies from the first step was conducted on 22 May 2023. This was done by evaluating those articles that either referenced or were cited by one of the eleven studies and were indexed in Scopus. The inclusion criterion for the accepted years of publication was adjusted to a lower limit of 2013 to account for the fact that referenced studies are necessarily older than the study they are referencing. This second step of the search strategy added another five studies to the total pool. Finally, Google<sup>7</sup> was used throughout May 2023 to further expand the set of LCOS studies and include gray literature, resulting in two additional reports. The literature search identified a total of 18 eligible studies (refer to Appendix D for an overview of all included studies). Figure 2 shows the process and reasons for exclusion.

Once the included articles and reports were identified, information relevant to determining the cheapest technologies and comparing the studies was collected from them. A data extraction template was created to standardize and objectify this process. The variables for which information was retrieved can be classified as characteristics, input parameters, and outcome variables. The authors, year of publication, methodology used, and technologies and applications evaluated are examples of study characteristics. Variables such as RTE or energy and power ratings are input param-

<sup>4</sup> The name specified in the study does not have to be LCOS as long as the general principle aligns with the one described in Section 2.3.

<sup>5</sup> It is sufficient if the results for specific applications of interest can be derived. Therefore, also studies that provide LCOS for a range of input parameters without referring to specific use cases can be included.

<sup>6</sup> <https://www.scopus.com/>.

<sup>7</sup> <https://www.google.com/>.



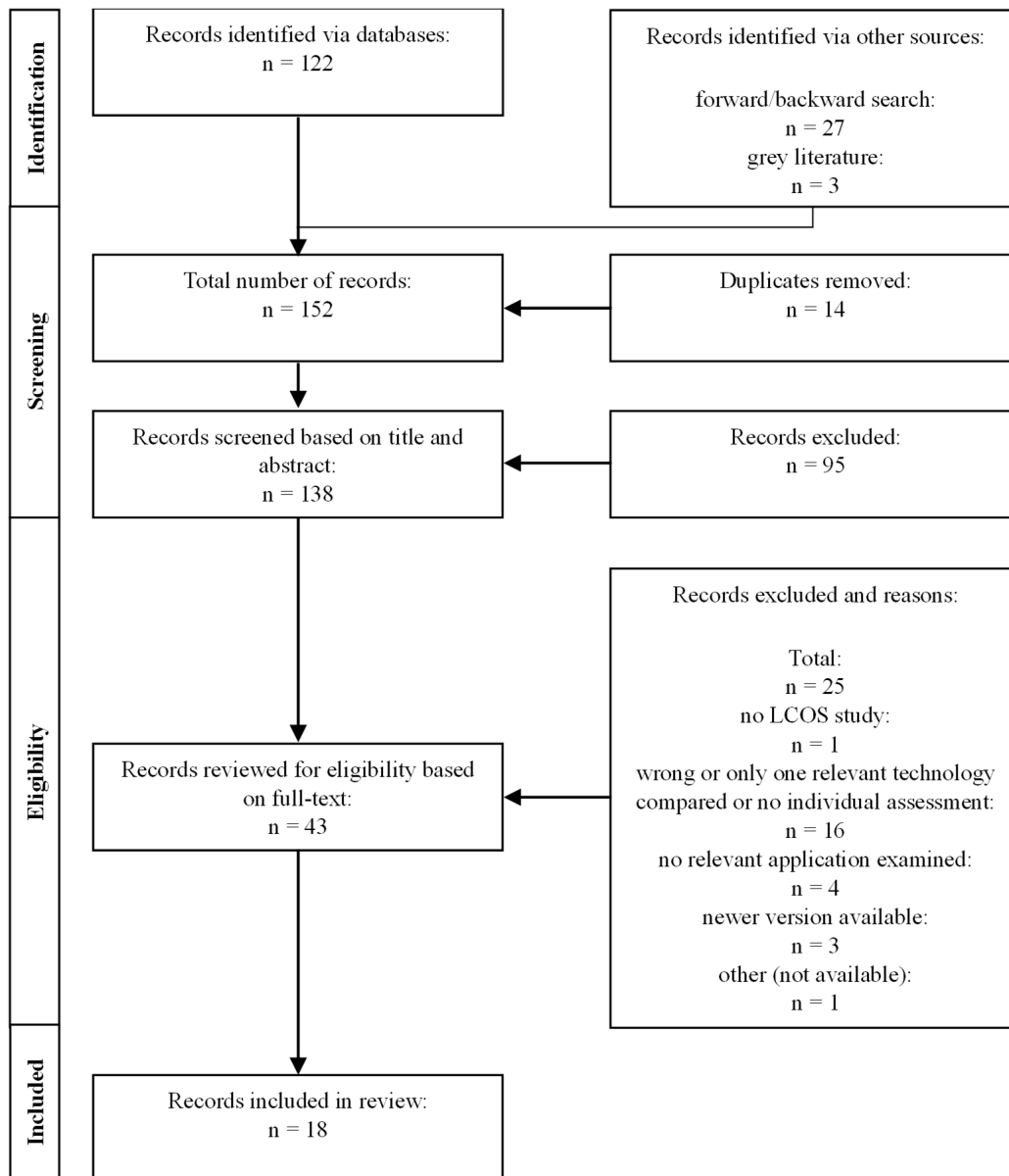


Figure 2: PRISMA Flow Chart (Adapted from Ramos-Martín et al. (2023, p. 4, Fig. 1))

eters, while LCOS and related concepts are the assessed outcomes. Please refer to Appendix C for a complete overview of the data extraction table.

Initially, only those studies that examined specific applications were analyzed (see Appendix D.1). The information on the input parameters drawn from these studies was then used to develop a general definition of all relevant applications, as shown in Table 1. This was done by taking all studies' overall minimum and maximum values and calculating the average of the means or most likely values (base case) given for individual parameters. If a study provided only a range of values, the minimum and maximum of this range were used to calculate the average. Only three critical determinants of a use case were considered to make the definition applicable to a wide range of studies. These are power rat-

ing, discharge duration, and number of annual cycles. Other factors, such as the required effective energy capacity (power times discharge duration), can often be derived from these. However, some studies did not provide values for all these parameters, leading to a potential bias in the definition from Table 1 and, therefore, in the analysis of the remaining studies described below.

Applications with similar technical characteristics were grouped as they would yield similar LCOS. Energy arbitrage and energy shifting were assigned to their parent category of time shifting. While peak shaving is the parent category of T&D investment deferral and demand charge management, the definition of peak shaving used by Nikolaidis et al. (2019, p. 756) is closer to time shifting (high power rating, medium discharge duration, medium number of annual cycles) than

