Junior Management Science 10(3) (2025) 810-830

Junior Management Science

www.jums.academy
ISSN: 2942-1861

KPIs for Sustainability: Defining the Strategy for a Sustainable Future in the Insurance Industry

Lea Wedel

Technical University of Munich

Abstract

Sustainability transformation has gained traction across industries worldwide. Given their critical risk exposure, this transformation is of extreme precarity to the insurance industry. Yet, literature lacks a comprehensive approach for the development of a sustainability strategy covering the environmental, social and governance (ESG) dimensions. This work bridges the gap by evaluating methods for defining sustainability Key Performance Indicators (KPIs) and their integration into strategy. A roadmap is then developed that guides successful strategy implementation. Based on a systematic literature review of 5.000+ academic papers, this work features a quantitative and qualitative analysis of literature and evaluates four core papers on the definition of sustainability KPIs for the insurance industry. Leadership commitment and ESG integration into core business emerge as the most important factors towards a successful transformation. The resulting sustainability roadmap provides a blueprint for insurers to embed ESG values, enabling businesses of all sizes to participate. This work contributes to academia and industry by supporting the development of comprehensive and successfully integrated sustainability strategies.

Keywords: insurance; KPIs; strategy; sustainability; transformation

1. Introduction

In 1987, the United Nations defined sustainability as "[...] meet[ing] the needs and aspirations of the present without compromising the ability to meet those of the future" (World Commission on Environment and Development, 1987, p. 34). This corresponds to social and environmental well-being for all people. In a business context, sustainability has often been transferred into Corporate Social Responsibility (CSR) and is"[...] understood to be the way firms integrate social, environmental and economic concerns into their values, culture, decision making, strategy and operations in a transparent and accountable manner [...]" (Hohnen, 2007, p. 4).

The first time that the private financial sector became part of this sustainability movement was in 1992 and the insurance sector followed in 1997 (cf. Schanz, 2022, p. 9). Out of these endeavors, the United Nations Environment Programme Finance Initiative (UNEP-FI) emerged. The initiative catalyzes a network of more than 500 banks and insurers and works with them towards a sustainable future (cf. UNEP-FI, n.d.). To this date, UNEP-FI is still highly relevant and on the forefront of working on the global sustainability transformation. One example for that is the recently founded Net-Zero Insurance Alliance (NZIA) that commits members to reduce emissions in their underwriting portfolios to net-zero by 2050 (cf. UNEP-FI, 2023b, p. 5).

In 2015, the United Nations (UN) presented the 17 Sustainable Development Goals (SDGs) that have set an agenda of 169 targets towards achieving sustainability by 2030. They are an "[...] urgent call for action by all countries [...]" (United Nations Department of Economic and Social Affairs, 2024) to combine efforts and transform this world into a more sustainable one. The 17 goals have defined an

I want to express my gratitude to everyone who supported me during the process of writing this thesis. Special thanks go to the TUM Chair of Management Accounting for the opportunity to write my thesis with them. My sincere appreciation is further extended to Prof. Dr. Maximilian Blaschke and Max Nadicksbernd for supervising my thesis and supporting me every step along the way.

DOI: https://doi.org/10.5282/jums/v10i3pp810-830

action plan that can be adapted to a breadth of industries and businesses. It is common practice for many insurers to align their endeavors towards a sustainability transformation along SDGs that are relevant for their business (cf. Sherwood and Sullivan (2021, p. 7) and Allianz (2021, p. 10)).

The topic of sustainable development is of extreme precarity to the insurance industry. In mere two decades we have seen the ESG movement grow "[...] from a corporate social responsibility initiative launched by the UN into a global phenomenon that is reshaping the asset management and broader business management" (Schanz, 2022, p. 9). To support this statement, PwC has shown that 85% of insurers believe that sustainability and ESG practices will influence their business along all functions (cf. 2022, p. 2).

The coming years will not see a change regarding this critical situation. Hansen, Sato and Ruedy of Columbia University have shown that climate change can be expected to accelerate much faster than previously thought (cf. 2024, p. 3). This increase in climate change has frequently been linked to an increase in severe weather events of all kinds (cf. IPCC (2023, p. 46) and European Environment Agency (2017, p. 19)) which in turn leads to an increase in insurance claims (cf. Sato and Seki, 2010, p. 333). In consequence, insurance premiums will rise and there will be a strong need for new mathematical models to predict the frequency of such events – which has recently been a huge challenge in the industry (cf. European Insurance and Occupational Pensions Authority, 2022, pp. 11–12). The last resort of insurers is to stop their operations in areas that are considered high-risk, which has been starting to happen in Florida and California, where a high number of insurers have stopped selling new policies (cf. Bogage, 2023). The same pattern will unfold in further regions if climate change is allowed to continue at its current rate.

However, sustainability is relevant to the insurance sector beyond the discussion of climate change. The social dimension is of extreme relevance as absorbing risks is the core business of insurers which in turn provides stability and security to communities and societies (cf. Schanz, 2022, p. 11). Insurers face difficult financial dynamics as a result of unstable societal and economic conditions. There is an interdependence between the insurance industry providing stability and security on the one hand and the insurance industry needing these factors to continue their operations on the other hand (cf. Trichet, 2005, pp. 67-68).

In short, climate change and related sustainability topics pose a large risk to insurers. This risk can only be mitigated by prevention measures and efforts towards the transformation into a sustainable business. As one of the most affected industries, the insurance sector should be on the forefront of these endeavors.

This paper aims to provide a comprehensive approach towards the definition of a new sustainability strategy in the insurance industry. It aspires to bridge a gap between extensive literature on ESG risks on one hand and their implementation and strategy integration in the insurance industry on the other hand. The consideration of all three ESG dimensions allows for the identification of interconnections and a view on their combined impact on strategy while existing literature often considers these dimensions in isolation. A detailed evaluation of the three ESG dimensions will be carried out and translate theoretical sustainability concepts into specific and strategic KPIs. In accordance with literature, investment management will not be covered given its dominance in existing works (cf. Stricker et al., 2022, p. 3). The paper concludes with the presentation of a step-by-step roadmap that enables the strategic integration of sustainability measures into the core of insurance companies and their strategic orientation.

This work underlines an urgent need for a new strategy that will guide firms through a new era of sustainability risks, requirements and opportunities. Following the concept of a systematic literature review, more than 5.500 papers were evaluated quantitatively and qualitatively. Based on this research, a comprehensive set of KPIs and a roadmap that will serve as a blueprint to companies was developed. The methodology will be explained further in chapter 2.