**Table 1:** Definition of Applications

| Application                             | Power [MW] |                  |         | Discharge Duration [h] |                  |         | Cycles [1/a] |                     |          | Study IDs                |
|---|------------|------------------|---------|------------------------|------------------|---------|--------------|---------------------|----------|--------------------------|
|   | Min        | Base Case        | Max     | Min                    | Base Case        | Max     | Min          | Base Case           | Max      |                          |
| Primary Response                        | 0.1        | 97.3<br>(181.1)  | 2,000.0 | 0.02                   | 0.3<br>(0.1)     | 1.0     | 250.0        | 3,373.5<br>(2813.3) | 15,000.0 | 2, 10, 11,<br>12, 14, 18 |
| Secondary Response                      | 1.0        | 152.9<br>(207.1) | 2,000.0 | 0.3                    | 1.0<br>(0.2)     | 24.0    | 20.0         | 617.5<br>(241.7)    | 1,000.0  | 3, 11, 14,<br>18         |
| Tertiary Response                       | 5.0        | 302.5<br>(202.5) | 1,000.0 | 1.0                    | 3.5<br>(0.5)     | 5.0     | 10.0         | 255.0<br>(245.0)    | 500.0    | 11, 14                   |
| Power Quality                           | 0.1        | 104.6<br>(200.3) | 1,000.0 | 0.003                  | 0.3<br>(0.1)     | 0.5     | 10.0         | 1,309.3<br>(1872.9) | 5,000.0  | 2, 11, 12,<br>14, 18     |
| Time Shifting<br>(incl. Peak Shaving)   | 0.001      | 223.1<br>(220.7) | 2,000.0 | 1.0                    | 5.4<br>(1.8)     | 24.0    | 50.0         | 364.0<br>(157.9)    | 730.0    | 2, 3, 11,<br>12, 14, 18  |
| T&D Investment<br>Deferral              | 1.0        | 31.4<br>(39.7)   | 500.0   | 0.5                    | 4.8<br>(2.4)     | 8.0     | 10.0         | 274.3<br>(56.5)     | 500.0    | 2, 12, 14,<br>18         |
| Demand Charge<br>Management             | 0.001      | 1.0<br>(-)       | 10.0    | 1.0                    | 4.0<br>(-)       | 6.0     | 50.0         | 500.0<br>(-)        | 500.0    | 14                       |
| Black Start                             | 0.1        | 280.0<br>(270.0) | 1,000.0 | 0.3                    | 2.0<br>(1.0)     | 4.0     | 1.0          | 6.5<br>(3.5)        | 20.0     | 11, 14                   |
| UPS                                     | 0.002      | 5.0<br>(-)       | 10.0    | 0.3                    | 0.4<br>(-)       | 0.5     | 50.0         | 50.0<br>(-)         | 50.0     | 11                       |
| Emergency Backup<br>& Power Reliability | 0.001      | 3.0<br>(2.0)     | 10.0    | 2.0                    | 6.0<br>(2.0)     | 10.0    | 50.0         | 50.0<br>(0.0)       | 400.0    | 11, 14                   |
| Seasonal Storage                        | 10.0       | 302.5<br>(202.5) | 2,000.0 | 24.0                   | 398.0<br>(302.0) | 2,000.0 | 1.0          | 3.5<br>(0.5)        | 5.0      | 11, 14                   |

Note. Study IDs are specified in Appendix D. Values in parentheses are standard deviations. Additional digits were added to numbers that would otherwise be displayed as zero.

to its sub-applications. Therefore, this definition of peak shaving was assigned to time shifting. Additionally, emergency backup and power reliability were combined into one category. No study analyzed inertial support, so it was excluded from the analysis. Moreover, Xu et al. (2022) were not included in the definition because this study examined three different real-life projects in China rather than providing a general overview of the technical requirements of the applications evaluated. As this was the only other study that explicitly considered peak shaving, this application was also excluded from further analysis. Next, an overview of the technical suitability of each EES technology for the applications under consideration was created (see Table 2) by listing all technologies examined for a specific application in at least one of the LCOS studies analyzed. Finally, the remaining LCOS studies' data (see Appendix D.2) was extracted using the assumptions from Table 1 and Table 2.

### 3.2. Results

Table 3 summarizes the most cost-effective EES technologies for each application and study<sup>8</sup>. A first look at these results indicates the presence of heterogeneity among the dif-

ferent studies rather than a consensus on the optimal technology for each application. It is worth noting, that a single study often limits its recommendations to only one or two technologies for different use cases. Nevertheless, no single technology is consistently recommended across all studies for any application. Instead, up to five EES technologies have been proposed for one examined application, such as primary response or time shifting. Each of the technologies considered appeared at least three times. However, Li-ion and PHS stand out as particularly prominent recommendations, accounting for more than half of all suggestions, with shares of 29 % for Li-ion and 26 % for PHS (see Figure 3)<sup>9</sup>.

To identify potential patterns in the results, the data was sorted by input parameters (power rating, discharge duration, and annual cycles), and the shares of each technology were computed. Initially, the applications were sorted based on the average discharge duration of each use case. Figure 4 displays the distribution of EES technologies as the cheapest option for each application. Despite the sorting, considerable variation is observed, suggesting that the results may not strongly correlate with the discharge duration. However, each study employs its own set of assumptions, which can

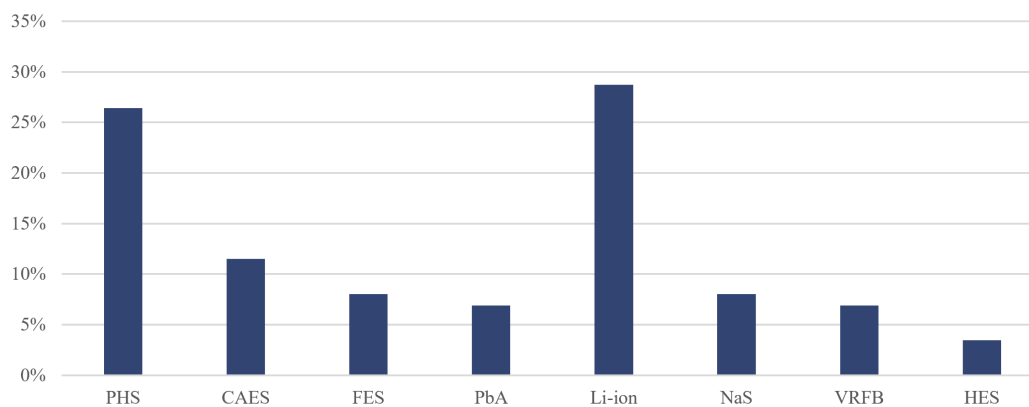
<sup>8</sup> A more detailed overview of the results is provided in Appendix C.

<sup>9</sup> Whenever two technologies were tied for one study and application, each technology was considered half a suggestion for calculating the shares.

**Table 2:** Technical Suitability of EES Technologies

| Application                          | EES Technology |            |            |                       |                       |                   |                      |        |
|--------------------------------------|----------------|------------|------------|-----------------------|-----------------------|-------------------|----------------------|--------|
|                                      | PHS            | CAES       | FES        | PbA                   | Li-ion                | NaS               | VRFB                 | HES    |
| Primary Response                     |                |            | 10, 14, 18 | 2, 10, 11, 12, 14, 18 | 2, 10, 11, 12, 14, 18 | 2, 11, 12, 14     | 2, 10, 12, 14        | 14     |
| Secondary Response                   | 14             | 14, 18     | 11, 14     | 3, 11, 14, 18         | 3, 11, 14, 18         | 11, 14, 18        | 3, 11, 14, 18        | 14, 18 |
| Tertiary Response                    | 14             | 14         |            | 11, 14                | 11, 14                | 11, 14            | 11, 14               | 11, 14 |
| Power Quality                        |                |            | 11, 14, 18 | 2, 11, 12, 14, 18     | 2, 11, 12, 14, 18     | 2, 11, 12, 14     | 2, 12, 14            | 14     |
| Time Shifting                        | 11, 14, 18     | 11, 14, 18 |            | 2, 3, 11, 12, 14, 18  | 2, 3, 11, 12, 14      | 2, 11, 12, 14, 18 | 2, 3, 11, 12, 14, 18 | 11, 14 |
| T&D Investment Deferral              | 14             | 14, 18     |            | 2, 12, 14, 17, 18     | 2, 12, 14, 17, 18     | 2, 12, 14, 18     | 2, 12, 14, 17, 18    | 14, 18 |
| Demand Charge Management             |                |            |            | 14                    | 14                    | 14                | 14                   | 14     |
| Black Start                          | 14             | 14         | 14         | 14                    | 14                    | 14                | 11, 14               | 11, 14 |
| UPS                                  |                |            |            | 11                    | 11                    |                   |                      |        |
| Emergency Backup & Power Reliability |                |            |            | 11, 14                | 11, 14                | 14                | 14                   | 14     |
| Seasonal Storage                     | 11, 14         | 11, 14     |            |                       |                       |                   | 14                   | 11, 14 |

*Note.* The numbers refer to the Study IDs shown in Appendix D.



**Figure 3:** Shares of EES Technologies in Overall Results

result in significant variations in the input parameters for a given application compared to those outlined in Table 1.

To address this variability between studies, the results were categorized into five mutually exclusive and collectively exhaustive discharge duration intervals ([0 h; 1 h), [1 h; 4 h), [4 h; 8 h), [8 h; 24 h), [24 h; 700 h]) according to the assumed discharge duration in each study and thus independent of the application examined<sup>10</sup>. Figure 5 illustrates the distribution of shares for each duration interval.