After concluding the description of the process that led to the identification of the four core papers analyzed further throughout this body of work, a quantitative analysis of the literature review will be provided. The strategic relevance and exponentially growing importance of ESG related topics will be highlighted based on purely quantitative data. This will be followed by a short introduction of the four key papers that stresses their importance for this work and outlines the current state of literature.

In chapter 4, three core papers on the evaluation and implementation of KPIs into company strategy will be evaluated, compared and synthesized with regard to the insurance industry. The relevance of each dimension will be substantiated with a quantitative analysis of the dataset. Next, an evaluation of a fourth core paper concerning the successful introduction of these KPIs in companies to ensure long-term strategic success concerning ESG topics will be provided.

Chapter 5 will present a distinctive roadmap that is meant to enable insurance companies to include sustainability measures into their daily business and their strategic orientation by following a step-by-step guide.

Finally, a future outlook will be provided and further fields of research will be identified.

2. Method of data collection and evaluation

This work is based on a systematic literature review. The methodology was chosen as it "offers a broader and more accurate level of understanding than a traditional literature review" (Pati & Lorusso, 2018, p. 15). The goal of this research was the identification of sustainability related trends in the insurance industry through covering an extensive time horizon and to provide a future outlook based on available literature. The maximization of the number of input papers was the preferred option to fulfill this task.

In line with the approach of Tranfield, Denyer and Palminder (cf. 2003, pp. 214-219), the process of this system-

atic review was broken up into three main steps. First, a thorough planning of the process was carried out, followed by the actual conduction of the review and completed by an organization of the results (cf. Tranfield et al., 2003, pp. 214-219). The main step of the planning process was the definition of two keyword lists that provided the basis for the review. In line with the focus of this thesis on the connection between sustainability strategy and the insurance industry, two lists of keywords in the respective dimensions of sustainability and insurance were drafted.

The keyword definition process happened in iterative steps. After designing a first draft of 20 keywords in both lists, their usefulness was evaluated by scanning a number of Whitepapers. This step ensured that relevant and current language was used to cover the breadth of available information. After further consultation with industry experts from a reputable German insurance company, two keyword lists of 21 and 31 keywords, respectively, were finalized.

Lastly, the next steps were defined. A python algorithm was used to iteratively combine each keyword of the insurance dimension[1] with each keyword of the sustainability dimension[2]. Finally, the identified papers were rated based on the most used keywords over all abstracts and then sighted manually in a last step.

With the finalization of a step-by-step plan for the review, the planning step was completed. Next, the review had to be carried out systematically.

Orgeolet et al. (cf. 2019, pp. 815-817) have proven the usage of artificial intelligence (AI) to support the manual implementation of a systematic literature review to be very efficient. The increasing number of published papers and consequently the increasing number of relevant papers makes it difficult to obtain a broad picture of the current state of literature without the support of AI technologies. For this reason and in compliance with current regulations, the conducted research was supported by the use of AI, namely the programs "ChatGPT"[3] and "Connected Papers"[4].

The first step towards the execution of the review was drafting a python script that would enable the systematic extraction of data from the web. With this script, the iterative combination of keywords from the sustainability and the insurance list was carried out in a Google Scholar[5] search.

For each combination, the algorithm opened the first 15 detail pages of the Google Scholar search results and extracted predetermined information into an excel file. In the excel file, the information was structured in columns by title, author, journal, abstract and the year of publishing. To ensure sufficient data quality, each abstract was copied into the file manually.

Including the built-in function of the algorithm to prevent duplications, the final total of papers in the excel file amounted to 6.396 papers. The duplication measures of the algorithm proved to be insufficient, so a further removal of duplicates by abstract, title and URL was carried out and supported by ChatGPT. This led to a total of 5.505 papers in a cleaned version of the excel file. Several quantitative analyses carried out on this data that will be evaluated in chapter 3.

To quantitatively and qualitatively analyze the papers, various mechanisms were used. First, several different methods of tagging and subsequently rating the abstracts were implemented. ChatGPT supported this tagging process by scanning all abstracts for the provided tag-words and entering them in a new column. This process was repeated multiple times and with different tag-words to provide coverage of different focus areas. For each method of tagging, two rating approaches were used. First, the rows were sorted by number of individual tags and second, they were ordered by the total count of tags including repeated occurrences in the abstracts. This ensured that the rating process was not biased by the length of the abstracts of the papers.

Finally, the first 20 papers of all tagging approaches were sighted repeatedly to decide on the keywords that would yield the best results. Consequently, the following 14 keywords were defined for the final method of tagging: Sustainability, Insurance, Risk, Social, Environmental, Governance, Financial, Climate, Investment, Strategy, Data, Innovation, Compliance and KPIs.

After the exclusion of all papers with zero tags, the first 50 papers of both rating methods were then sighted manually and evaluated into categories ranging from "not useful to this work" to "highly accurate core papers". The final category of core papers included four papers, while a high number of supporting papers contributed to this work. A quality check of the core papers using different ratings was purposefully delayed until this step to ensure that the total amount of publications was used for the quantitative analysis.

Figure 1 illustrates the methodology applied to collect, filter and analyze the data for this work.

As a second-to-last step, the four remaining core papers were quality checked by consulting three tools. Two different VHB-Ratings were used, namely the "VHB-Rating 2024 für Publikationsmedien"[6], the VHB-JOURQUAL 3[7] and additionally the ABDC Journal Quality List[8]. One of the four core papers was not listed in either one of these tools but a plausibility check led to the decision to include this paper. It was published by the Geneva Association, an internationally recognized association of insurance and reinsurance CEOs (cf. The Geneva Association, n.d.). Two of the remaining three

[1] Keyword List of the Insurance Dimension: [Investments, Insurance, Retail, Industry, Motor, Home, Flood, Catastrophe, Wildfire, Governance, Risk, Risk Management, Life, Health, Own Operations, Reporting, Finance, Strategy, Security, Ehrbarer Kaufmann, Responsibility]

[2] Keyword List of the Sustainability Dimension: [Sustainability, Net-Zero, Engagement, Exclusion, Climate, Biodiversity, Science-Based Targets, Diversity, Equity, Inclusion, Transition, Mitigation, Impact, Governance, Compliance, Anti-Money Laundering, Human Rights, Ethics, SDG, Social, Diversity, ESG, Green, Impact, Carbon, Environmental Management, CSR, Greenwashing, Waste, Local]

[3] chatgpt.com

[4] connectedpapers.com

[5] scholar.google.com

[6] https://vhbonline.org/service/vhb-rating-2024

[7] https://vhbonline.org/service/vhb-jourqual/vhb-jourqual-3

[8] https://abdc.edu.au/abdc-journal-quality-list/

Keyword List Insurance
Investments, Insurance, Retail, Industry, Motor, Home, Flood, Catastrophe, (wild)fire, Governance, Risk, Risk Management, Life, Health, Own Operations, Reporting, Finance, Strategy, Security, Ehrbarer Kaufmann, Responsibility

Keyword List Sustainability
Sustainability, Net-Zero, Engagement, Exclusion, Climate, Biodiversity, Science-Based Targets, Diversity, Equity, Inclusion, Transition, Mitigation, Impact, Governance, Compliance, Anti-Money Laundering, Human Rights, Ethics, SDG, Social, Diversity, ESG, Green, Impact, Carbon, Environmental Management, CSR, Greenwashing, Waste, Local

Input	Database	Output	Number of articles
Iterative combination of keywords from both lists	Google Scholar	Excel file with one row per paper	6.396

Unique documents	Elimination of duplicates by title, abstract and URL	Number of articles	5.505

Further exclusion of documents leading to final sample size	Elimination of papers with 0 tags	Number of articles	4.379

Number of final core papers	4	Number of identified supporting papers	9

Figure 1: Implementation of search process using Python and Google Scholar

papers yielded ratings of A and B from the ABDC Journal Quality List. One core paper was only included in the 2015 Rating of VHB where it received a rating of C, which still corresponds to a recognized and professional journal, hence it was included in this work.

Not all supporting papers were rated with these tools but a high number of recurring journals was observed which allowed for a quick plausibility check.

Finally, to guarantee the inclusion of all relevant existing literature, the four identified core papers were analyzed with the AI tool Connected Papers. This tool takes a so-called *origin paper* as an input and then analyzes 50.000 publications to build a graph that is based on co-citations and the coupling of bibliographies (cf. Behera et al., 2023, p. 3). While no further core paper was found with this approach, a number of supporting papers were identified by analyzing the graphs.

This step concluded the process of data collection. A qualitative analysis of the complete dataset of all papers followed by an introduction of the core papers will be carried out in chapter 3. Chapter 4 will build up on this with a comparative analysis of the core papers and some supporting papers while chapter 5 will provide a combination of both to identify trends and a roadmap.

3. Quantitative and qualitative analysis of the literature

In the following section a quantitative analysis of the dataset will be provided. The chapter will be concluded by an introduction of the identified core papers. The relevance of each core paper will be stressed in relation to the research question.

3.1. Quantitative findings

To ensure a holistic picture, the dataset was not just analyzed qualitatively but also quantitatively. Several statistical analyses were conducted to visualize development over time and identify current and future trends. These trends will be presented in the following chapter. The results from the quantitative data analysis support the qualitative findings presented in the introduction and underline the need for action by the insurance industry.

First, the frequency of published academic papers over all papers was analyzed which is displayed in Figure 2. With the first paper on social insurance dating back to 1913, a drastic increase over the last 100 years is observed. A takeoff happens around the year 2000 and since then the number of published papers has been growing exponentially. Similar trends can be observed for the number of published sustainability reports by companies that are following the Global

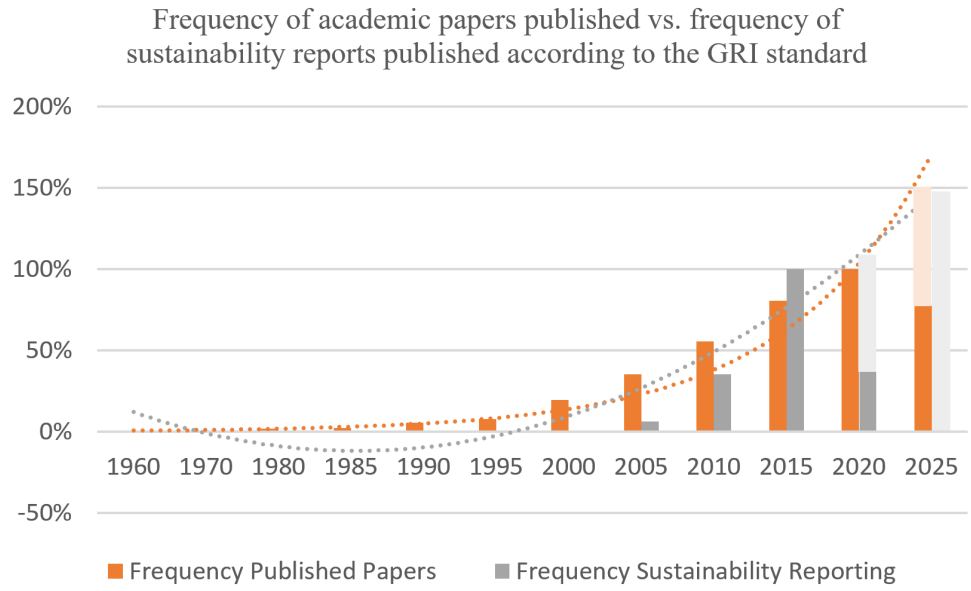

Figure 2: Frequency distribution of published academic papers vs. released sustainability reports

Reporting Initiative (GRI)[9] standards based on data by Verdantix (cf. 2017). A drastic increase can be seen from 2010 onwards and continues to develop in a polynomial curve. The progress regarding published sustainability reports happens in a time-delay compared to the frequency of total published papers. This underlines that we are still in the early days of sustainability adoption in the industry. Acting now will provide companies with a head start and allow them to leverage an early mover advantage in the following years.

A similar picture is painted when looking at the keywords "strategy" and "sustainability" and the frequency by which they jointly occur in academic papers as seen in Figure 3. The first time these words appeared together was in 1999 and in the following years only occasional mentions were recorded. A more dynamic development started in 2015 and has not halted since. There is no reason to assume a decrease in the upcoming years which supports the prediction of an expected takeoff in sustainability endeavors in the academic and industrial world.

In this regard, a special focus should be shown upon the changes in the conversation on sustainability and sustainable development over the course of the last 15 years. Part of this can be seen in the wording that is used in academic literature. Figure 4 shows the difference in frequency of the 10 most frequent keywords found in all abstracts. The graph shows their absolute frequency in occurrence in the years 2010-2019 compared to their absolute frequency in the years 2020-2024. Notably, the second time period is less than half the years of the first, which underlines the drastic message of this graph. Increases can be seen for almost all keywords, with climate having an increase of more than 100 additional mentions in all abstracts. There are only three decreases, "ethical", "biodiversity" and "governance". Biodiversity and governance are almost at a change of 0 so this can presumably be attributed to the difference in time spans. The decrease of the keyword "ethical" on the other hand is most likely of other nature. While in the last decade, sustainability was more of an ethical topic, a question of morale, we are now in a time of it being the main narrative. The commitment to sustainability is not optional anymore, the only question is the level of commitment.