<sup>10</sup> Studies without information about the assumed discharge duration were not considered in this categorization.

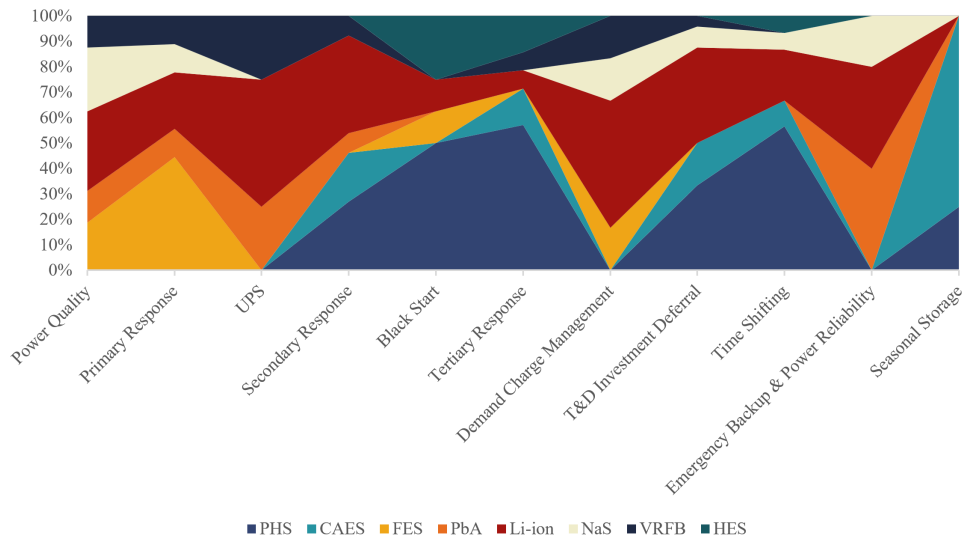
As a result of this categorization, a new pattern emerges, suggesting a dependency on discharge duration. Li-ion and FES have the largest shares among the EES technologies for durations of less than one hour. Li-ion continues to dominate for medium discharge durations, while PHS gradually replaces FES and reaches a peak share of 50 % in the 8–24-hour interval. In the case of very long discharge durations, CAES becomes the dominant technology, accounting for 75 % of the studies’ recommendations, with PHS being the only other economically viable option. These observations are further clarified in Figure 6, showing that only PHS, CAES, FES, and Li-ion have shares exceeding 20 % in any interval.

Table 3: Most Cost-Effective EES Technologies for Each Application and LCOS Study

| Study ID | Application                       |                    |                   |                            |                   |                         |                            |                            |        |                                      |                  |
|----------|-----------------------------------|--------------------|-------------------|----------------------------|-------------------|-------------------------|----------------------------|----------------------------|--------|--------------------------------------|------------------|
|          | Primary Response                  | Secondary Response | Tertiary Response | Power Quality              | Time Shifting     | T&D Investment Deferral | Demand Charge Management   | Black Start                | UPS    | Emergency Backup & Power Reliability | Seasonal Storage |
| 1        |                                   | PHS                | Li-ion/VRFB       |                            | PHS               | Li-ion/VRFB             |                            |                            |        |                                      |                  |
| 2        | Li-ion                            |                    |                   | Li-ion                     | NaS               | NaS                     |                            |                            |        |                                      |                  |
| 3        |                                   | Li-ion (LFP/NCA)   |                   |                            | Li-ion (LFP)      |                         |                            |                            |        |                                      |                  |
| 4        | Li-ion FES (Long-/Short-Duration) | Li-ion             | PHS               | Li-ion/FES (Long-Duration) | PHS               | PHS                     | Li-ion FES (Long-Duration) | Li-ion/FES (Long-Duration) | Li-ion | Li-ion                               |                  |
| 5        |                                   | Li-ion             |                   |                            | HES (Underground) | Li-ion                  | Li-ion                     |                            |        |                                      |                  |
| 6        |                                   | Li-ion             |                   |                            | CAES (D-CAES)/PHS |                         |                            |                            |        |                                      | CAES (D-CAES)    |
| 7        |                                   | PHS                | PHS               |                            | PHS               | PHS                     |                            |                            |        |                                      | PHS              |
| 8        | VRFB                              | VRFB               | PHS               |                            | PHS               |                         |                            | PHS                        | VRFB   |                                      |                  |
| 9        |                                   |                    |                   |                            |                   |                         |                            |                            |        |                                      |                  |
| 10       | FES                               |                    |                   |                            |                   |                         |                            |                            |        |                                      |                  |
| 11       | PbA (Advanced)                    | PbA (Advanced)     | HES               | PbA (Advanced)             | PHS               |                         |                            | HES                        | PbA    | PbA                                  | CAES             |
| 12       | NaS                               |                    |                   | NaS                        | Li-ion            | Li-ion                  |                            |                            |        |                                      |                  |
| 13       |                                   | CAES (D-CAES)      |                   |                            | CAES (D-CAES)     | CAES (D-CAES)           | NaS                        |                            |        | NaS                                  |                  |
| 14       | FES                               | PHS                | PHS               | NaS                        | PHS               | PHS                     | VRFB                       | PHS                        |        | PbA                                  | CAES             |
| 15       |                                   |                    |                   |                            | PHS               | PHS                     |                            |                            |        |                                      |                  |
| 16       |                                   | Li-ion (LFP)       | CAES              |                            | Li-ion (LFP)      | Li-ion (LFP)            | Li-ion (LFP)               |                            |        |                                      |                  |
| 17       |                                   |                    |                   |                            |                   | Li-ion (LFP)            |                            |                            |        |                                      |                  |
| 18       | FES                               | CAES (Aboveground) |                   | FES                        | PHS               | CAES (Aboveground)      |                            |                            |        |                                      |                  |

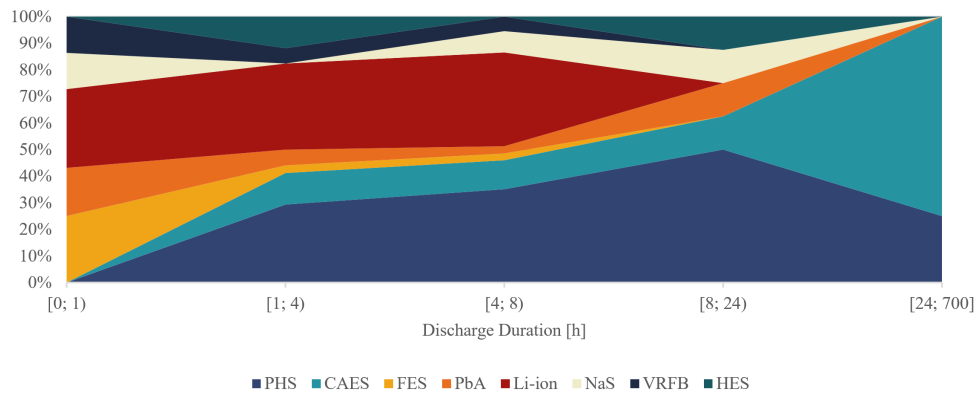
Note. Sub-groups of technologies are specified in parentheses. LFP = lithium iron phosphate; NCA = nickel cobalt aluminum oxide. The two cheapest technologies were taken for this table whenever there was no clear winner.