Lastly, Figure 5 shows a word cloud that is the result of a frequency analysis of all papers regarding their abstracts using Python. The prominence of the words "impact" and "risk" shows the strong awareness for the fact that climate change and sustainability topics have the potential to disrupt and disturb entire industries and pose an immense risk if not mitigated correctly.

Further, the words "model", "system" and "framework" show that the need for a new strategy that guides firms through these challenges is very present. Sustainability risks need to be addressed and targeted systematically along the whole value chain and cannot be limited to certain areas or industries.

In combination, these analyses strongly suggest the need for literature and research on valid strategies and systems to navigate the complex landscape of sustainable development for insurers. The qualitative analysis of the literature will build up on this data in the next chapters.

3.2. General characteristics of the core papers

In the following section a short introduction of the key papers will be provided. First results and a classification as well as the rhetoric importance of the papers will be explained.

[9] www.globalreporting.org/about-gri/

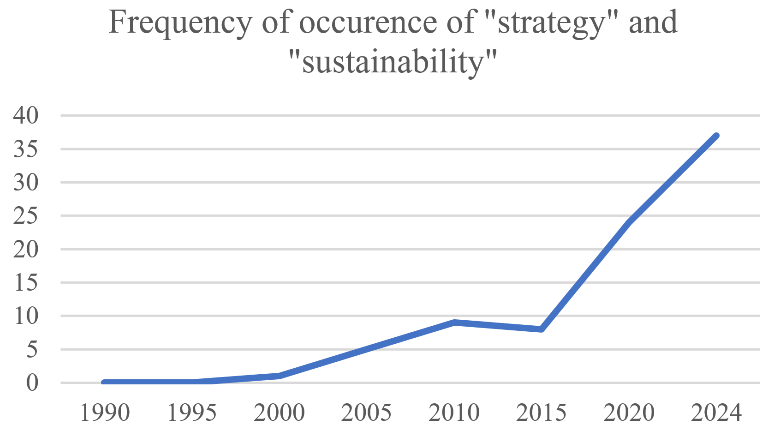

Figure 3: Frequency of the occurrence of the keywords "strategy" and "sustainability" in the same publication

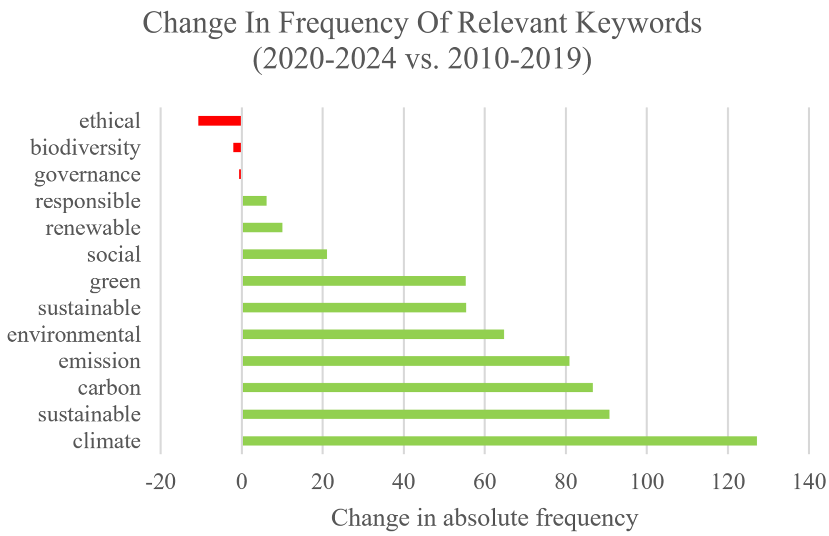

Figure 4: Change in frequency of relevant keywords from 2010-2019 to 2020-2024

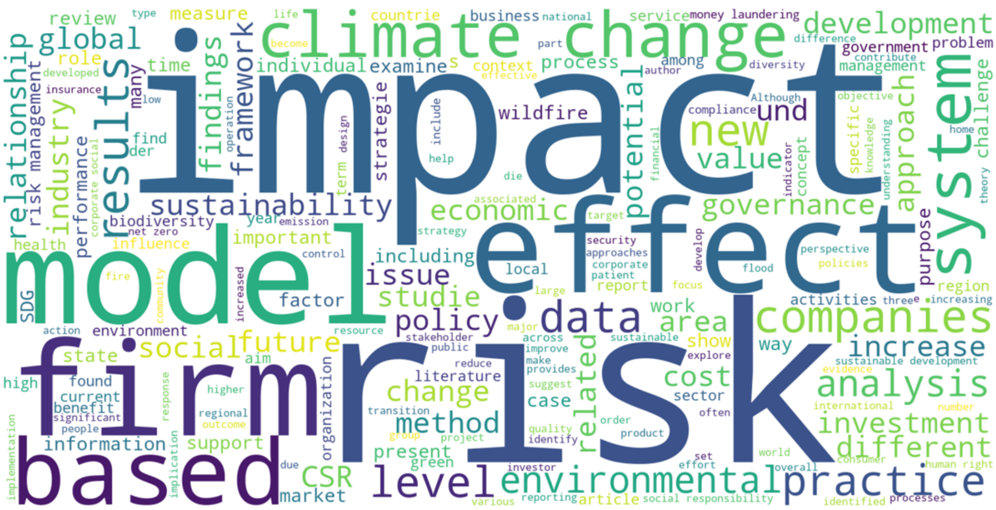

Figure 5: Word cloud based on 5.500 papers analyzed with Python

3.3. Core paper on KPIs defined by a two-fold approach

The first paper that was identified as a core paper is an article by Hristov and Chirico (cf. 2019) evaluating potential KPIs used in sustainability strategies by using a two-fold approach. First, they conducted a systematic literature review with the goal of identifying KPIs that enable the development of a comprehensive sustainability strategy (cf. Hristov and Chirico, 2019, p. 2). Second, they drafted a questionnaire and interviewed 25 Italian managers with more than 5 years of experience in the area of sustainability. These managers were asked about their strategic goals and the prioritization of the previously identified KPIs. This two-sided approach allowed them to set up a sustainability perspective containing strategic goals, KPIs and measurements for the environmental, social and economic dimension which can be found in Appendix 2 (cf. Hristov and Chirico, 2019, p. 2). Their use of the economic dimension can reasonably be translated into the governance dimension of the ESG rationale. It represents the strategic handling of the integration of KPIs of the environmental and social dimension as well as cost handling and enhancement of the sustainability transformation process. For the purpose of this work, the KPIs identified in the economic dimension will therefore be evaluated in the governance section.