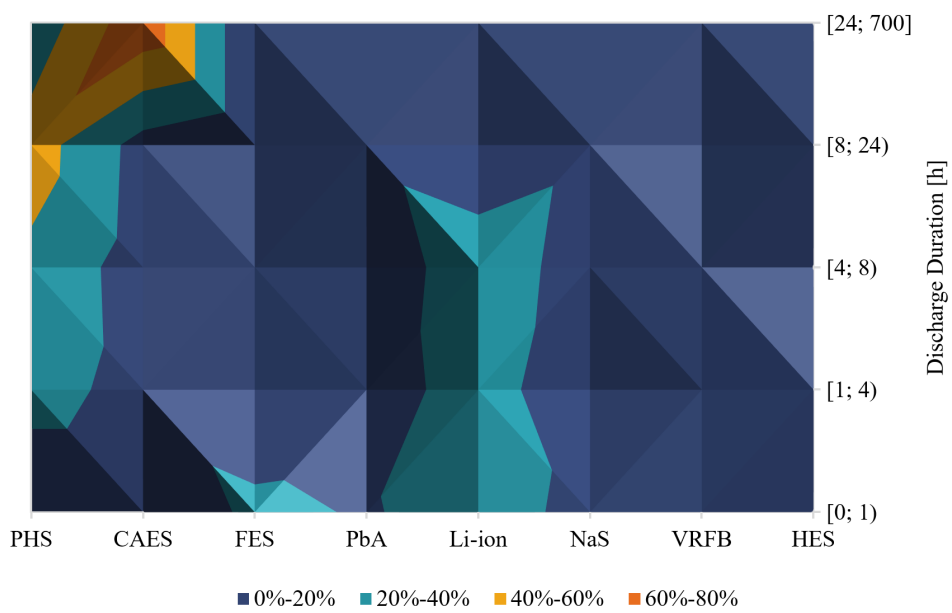


**Figure 4:** Shares of Results per Application, Sorted by Discharge Duration

*Note.* Ascending order from left to right.



**Figure 5:** Shares of Results per Duration Interval



**Figure 6:** Contour Plot of Shares per Duration Interval

The same clustering approach was applied to power ratings and the number of annual cycles, detailed in Appendix E and Appendix F, respectively<sup>11</sup>. Plotting the shares of results based on power intervals (see Appendix E.2) leads to a somewhat similar structure as in Figure 5. Again, Li-ion and PHS dominate all power ranges, with the former having the greatest shares for low to medium power ratings and the latter taking over for medium to high power. Notably, PbA has the third largest share for the lowest and highest power intervals, with 12 % and 30 %, respectively.

Regarding the parameter of annual cycles, the shares of the results exhibit the most remarkable variation (see Appendix F.2). Most technologies, particularly PHS and Li-ion, appear to be viable over a wide range of frequencies, as depicted in Figure 7. Overall, PHS, CAES, and HES dominate low-frequency applications. While PHS remains strong for medium levels of annual cycles, CAES and HES are replaced by Li-ion, PbA, and NaS. Li-ion becomes even more prominent for higher frequencies, peaking at a 75 % share for 600 to 1,000 annual cycles. Only for high-cycle applications, FES supplants Li-ion as the dominant technology, accounting for 50 % of the results for frequencies between 1,000 and 8,000 cycles.

Finally, the studies' projections for the cheapest EES technologies in the future were examined. In this analysis, most studies indicate that Li-ion has a significant advantage over other EES technologies, representing at least 75 % of the results for all but two applications (see Figure 8). Only for the short-duration, high-frequency primary response application, Li-ion will continue to compete with FES, while for the long-duration, low-frequency seasonal storage application, HES is expected to be the most economical option in all studies that provided a forecast for this use case (Hunter et al., 2021; Jülch, 2016; Schmidt et al., 2019a).

### 3.3. Discussion

Upon examining the structured and visualized results, noticeable patterns emerge that allow for the development of general assumptions regarding the most cost-effective technology for each use case.

#### 3.3.1. Short-Duration Applications

For applications with very short discharge durations, FES and Li-ion appear to be the most promising technologies (see Figure 6). Although UPS would fall into this category with an estimated average discharge duration of 0.4 hours (see Table 1), FES was not considered technically suitable for this application (see Table 2).

One notable advantage of FES technologies, as mentioned in Section 2.2.1, is their very high cycle life compared to other EES technologies. This is reflected in the analyzed LCOS studies, where FES exhibits an average cycle life of about 1,450,850 compared to 4,800 for Li-ion and 3,300 for

PbA. The extended cycle life of FES can provide a cost advantage in high-frequency applications since flywheels require fewer replacements than other technologies. For instance, in the case of primary response, with an average project life of 14 years and a mean number of about 3,374 annual cycles, FES technologies would last 430 years without replacement, while Li-ion and PbA would require ten and 15 replacements, respectively<sup>12</sup>. Given this cost advantage, one might expect FES to consistently appear as the cheapest technology for primary response. However, only four out of nine studies suggest FES for this application (see Table 3). This discrepancy may be attributed to the set of technologies evaluated in each study for primary response. It can be noted that all studies that considered FES suggest it as the cheapest technology for primary response. Of course, the exclusion of FES in the other studies does not automatically imply that it would have the lowest LCOS if included. Nevertheless, combined with its cost advantage in high-frequency scenarios, this strongly indicates that FES may be the cheapest technology for primary response. As shown in Figure 8, Li-ion is expected to catch up in the future (Beuse et al., 2020b; Castro et al., 2022; Schmidt et al., 2019a), possibly due to its significant projected cost reduction (Schmidt et al., 2019b, Table S8) resulting from the widespread adoption of EVs as described in Section 2.2.2.

In the power quality application, FES is only recommended in two out of eight studies (see Table 3). Again, this could be partly due to the exclusion of FES in four studies considering this use case (Battke et al., 2013; Beuse et al., 2020a; Moradi-Shahrbabak & Jadidoleslam, 2023; Rahman et al., 2021). Nevertheless, although it was part of their considerations, Nikolaidis et al. (2019) and Schmidt et al. (2019a) do not propose FES for power quality. One possible explanation for the weaker performance of FES technologies in power quality is their comparatively high investment costs. Taking the average of all studies considering the technology (see Appendix D), FES has an energy-based CAPEX of 2,924 USD/kWh and a power-specific CAPEX of 477 USD/kW, compared to values of 381-583 USD/kWh and 331-885 USD/kW for BES technologies<sup>13</sup>. The estimated average number of annual cycles for power quality is more than 60 % lower than that of primary response. As a result, FES technologies may struggle to offset their higher initial investment costs with their cycle life advantage. This is especially true for the lower frequency range of only ten annual cycles, where no technology would reach its cycle life within the estimated project life of about 17 years. Nevertheless, FES could still be a viable option for power quality, especially for higher frequencies, as indicated by two studies recommending FES

<sup>12</sup> The calendrical lives of 19, 12, and 10 years for FES, Li-ion, and PbA do not influence this result. It would be the limiting factor for FES, but it still lies above the project life.

<sup>13</sup> Assuming ten-year average (2013-2022) exchange rates of 0.8606 EUR/USD, 1.3129 AUD/USD, and 6.5580 CNY/USD (Organisation for Economic Co-operation and Development (OECD) (2023)) and without considering inflation. These assumptions also apply to all following CAPEX and OPEX comparisons.

<sup>11</sup> Again, only studies with information about the categorizing input parameter were considered.

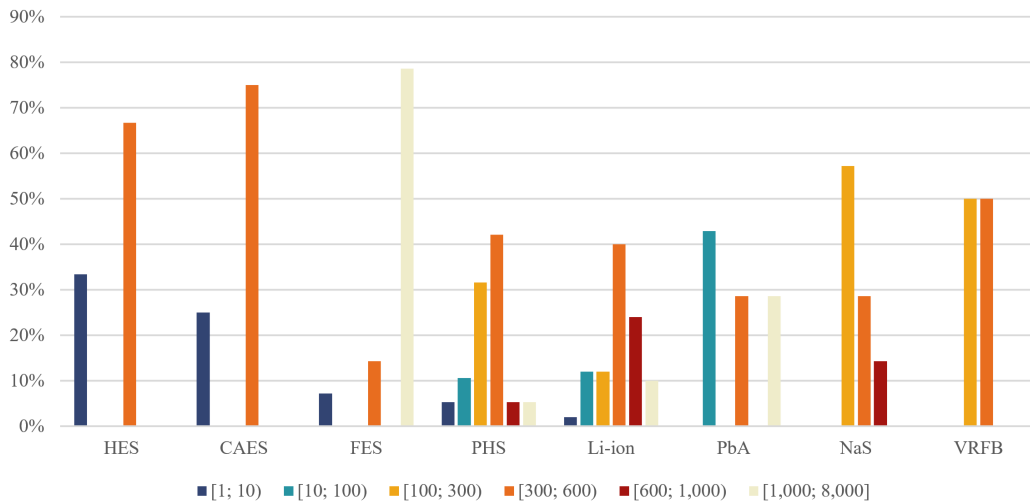


Figure 7: Shares of Cycle Intervals in the Results of Each EES Technology

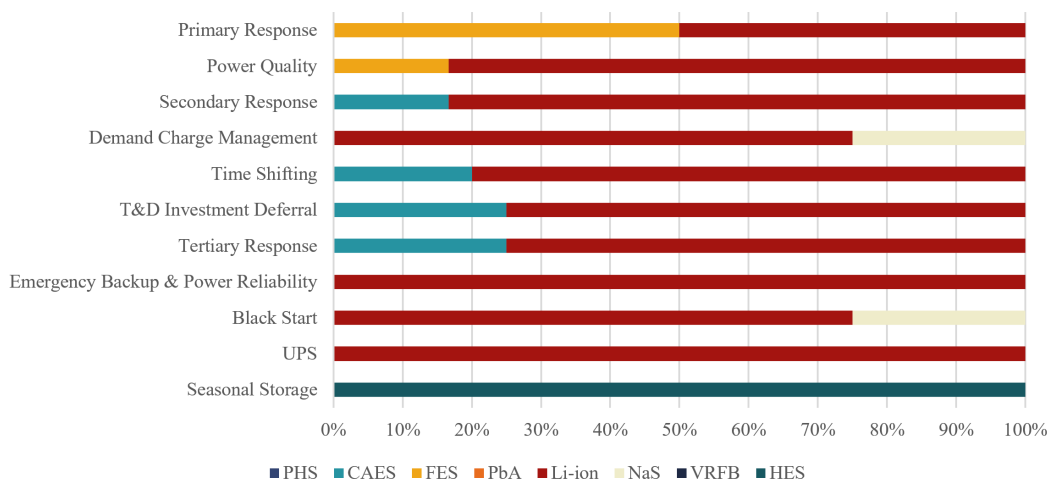


Figure 8: Most Cost-Effective EES Technologies in the Future

Note. Only Beuse et al. (2020a), Castro et al. (2022), Hunter et al. (2021), Jülich (2016), Schmidt et al. (2019a), and Viswanathan et al. (2022) provided future projections.

for this application assuming more than 1,000 annual cycles (Castro et al., 2022; Zakeri & Syri, 2015).

There is a clear trend toward BES for power quality, with over 80 % of study results favoring this group of storage technologies. Moradi-Shahrbabak and Jadidoleslam (2023) conclude that VRFB is the cheapest BES technology. However, this study lacks transparency regarding the input parameters used, as it only provides ranges, which even differ between the technologies. This makes it unclear which values were used for the LCOS calculation. While the study assumes a power range for VRFB of 0.01-3 MW, Li-ion can reach a power of up to 50 MW (Moradi-Shahrbabak & Jadidoleslam, 2023, p. 1704). Additionally, the study assumes low balance of system (BOS) and fixed O&M costs for VRFB compared to other technologies (Moradi-Shahrbabak & Jadidoleslam, 2023, p. 1705). This could lead to lower overall power-based costs for VRFB, making it the preferred technology. In addition,

the study overlooks some vital cost factors, such as time and cycle degradation, further impacting the reliability of the results compared to some of the other studies. Nikolaidis et al. (2019) propose advanced PbA as the cheapest technology for power quality (voltage regulation). No other study considers this technology. Instead, they primarily refer to the classic VRLA battery. Furthermore, this study calculates LCOS on a power basis (USD/kW) rather than an energy basis (USD/kWh). As described in Section 2.3.1, this is a viable approach for applications where the ability to provide power is more significant than the total discharged energy. This is arguably the case for power quality. The EES technologies may not need to discharge large amounts of energy but must react quickly and precisely inject or absorb power to balance out voltage fluctuations. Without taking PbA into account, NaS is the cheapest technology in Nikolaidis et al. (2019), which is consistent with the findings of Rahman et al. (2021)

and Schmidt et al. (2019a). Overall, NaS and Li-ion emerge as the most prominent options for power quality. While it is difficult to determine the superiority of either technology at this stage, as there are detailed studies supporting both options (Beuse et al., 2020a; Schmidt et al., 2019a), Li-ion is expected to be the clear winner in the future (see Figure 8) (Beuse et al., 2020b; Castro et al., 2022; Schmidt et al., 2019a).

BES also appears to dominate the third use case with short discharge durations, namely UPS. Nikolaidis et al. (2019) was the only study that specifically defined this application, potentially leading to biased input parameters in Table 1 and influencing the results drawn from other studies. Furthermore, the study only compares two relevant technologies, PbA and Li-ion, which is why Table 2 limits this application to these two EES technologies. Generally, UPS can be seen as a customer service (Fitzgerald et al., 2015, p. 16) requiring a low power rating, which may be why mechanical storage is unsuitable here. However, technical characteristics provided by Schmidt et al. (2019b, Table S3) suggest that VRFB or NaS could also be suitable for UPS, even though Nikolaidis et al. (2019) did not consider them. In this context, Moradi-Shahrbabak and Jadidoleslam (2023) once more suggest VRFB, but the lack of transparency described above again makes it difficult to compare these findings with other results. Nikolaidis et al. (2019) propose PbA for UPS. As described above, this study uses LCOS on a power basis, which is an appropriate approach for UPS. Here, the value of the application mainly comes from providing power in the event of a system failure instead of the total amount of energy discharged. However, Nikolaidis et al. (2019) do not consider time or cycle degradation, which could be particularly beneficial for PbA, which typically suffers from high capacity degradation as described in Section 2.2.2. Drawing precise conclusions for UPS is challenging due to the limited number of studies and the potential bias in the definition of the application. In most cases, Li-ion appears to be the preferred technology, while PbA may also be a viable option. Only Beuse et al. (2020a) and Castro et al. (2022) provide future projections applicable to this use case, and both studies assume that Li-ion will be the most cost-effective technology.

### 3.3.2. Lower Intermediate Applications

For medium-duration applications, Li-ion shares its dominance with PHS (see Figure 5). While the latter takes over for upper intermediate durations and higher power ratings, Li-ion appears to be the most appropriate technology in relatively lower duration and power applications. Secondary response, demand charge management, emergency backup, and power reliability are examples of those medium-duration use cases on the lower end of the power ratings or discharge durations.

In the context of secondary response, Li-ion is the least expensive technology in five of 13 studies. PHS and CAES share the second place, each appearing three times (see Table 3). Australian Energy Regulator (AER) (2020) is one of the studies that suggest PHS for this application. However, this study

has a regional focus on Australia. It incorporates financing and funding costs (AER, 2020, p. 7) that are not considered in most other studies and may vary significantly between regions. It also assumes that each EES technology can deliver its full rated capacity. This does not reflect the reality where energy is lost due to inefficiencies or capacity degradation over time, which is why the rated capacity often needs to be higher than the actual capacity required (AER, 2020, pp. 29–30). Similarly, self-discharge is not considered. End-of-life costs, including recycling efforts and potential revenue from salvage values, are essential factors not considered in the calculations of AER (2020). Different materials used in BES may require varying degrees of recycling effort (Battke et al., 2013, p. 248). Furthermore, this study lacks transparency regarding input parameters such as DoD, cycle or calendric life, CAPEX, OPEX, and BOS cost. This lack of transparency makes it challenging to compare the results with other studies and to understand the reasons for different outcomes. Most importantly, the study does not directly compare LCOS between different technologies but instead displays LCOS on separate graphs. Therefore, values need to be read from the graphs, which is very imprecise, especially when values are close together (AER, 2020, pp. 40–44). Consequently, it is impossible to draw precise and meaningful conclusions from this study.