The resulting sustainability perspective of the study is based on a concept called the sustainability balanced scorecard that aims to integrate "[...] environmental and social issues [...] with the general management of a business unit" (Figge et al., 2002, p. 281). This scorecard will allow companies to have a readily available blueprint which they can extend and fill with specific goals and measurements according to the needs of their companies (cf. Hristov et al., 2019, p. 13). This makes the model of the sustainability balanced scorecard applicable beyond the boundaries of specific industries and hence of high relevance for the insurance sector and this work.

3.4. Core paper on a roadmap for executive management

The second core paper identified discusses a roadmap towards green insurance for executive management (cf. Stricker et al., 2022). The roadmap is laid out along the classical insurance value which can be seen in Figure 6 (see Porter (1985) as cited in Eling and Lehmann (cf. 2018, p. 362), and Rahlfs (cf. 2007, pp. 169-170)). It divides the activities of insurance companies into primary activities such as product development and claim management on one side and support activities such as general management and Information Technology (IT) on the other side.

The paper focuses on three elements along the value chain of insurers, which are first product development as well as marketing and sales, second risk management and underwriting and third operations and claims management (cf. Stricker et al., 2022, p. 3). It reviews current literature with regard to these three dimensions and suggests a set of metrics for monitoring the sustainability efforts of companies.

The paper further identifies ESG risks that can be transferred into KPIs to promote sustainability. These risks as displayed in Table 1 provide a structured approach for general management to evaluate exposure to their firm and derive strategic goals and KPIs based on their identified risks. While the paper has a strong focus on environmental KPIs along the value chain, social and governance aspects will also be considered shortly.

The final roadmap developed in this paper can be found in Appendix 3 to ensure completeness.

This paper is of high relevance to the research objective of this work as it pinpoints clear KPIs along the value chain of insurance companies which provides a different approach than the first core paper. They complement each other in achieving a synthesis of a comprehensives set of KPIs with a focus on environmental activities.

3.5. Core paper on the social impact of insurers

The third core paper by Schanz (cf. 2022) concentrates on the social dimension of sustainability and briefly covers some governance aspects. It concludes the triad of core papers on specific KPIs and ensures that all three ESG dimensions have sufficient coverage. The paper refers to social sustainability as the "capacity of current and future generations to live and work in healthy and liveable conditions that promote diversity and equal opportunities" (Schanz, 2022, p. 6). It further calls out the relevance of the insurance industry by pointing to the socially beneficial core of their business (cf. Schanz, 2022, p. 6).

The report was issued by the Geneva Association and is based on more than 40 interviews with executives and experts (cf. Schanz, 2022, p. 8). It follows an explanatory approach examinating insurers in the social dimension of sustainability and aims to provide a framework for guiding firms towards social sustainability. The findings of the report have been summarized into four main recommendations. First, a three-tier approach for the management of social sustainability that consists of the maximization of social impact, protection of benefits and exploration of further actions should be implemented. Second, the current business model has to be reviewed followed by third, the adaption of core business activities. Lastly, governance towards the social dimension has to be integrated into top management activities (cf. Schanz, 2022, p. 8).

The paper takes the SDGs related to social sustainability as a basis and provides suggestions for the introduction of KPIs and activities stemming from these. Lastly, the paper provides some suggestions for the introduction of governance KPIs into the strategy that will help to promote social sustainability on a long-term basis. While there is no focus on the environmental dimensions, the governance aspects mentioned are very generalist which makes them applicable for both, the social and environmental dimension. This makes the paper highly relevant for the current research question as it explores areas that were not covered by the other works and allows a synthesis towards a comprehensive sustainability transformation strategy.

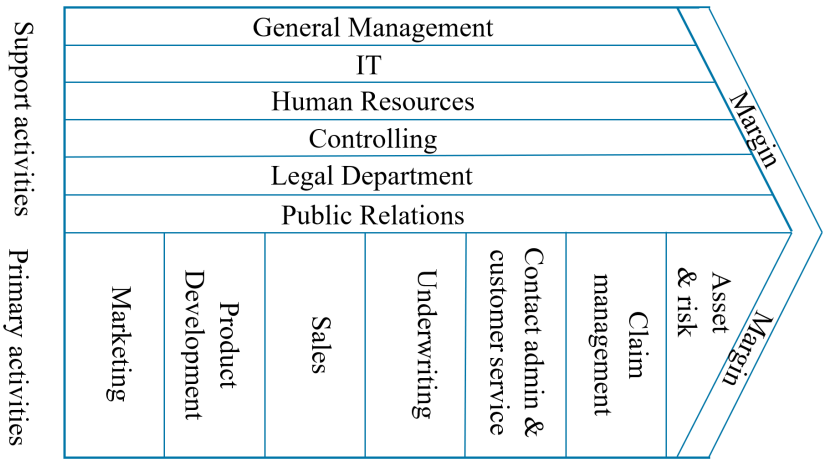

Figure 6: Classical value chain of insurance companies based on Porter (1985) as cited in Eling and Lehmann (cf. 2018, p. 362) and Rahlfs (cf. 2007, pp. 169-170)

Issues	Description
Environmental	• Climate mitigation and adjustment to climate change • Protection of biodiversity • Sustainable use and protection of water and maritime resources, sustainable land use • Transition to a circular economy, avoidance of waste and recycling • Avoidance and reduction of environmental pollution, protection of healthy ecosystems
Social	• Compliance with recognized labor standards (no child labor, forced labor or discrimination) • Compliance with employment safety and health protection • Appropriate remuneration, fair working conditions, diversity, training/development opportunities • Trade union rights and freedom of assembly • Guarantee of adequate product safety, including health protection • Application of the same requirements to entities in the supply chain • Inclusive projects and consideration of the interests of communities and social minorities
Governance	• Tax honesty and anti-corruption measures • Sustainability management by the board, board remuneration based on sustainability criteria • Facilitation of whistle-blowing, employee rights guarantees • Data protection guarantees and information disclosure

Table 1: Characterization of ESG Risks based on BaFin (cf. 2020, pp. 12-15), COSO and WBCSD (cf. 2018, pp. 9-10), EBA (cf. 2020, pp. 30-31) and EIOPA (cf. 2019, pp. 27-29)

3.6. Core paper on systematic integration into strategy

The last core paper chosen for this analysis focuses less on specific KPIs and more on a framework for the successful integration of said KPIs into a sustainability strategy (cf. Johannsdottir and McInerney, 2018). The study aims to "[...] bridge the gap between strategy, strategy implementation and sustainability by identifying the critical factors evident in strategies and activities [...]" (Johannsdottir & McInerney, 2018, p. 1253).