One possible reason why studies like AER (2020), Hunter et al. (2021), Jülch (2016), and Salvini and Giovannelli (2022) suggest PHS or CAES instead of Li-ion for secondary response could be their assumption of longer discharge durations ranging from 4–12 hours, compared to the estimated average of one hour (see Table 1) for this application. PHS and CAES have significantly lower energy-based CAPEX than BES technologies (96–124 USD/kWh vs. 381–583 USD/kWh). Therefore, as the energy capacity increases, PHS and CAES become relatively more attractive, assuming all other factors remain constant. This is the case here since energy capacity is the product of discharge duration and power rating. Conversely, PHS and CAES have high power-based CAPEX of 983 USD/kW and 957 USD/kW, respectively, making them potentially more expensive than BES (331–885 USD/kW) for lower discharge durations assuming the same power ratings. Nevertheless, Schmidt et al. (2019a) and Zakeri and Syri (2015) propose PHS and CAES, even when assuming short discharge durations of 1 and 1.25 hours, respectively. One possible explanation is that Schmidt et al. (2019b, Table S6) use a shallow DoD assumption for Li-ion (57 %) compared to the 80–90 % (Castro et al., 2022, p. 357; Nikolaidis et al., 2019, p. 757) used in the other studies. A lower DoD increases the required nominal energy capacity to achieve the same effective energy output, driving up the LCOS of a technology. Zakeri and Syri (2015, p. 592) assume RTEs for CAES of 70–90 %, considerably higher than the typical range in other studies, which usually falls between 44 % (Beuse et al., 2020a, p. 2165) and 70 % (Jülch, 2016, p. 1599). LCOS is highly sensitive to changes in the RTE (Mugyema et al., 2023, p. 11), which could explain why this study identifies CAES as the cheapest technology. Moradi-Shahrbabak and



Jadidoleslam (2023) and Nikolaidis et al. (2019) are two more outliers, suggesting VRFB and advanced PbA, respectively. However, as mentioned earlier, these studies are less comparable, and they also did not consider CAES or PHS for secondary response.

In summary, except for Beuse et al. (2020a), who used comparatively low discharge durations, all studies that included CAES or PHS in their comparisons, suggested one of them as the cheapest technology. When increasing the assumed discharge duration to two hours, Beuse et al. (2020b) aligns with the other studies and recommends PHS. Therefore, PHS, CAES, and Li-ion are likely competitive options for secondary response, with PHS and CAES potentially being the preferred choice for relatively longer discharge durations. Looking to the future, most studies agree that Li-ion will be the dominant technology, outperforming PHS and CAES for this application (Beuse et al., 2020b; Castro et al., 2022; Hunter et al., 2021; Jülch, 2016; Schmidt et al., 2019a; Viswanathan et al., 2022).

The perspective changes when it comes to demand charge management. As a behind-the-meter customer service (Fitzgerald et al., 2015, p. 16), mechanical storage is unsuitable (see Table 2), and BES is the dominant technology. The most prominent representative of this group is, once again, Li-ion (see Table 3), but three studies are recommending other technologies. Castro et al. (2022) conclude that long-duration flywheels are the most suitable technology for applications such as demand charge management. However, long-duration flywheels are a relatively new and emerging technology (Castro et al., 2022, p. 355) not considered in the other studies. In addition, self-discharge is not taken into account. FES technologies have an average self-discharge of nearly 190 % per day<sup>14</sup>, so not considering this could significantly affect the results. Salvini and Giovannelli (2022) identify NaS batteries as the cheapest technology for demand charge management. This finding may be influenced by the assumption of a higher power rating (5 MW, five times higher than other studies) and a longer discharge duration (six hours, 50 % higher). The average energy-based CAPEX of NaS used in all studies analyzed is the lowest at 346 USD/kWh compared to other BES technologies (381-583 USD/kWh). The higher power rating and longer discharge duration result in higher energy capacity requirements, which therefore have a proportionately lower impact on the LCOS of NaS, potentially making it the cheapest technology in this study. It is worth noting that Salvini and Giovannelli (2022) do not consider essential cost factors like replacement cost, end-of-life cost, cycle and time degradation, and self-discharge, which may affect the accuracy of the resulting LCOS estimates. Finally, Schmidt et al. (2019a) propose VRFB as the cheapest technology for demand charge management. The study assumes 500 annual cycles, which is at the upper end of the range for this appli-

cation (see Table 1). One advantage of VRFB is its long cycle life compared to other BES technologies, lasting about twice as many cycles as Li-ion, PbA, or NaS in this study (Schmidt et al., 2019b, Table S3). This extended cycle life may be why VRFB is preferred in this analysis. Apart from that, this study demonstrates high overall quality, considering a wide range of cost factors and taking into account the uncertainty of their input parameters.

While it is difficult to draw definitive conclusions, Li-ion may have a slight advantage over other BES technologies for demand charge management, resulting in the lowest LCOS in 50 % of the studies. Nevertheless, NaS and VRFB could also be viable options, often ranked in the top three technologies. It is essential to acknowledge that the estimates of input parameters used for this application (see Table 1) are again only derived from the values of a single study (Schmidt et al., 2019b), increasing the risk of biased conclusions. In the future, 75 % of the studies predict that Li-ion will outperform all other technologies for this use case (Beuse et al., 2020b; Castro et al., 2022; Schmidt et al., 2019a; Viswanathan et al., 2022).

As for demand charge management, mechanical storage is unsuitable for emergency backup and power reliability (see Table 2), which may explain the dominance of BES solutions. The two most frequently proposed technologies for these use cases are Li-ion and PbA, each suggested by 40 % of the studies. Salvini and Giovannelli (2022) stand out as the only outlier, again identifying NaS as the cheapest technology. The reasons for this result are equivalent to those described earlier for demand charge management, as the same input parameters were used for both applications. For the studies favoring PbA (Nikolaidis et al., 2019; Schmidt et al., 2019a), a much lower cycle frequency was assumed than for the other studies (except for Beuse et al. (2020a)). PbA is less suitable for higher numbers of cycles due to cycle degradation (Hoff, 2022, p. 156). On the other hand, PbA is a relatively inexpensive technology compared to Li-ion<sup>15</sup>. At lower frequencies, cycle life and degradation are less critical, making investment cost one of the main drivers for the LCOS. Furthermore, studies favoring PbA over Li-ion assume comparatively higher RTEs for PbA (84-90 % (Nikolaidis et al., 2019, p. 757; Schmidt et al., 2019b, Table S4) vs. 72-79 % (Beuse et al., 2020a, p. 2165; Cortez et al., 2021, p. 209). For comparison, the range specified by IRENA falls somewhere in the middle at 80-82 % (Ralon et al., 2017, p. 125), so both assumptions appear similarly accurate. There are high-quality studies that consider a wide range of cost factors on either side (Beuse et al., 2020a; Schmidt et al., 2019a).

In summary, while there may be a variety of suitable technologies for emergency backup and power reliability applications, Li-ion and PbA appear to be particularly advantageous. Again, all studies agree that Li-ion will be the dominant technology in the future (Beuse et al., 2020b; Schmidt et al., 2019a), likely due to its stronger cost reduction (Schmidt et

<sup>14</sup> Average calculated from the values provided by all studies that considered FES: Mugyema et al. (2023), Nikolaidis et al. (2019), Schmidt et al. (2019a), and Zakeri and Syri (2015).

<sup>15</sup> 381 USD/kWh and 583 USD/kWh for PbA compared to 552 USD/kWh and 773 USD/kWh for Li-ion.

al., 2019b, Table S8) and higher performance improvements (Ralon et al., 2017, p. 125). It is worth noting that both studies pointing to PbA (Nikolaidis et al., 2019; Schmidt et al., 2019a) were published four years ago, while Schmidt et al. (2019a, p. 87) even expected Li-ion to overtake PbA by 2020. Therefore, Li-ion may already be the single most cost-effective EES technology for these two use cases.