The research approach was divided into several steps. First, a case study with the largest non-life insurance companies in the Nordic Region was conducted, followed by a study on medium- sized companies in Iceland (cf. Johannsdottir and McInerney, 2018, p. 1257). The last step was a verification of the proposed framework by literature review. These steps concluded in the development of a so-called 5 C Framework (cf. Johannsdottir and McInerney, 2018, p. 1257). The five C's represent the five steps towards successful strategy implementation. They are "1) commitment, 2) configuration, 3) core business, 4) communication and 5) continuous improvements" (cf. Johannsdottir and McInerney, 2018, p. 1258).

The paper will be used as a final step in this work to demonstrate the successful integration of sustainability measures into sustainability strategy. Taken together with the evaluation of the results of all ESG dimensions, it will provide the basis for the subsequent development of the roadmap towards successful strategy implementation in chapter 5.

3.7. Further lines of research and placement of work

Further lines of research exist mostly in the area of the growing influence of ESG-related topics on the insurance industry in the years to come. The discussion of specific KPIs is rare and usually concludes with a statement stressing the need for further research.

Additionally, there is a high number of studies evaluating the risk that stems from the disregard of sustainability factors. The environmental dimension is discussed the most in this stream of literature, as the increase in natural disasters poses an enormous risk for the insurance industry.

The social dimension with regard to the definition of specific KPIs and frameworks is the one least discussed in research. Most academic papers on the social dimension deal with the role of insurance in developing countries and their important contribution to social welfare. The specific discussion of KPIs or transformation strategies is rare, if at all found.

This work contributes to existing literature in summarizing and synthesizing efforts made to define and evaluate different KPIs. It provides a combination of sets of KPIs for all three ESG dimensions together with a framework to implement these KPIs into a sustainability strategy. This ensures that efforts are not halted at the definition but a transformation of the business is enabled for insurance companies.

4. Findings

This chapter will identify and evaluate different KPIs and strategies mentioned in the core papers. They will be categorized based on the ESG dimensions. First, the environmental factors will be investigated as the most researched area in literature. Second and third, social and governance factors will be discussed. This will be concluded by an evaluation of strategy integration of all three dimensions which intends to provide an overarching picture. The results of this chapter have been used to develop a holistic framework presented in chapter 5. The framework is expected to serve not only as a starting point for firms to identify potential KPIs for a sustainability strategy but also allow the personalization and tracking of identified goals.

4.1. Environmental factors

The environmental dimension of the ESG narrative is generally seen as the easiest to grasp and quantify. Improving the environmental performance comes down to reducing greenhouse gas (GHG) emissions, which ultimately means reducing carbon dioxide (CO_2) emissions (cf. Lee et al., 2015). Compared to the other ESG dimensions of social and governance these emissions are quantifiable in almost all operations.

CO_2 and GHG emissions are commonly divided into three categories, so-called scopes. Scope 1 comprises all direct emissions that are owned and controlled by a company, scope 2 emissions are indirect emissions from electricity consumed by a company and lastly scope 3 emissions are all remaining indirect emissions that occur as a consequence of the company's activities but cannot be directly controlled by them (cf. World Business Council for Sustainable Development and World Resources Institute, 2004, p. 25). With increasing reporting requirements, firms will have to report their emissions up and down their value chain which is intended to exert pressure on them and their value chain (cf. Wagenhofer, 2024, p. 6). These requirements will force companies to increasingly disclose their emissions which constitutes a need for them to develop emission reduction strategies to stay competitive in the market and fulfill customer demand for sustainable practices (cf. Wagenhofer, 2024, p.3).

Figure 7 paints a similar picture and confirms the need for a strategy handling emissions. Although the frequency of the occurrence of the combination of the keywords "strategy" and "environment" seems to have come to a halt in recent years, it needs to be noted that the last bin covers only 3.5 years instead of 5 years. This is due to the analysis being conducted in mid-2024. That means that we are and still will be seeing an increase in the occurrence of this combination. The development of emission handling strategies that will adequately cover the environmental dimension is an ongoing process. One reason for a less prominent increase than with other keywords might be that the debate on the environmental dimension has been going on for a longer time. Yet, there is still much potential for improvement and acting now will benefit the firms in the future.

4.1.1. Clustering by strategic goals

According to Hristov and Chirico (cf. 2019, p. 7), the most relevant and prevalent KPIs in the environmental dimension are related to GHG emissions, renewable resources, resource consumption and waste. Table 2 shows the goals and related indicators that have been identified as being the most important measures in their interviews (cf. Hristov and Chirico, 2019, p. 9). The topic of renewable energy has clearly been identified as the most prevalent issue with 100% of managers ranking it as the most important one. All managers further agreed that the renewable sources rate should be used to measure the progress towards this goal. The further goals identified as top priority in declining frequency were the reduction of superfluous materials, the reduction of GHG emissions, safeguard governmental policies and lifestyles towards natural resources. In Appendix 1, a compilation of subsequently identified specific KPIs related to these goals can be found. The list contains several KPIs per goal which demonstrates that the identification and agreement upon goals is the most difficult part, whereas the definition of KPIs to measure the progress is a quicker process.

An important aspect to note is how much specific KPIs will differ among companies. One example for this is the goal of reduction of superfluous materials seen in Table 2. The associated KPI is the rate of efficiency of materials used. The identification and agreement upon the clear reduction goal is the difficult part, the KPI stems from it naturally. Every company will have different materials use, so the exact KPI for reduction will differ notably while the overarching goal

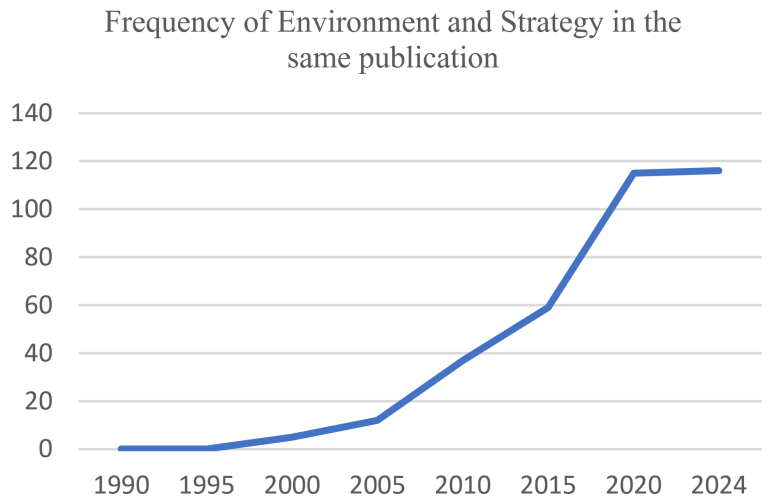

Figure 7: Frequency of the occurrence of the keywords "environment" and "strategy" in the same publication

Goal	Frequency	%	KPI	Frequency	%
Renewable Energy Sources	25	100	Renewable Sources Rate	25	100
Reduction Superfluous Materials	23	92	Efficiency Materials Use Rate	23	92
Reduction Greenhouse Gases	22	88	Emissions Greenhouse Gases Rate	18	72
Environment's Safeguard Governmental Policies	16	64	Waste Reduction Rate	16	64
Lifestyles towards natural resources	16	64	Recycled Materials used rate	16	64

Table 2: Frequency distribution of KPIs in the environmental dimension (cf. Hristov and Chirico, 2019, p. 10)

will be of use for a broad spectrum of companies in different industries.

4.1.2. Clustering along the value chain and based on risks

Stricker et al. (cf. 2022, p. 4) take a different approach into the definition of KPIs by addressing them along the value chain. In this, they acknowledge that the insurance business as a whole has to be part of the sustainability transformation and undertake a more structured approach. In contrast to Hristov and Chirico (cf. 2019) they focus on the environmental dimension and only shortly cover social and governance aspects.

In their evaluations of the environmental aspect, they focus on emission reduction by transforming different operational activities into their related emissions and potential for action. They clearly apply the GHG scope model to this narrative. In this, they summarize all identified goals under the umbrella term of CO_2 emissions.

For scope 1, Stricker et al. (cf. 2022, p. 12) consider onsite heating emissions and fleet emissions, scope 2 consists of the share of renewable energy and scope 3 comprises emissions from travel, emissions from suppliers and emissions from employee commutes. While this approach might be harder to grasp at first, the clustering of emissions into three scopes is going to be increasingly important due to new reporting requirements and allows for clear communication.

The main difference between the goals identified by Hristov and Chirico (cf. 2019, p. 10) versus Stricker et al. (cf. 2022, p. 12) is the decision to structure them. While the development of a model for clustering into scopes requires a higher effort, a clear framework will also ease the compliance with reporting requirements in the future. This makes the approach by Stricker et al. (cf. 2022, p. 12) preferable.

Additionally, Stricker et al. (cf. 2022, p. 6) also cover green insurance products which extends the range of KPIs. While "insurance is a promise and as such an intangible product" (Stricker et al., 2022, p. 5) that does not produce emissions in itself, the sustainability of a product is linked to the object that is insured and the operations of the company. According to Stricker et al. (cf. 2022, p. 5), a sustainability roadmap for insurance products can be defined by four major aspects: insurance for green objects, inclusion of green policy features, sustainable transition claims support and pro-

motion of environmentally friendly behavior. All of this is enabled through a regular dialogue with customers. Examples for green policy features in cases where environmental impact cannot be reduced is CO_2 compensation (Stricker et al., 2022, p. 6). An example for this is a CO_2 compensation extension for travel insurance. The potential for green insurance products is huge for companies, especially as there is no clear definition for these products which allows extensive tailoring by insurers. A market leader position can be inherited by allocating time and resources to the development of these products. Potential ideas range from pay-as-you-drive offers for car insurance policies to re-use incentives as claim handling strategies to only name two examples (cf. Stricker et al., 2022, p. 6).

In further literature it has been established (cf. Marti et al., 2024, p. 207) that "product development evolution linked to ESG criteria is going further in the practitioner world than in the academic one". This statement has been confirmed in the process of the literature review. There is a gap in research with regard to sustainable insurance products. The market would benefit greatly from a detailed roadmap targeting the development and consecutive establishment of green insurance products.

To return to the bigger picture it is important to note that there is no "one fits all" approach to a greener insurance. A comprehensive approach by insurance companies is needed to retain credibility and prevent greenwashing accusations (cf. Stricker et al., 2022, p. 6). This entails a sustainable orientation along the whole value chain ranging from own operations to risk management and claims handling.

4.1.3. Discussion on environmental factors

Both papers provide valuable insights into the environmental dimension and appropriate KPIs to quantify progress towards a sustainable insurance business. Specific policies covered in the papers have not been discussed as single examples administered across different organizations will not yield a comprehensive insight. A quantitative analysis or empirical study over a broad range of insurance companies would bridge an important gap in this area.

It is important to note, that the overarching KPI of reducing CO_2 emissions –by the achievement of net zero or an emission-cutting process – is omnipresent in literature. Much debate concerns the exact measures needed to achieve this goal and the part that compensation has to play. A general trend is a distancing from compensation and efforts towards actual emission cutting as the avoidance of greenwashing accusations becomes increasingly important for firms (cf. Lyon and Montgomery, 2015, pp. 223-224).

The most important aspect that can be derived from this analysis is the strategy for the development of KPIs. The definition of strategic goals should be the overarching directive based on which KPIs can be derived. This provides a structured approach instead of the random assignment of KPIs related to specific climate issues. Additionally, the development of green insurance products will be critical over the next years. Giving customers the option to make a sustainable choice while upholding a high-quality service is the baseline. The identification of core areas for the implementation of these products will allow companies to foresee pain points and stay competitive in the future.

4.2. Social factors

The social dimension has been discussed frequently in literature, yet there is no clear definition for the scope of social impact. Most definitions cover a broad range of aspects and consider the social dimension as a capacity for providing welfare and life-enhancing living conditions to citizens (cf. Hristov and Chirico (2019, p. 7) and McKenzie (2024, p. 12)). The review of the papers obtained by the literature review concludes that the social dimension is the least researched dimension of all three when it comes to the implementation and evaluation of specific KPIs. This is most likely also linked to limited understanding of the social dimension as "[...] social factors are less tangible and come with limited data on how they can impact a company's performance" (Schanz, 2022, p. 10).