### 3.3.3. Upper Intermediate and Long-Duration Applications

After analyzing the lower intermediate applications, the remaining use cases in this overall category are examined. These are tertiary response, T&D investment deferral, time shifting, and black start. The goal is to get a better understanding of whether PHS may, in fact, be the most appropriate technology for them.

For tertiary response, 57 % of all studies considering this application concluded that PHS is the least expensive technology. CAES and HES come in second place, with one study each (14 %) suggesting them (see Table 3). Only one of the seven studies recommends BES technologies for this use case. In that study (AER, 2020), although it considered PHS, Li-ion and VRFB appear to be the cheapest options. As described in Section 3.3.2, this study's results are unreliable for this analysis due to regional focus, neglect of essential cost factors, lack of transparency, and omission of exact LCOS values for comparisons between different EES technologies.

Viswanathan et al. (2022, p. 130) conclude that CAES is the cheapest technology, while PHS ranks only fourth out of six, following Li-ion and VRFB. Like AER (2020), this research focuses on a specific region (USA). It takes into account taxes and financing costs, which again makes it less comparable to other studies and deviates from the aim of this thesis to provide a general and regionally independent view of the suitability of EES technologies. The LCOS of CAES (0.15-0.18 USD/kWh), Li-ion (0.14-0.20 USD/kWh), PHS (0.17-0.24 USD/kWh) and VRFB (0.17-0.23 USD/kWh) (Pacific Northwest National Laboratory (PNNL), 2023)<sup>16</sup> are fairly close. At the same time, it is unclear how much impact taxes and financing costs have on the total LCOS, so the technology rankings might be different if they were not considered. Except for AER (2020) and Viswanathan et al. (2022), all other studies that did not propose PHS for tertiary response did not consider it at all. Again, this does not automatically imply that PHS would be the cheapest technology if included in these studies. Nevertheless, it reinforces the overall impression that PHS is the dominant technology for tertiary response and has a slight advantage over other options, such as CAES or Li-ion. In terms of the future, Li-ion is the clear winner, as it is proposed by all but one study that provides a future projection for this use case (Beuse et al., 2020b; Jülch, 2016; Schmidt et al., 2019a; Viswanathan et al., 2022).

For T&D investment deferral, similar to tertiary response, AER (2020) suggests Li-ion and VRFB as the cheapest option, but as mentioned before, these results could be more reliable and precise. All other studies either recommend PHS or did not consider this technology. Mechanical storage seems to dominate for this application, with CAES being the cheapest technology when PHS is not included in the analysis. T&D investment deferral shares its future projections with tertiary response.

The dominance of PHS is even more apparent for time shifting, where it is the cheapest technology in all nine studies that considered it in their comparison. Including almost all studies (15 out of 18 (see Table 3)) in evaluating this application reduces the bias in the results. Therefore, PHS has a high probability of having a cost advantage in this particular use case. Similarly, Li-ion is likely to be the preferred choice in the future, with four out of five studies predicting that it will have the lowest LCOS (Beuse et al., 2020a; Hunter et al., 2021; Jülch, 2016; Schmidt et al., 2019a; Viswanathan et al., 2022).

Regarding black start applications, only four studies' results could be used to evaluate the techno-economic suitability of EES technologies for this use case (see Table 3). Additionally, only Nikolaidis et al. (2019) and Schmidt et al. (2019b) could be taken for defining the input parameters used in the remaining two studies, further limiting the reliability of the conclusions. PHS emerges as the winner in all studies where it was considered, underscoring the overall dominance of this technology for applications with upper intermediate discharge durations or power outputs. Only two studies provide future projections (Castro et al., 2022; Schmidt et al., 2019a), but they do not deviate from the consensus that Li-ion is the cheapest EES technology in most future scenarios. This supremacy can be attributed to the significant investments expected in Li-ion technologies, particularly in the EV industry, as discussed earlier. These investments enable economies of scale and accelerate learning effects (Beuse et al., 2020a, pp. 2166–2167), resulting in more significant cost reductions compared to the other technologies (Schmidt et al., 2019b, Table S8).

Seasonal storage is the only application where no study recommends BES. Instead, CAES and PHS are the only two technologies that appear at the top of the list. This is not surprising from an economic point of view, as the energy capacity requirements for seasonal storage of 240 MW to up to 4 GW<sup>17</sup> can be significantly higher compared to other use cases. As described in Section 3.3.2, PHS and CAES have a cost advantage over BES regarding energy-based CAPEX. This competitive advantage grows with the energy requirements of an application and is, therefore, highest for seasonal storage. From a technical perspective, except for VRFB, BES technologies are not considered applicable for this use case (see Table 2), which further explains their absence in the

<sup>16</sup> An overview of the up-to-date LCOS values from Viswanathan et al. (2022) is given in Pacific Northwest National Laboratory (PNNL) (2023), which is why the latter was used here.

<sup>17</sup> When multiplying the lower and upper bounds of power and discharge durations, respectively (see Table 1).

recommendations. Jülch (2016) is the only study that suggests PHS for seasonal storage. One notable difference here is the assumption of a longer lifetime for PHS compared to the other three studies (80 years (Jülch, 2016, p. 1597) vs. 30-55 years (Hunter et al., 2021, p. 2093; Schmidt et al., 2019b, Table S4)). However, all of these values are within the bounds specified by IRENA (Ralon et al., 2017, p. 124), making it challenging to determine which study made more realistic assumptions, especially considering their overall similarity. In summary, CAES and PHS dominate the current state of seasonal storage, while HES is the clear winner for the future, being the only technology proposed for this use case (Beuse et al., 2020a; Hunter et al., 2021; Jülch, 2016; Schmidt et al., 2019a).

### 3.3.4. Most Cost-Effective EES Technologies

By evaluating the outcomes for each use case and considering the array of studies, it is possible to answer the fundamental question of this thesis: Which technology is most cost-effective for each application? In cases like demand charge management, UPS, emergency backup, and power reliability, which are typically behind-the-meter customer services, Li-ion emerges as the most suitable and cost-effective option overall. However, other BES technologies like PbA, NaS, and VRFB show promise and may be the preferred choice for specific individual use cases. Mechanical storage is not well suited for these applications. This also applies to power quality<sup>18</sup>, where Li-ion and NaS have been identified as the most cost-effective options. PHS demonstrates dominance in the mid-range applications of secondary response, tertiary response, T&D investment deferral, time shifting, and black start, with CAES often a competitive alternative. For primary response, FES technologies exhibit a cycle life advantage, potentially making them the cheapest option overall, despite varied inclusion across studies. However, Li-ion is expected to catch up in the future. BES is not recommended for seasonal storage, where CAES and PHS are the top choices. Looking ahead, Li-ion is projected to increase its dominance, becoming the most suitable technology in all use cases except for seasonal storage, where HES is predicted to be the most cost-effective option. This is primarily due to Li-ion's expected cost reductions and performance improvements driven by extensive investments. In conclusion, the optimal energy storage technology varies across use cases, with PHS and Li-ion emerging as the most prominent and versatile options - one of these technologies being among the cheapest in almost all applications. Table 4 provides an overview of the most appropriate technologies for each application and period.

While the above paragraph answers the question of which technology is most cost-effective for which use case, it is essential to note that these conclusions largely depend on the application definitions used to extract data from the LCOS studies (see Table 1). These definitions are based on a sample of studies and may not reflect the true nature of these

applications. This is particularly the case for demand charge management and UPS, where only one source was useable to estimate the input parameters. To allow for broader applicability of the findings and to reduce their dependence on specific use case definitions, Figure 9 provides a more general overview of the results that also reflects the input parameters assumed for each application. This also makes it possible to verify the observations and assumptions made in Section 3.2.

Figure 9 shows that FES and Li-ion dominate short-duration, high-frequency applications with discharge durations of less than one hour. While FES is only viable for several thousand cycles per year, Li-ion and other BES technologies are suitable for frequencies as low as 50 cycles to more than 1,000 annual cycles. This is consistent with the observations in Figure 5 and Appendix F.2. Discharge durations of about one hour form a transition zone where both BES as well as PHS and CAES are suitable technologies. From then on, the two mechanical storage technologies are the best option for almost all applications. Only for smaller use cases, with power ratings below 10 MW, can BES maintain its position as the cheapest EES technology. This differs from the initial assumptions made in Section 3.2 based on Appendix E.2. Finally, most technologies are indeed suitable for a wide range of annual cycles. In addition to the wide frequency range of BES, mechanical storage without FES can be economically viable in applications ranging from 600 to less than ten yearly cycles. This also confirms the general trend that BES is more suitable for medium to high frequencies, while mechanical storage takes over for medium to low frequencies, which aligns with the findings of Figure 7 and Appendix F.2.

While these general conclusions increase the usability for decision-makers by being less dependent on the definition of specific use cases, one should note that the LCOS is no law of nature, and the results rely on a series of studies that build their estimates on assumptions and simplifications of the real world. These findings can serve as guidelines, but the high uncertainty associated with estimating LCOS must be kept in mind. In addition, the cost is only one side of the economic viability coin. An EES technology must also create value by generating revenues or reducing other expenses to justify an investment. Some technologies could simultaneously be used for multiple applications, creating value from different sources (Ralon et al., 2017, p. 13). This could give them a comparative advantage, even though they may be more expensive than other technologies that are only useable for one application at a time. A goal of future research could be to develop a more holistic metric that considers both costs and economic value.

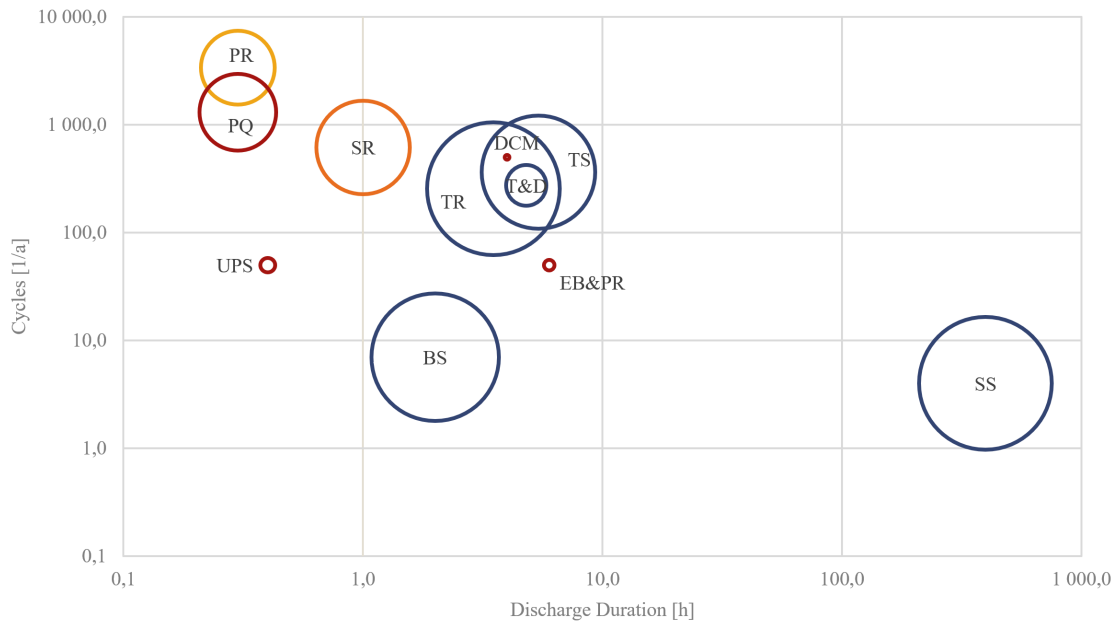
## 4. Conclusion

The objective of this thesis was to provide valuable assistance to decision-makers, policymakers, and other stakeholders in selecting EES technologies for specific applications. Various LCOS studies were analyzed and compared using a

<sup>18</sup> Except for FES, which is a suitable technology for power quality.

**Table 4:** Most Cost-Effective EES Technologies for Each Application and Period

| Application                          | Period          |            |
|--------------------------------------|-----------------|------------|
|                                      | Present State   | Future     |
| Primary Response                     | FES             | Li-ion/FES |
| Power Quality                        | Li-ion/NaS      | Li-ion     |
| UPS                                  | Li-ion/PbA      | Li-ion     |
| Secondary Response                   | PHS/CAES/Li-ion | Li-ion     |
| Demand Charge Management             | Li-ion/NaS/VRFB | Li-ion     |
| Emergency Backup & Power Reliability | Li-ion/PbA      | Li-ion     |
| Tertiary Response                    | PHS             | Li-ion     |
| T&D Investment Deferral              | PHS             | Li-ion     |
| Time Shifting                        | PHS             | Li-ion     |
| Black Start                          | PHS             | Li-ion     |
| Seasonal Storage                     | PHS/CAES        | HES        |



**Figure 9:** Most Cost-Effective EES Technologies in Dependence on Input Parameters

*Note.* Bubble sizes represent power ratings; Bubble color represents EES technology: Yellow = FES, red = BES, orange = mechanical storage (without FES)/BES, blue = mechanical storage (with FES); Bubble names: PR = primary response, SR = secondary response, TR = tertiary response, PQ = power quality, TS = time shifting, DCM = demand charge management, T&D = T&D investment deferral, EB&PR = emergency backup & power reliability, BS = black start, SS = seasonal storage.

systematic literature review to determine which EES technology is the most cost-effective for each stationary application.

The findings of this analysis suggest that Li-ion or PHS are viable technologies for most applications, demonstrating their versatility and economic competitiveness. The only exception is primary response, where FES has a comparative advantage for this use case. Looking to the future, seasonal storage is the only application where Li-ion is not expected to be the cheapest technology. Instead, all studies agree that HES will dominate this use case in the upcoming years. These conclusions are tied to specifically defined applications. To provide a universal picture and to increase the usability and

value of the results, they were also analyzed in terms of their input parameters to draw conclusions independent of application definitions. The analysis shows that BES, especially Li-ion, is the optimal choice for applications with discharge durations of less than one hour, with the addition of FES for high-frequency cycling scenarios. On the other hand, CAES and, especially PHS, take precedence for applications with durations beyond one hour and power ratings exceeding 10 MW. At the same time, BES remains viable for low-power use cases.

While this thesis has revealed patterns and similarities among the analyzed LCOS studies, it is vital to acknowl-



edge the heterogeneity of methodologies that makes direct comparisons challenging. Differences in assumptions, estimations, and the limited availability of studies - particularly for black start, UPS, and seasonal storage - introduce uncertainties and limitations to the precision and confidence of the conclusions drawn. This makes it crucial to develop norms and guidelines that standardize the calculation of LCOS and promote comparability across studies in the future. In addition, future research efforts should explore the development of more holistic metrics that consider costs, value streams, and environmental and social impacts. Emerging technologies should be included in the evaluation to ensure a comprehensive and up-to-date assessment of the EES landscape. A more quantitative approach to this systematic literature review could increase the reliability of existing conclusions and provide further insights by using a larger sample size to determine correlations between preferred EES technologies and specific input parameters.

From a scientific perspective, this thesis contributes to the existing body of knowledge by providing a comprehensive analysis and comparison of multiple LCOS studies. It highlights the considerable heterogeneity among these studies and provides a clearer understanding of the underlying patterns and similarities. From a practical standpoint, by identifying the most cost-effective EES technologies for different stationary applications, this thesis provides decision-makers, policymakers, and industry stakeholders with valuable information to make informed choices in their storage technology selection. These insights will not only help to reduce costs but also increase the efficiency of storage technology deployment. Furthermore, in the context of the global energy transition, where reliable and efficient storage technologies are critical for integrating intermittent renewable energy sources, this research offers practical guidance for stakeholders to navigate the complexities of energy system transformation.

Deploying EES technologies paves the way for future cost reductions and performance enhancements by enabling economies of scale. Due to the central role of EES in achieving the global energy transition, we cannot wait for more certain times but must invest in these technologies now. This way, we will be taking a far-reaching step toward a greener and more sustainable future

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