While this might lead to the conclusion that activities with regard to environmental factors are more important to companies, an analysis of the keywords "social" and "strategy" paints a different picture. Similar trends as shown above for the environmental dimension can be seen in the combination of the keywords "social" and "strategy" in Figure 8. A slow development seems to start around the year 2000 and up until now there is no sign of a significant slowdown[10]. This underlines the importance of considering the social dimension in the movement towards sustainability. According to some reports, the developments regarding the social dimension have been gaining even more traction since the start of the global Covid-19 pandemic and the ongoing conflict in Ukraine as the social imbalances caused by this will force businesses to pay more attention to social matters (cf. Schanz, 2022, p. 15).

The increasing importance of the social dimension will additionally be driven by increasing regulations and legislative initiatives worldwide. Some examples of recent years include the European Union (EU) taxonomy regulation, the Corporate Sustainability Reporting Directive (CSRD) and a potential social EU taxonomy (cf. Schanz, 2022, pp. 15-16).

An interesting perspective for the approach of the social dimension has been provided by the Geneva Association. They developed a model that applies the 3 scope model of the environmental dimension to the social dimension of ESG as can be seen in Figure 9 (cf. Schanz, 2022, p. 27). This approach partitions the broad field of social impact that a firm has into three scopes. Scope 1 represents the social impact that is directly controlled by the firm, scope 2 is the impact that an insurer has through its own operations and employees and scope 3 is the impact that results from the insurance

[10] This is again based on the consideration of different time brackets as this analysis was concluded in mid-2024.

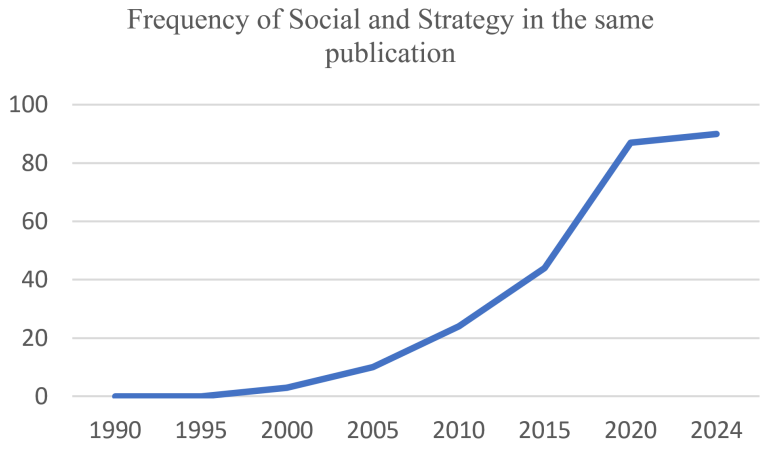

Figure 8: Frequency of the occurrence of the keywords "social" and "strategy" in the same publication

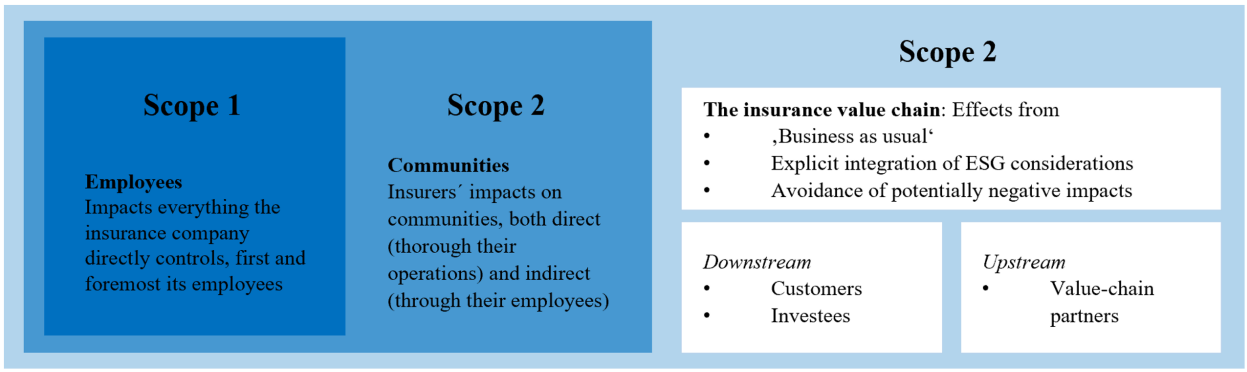

Figure 9: The 3-Scope Model applied to the social dimension (cf. Schanz, 2022, p. 27)

value chain. As in the environmental model, scope 3 cannot be directly controlled although accounting for the biggest part of social impact (cf. Schanz, 2022, p. 27). This approach allows for a clustering of social impact that will serve to structure KPIs in the social dimension.

4.2.1. Clustering by strategic goals

Similar to the structuring of the environmental KPIs, Hristov et al. (cf. 2019, pp. 8-9) have structured their discussion on social indicators along the three steps of goal identification, KPI identification, and lastly KPI ranking through interviews. The results of this process are displayed in Table 3.

The strategic goals upon which Hristov and Chirico (cf. 2019, p. 8) agreed were the encouragement of employees to accept cultural change, the improvement of working conditions, the guarantee of respect for human rights and the participation in social initiatives. Again, from these strategic goals specific KPIs were derived and ranked by priority in interviews. The first observation is the reduced agreement on specific goals and KPIs compared to the environmental dimension. This probably stems from the fact that the social dimension is broader and less clearly defined. This makes it harder to measure progress and therefore set specific goals. The most unity can be seen in the goal “Inclusion of all society members in the development of sustainable goals” with 21/25 managers agreeing on this goal. The associated KPI is the integration rate of employees. This KPI is directly linked to the goal of “Inclusion of employees in the decision process” that was prioritized by 15 out of the 21 respective managers. While both KPIs are hard to survey, they will provide very valuable information to the company and serve as a quantitative KPI that can be consequently reported.

When considering the results of the research by Hristov et al. (cf. 2019, p.10) under the approach of the scope model, a focus on scope 1, i.e. the employees, is observed. There is some focus on scope 2 but close to no consideration of the value chain impact of scope 3. To date, scope 3 impact can rarely be found in literature, but this can be expected to change soon. With the Act on Corporate Due Diligence in Supply Chains[11] in Germany (cf. Federal Ministry of Labour and Social Affairs, n.d.) and similar acts in the European Union (cf. Directorate-General for Communication European Commission, 2024) companies will be required to increasingly disclose information about social and environmental factors along their value chain.

[11] Also known as Lieferkettensorgfaltspflichtengesetz (LkSG)

Goal	Frequency	%	KPI	Frequency	%
Inclusion of all society members in the development of sustainable goals	21	84	Integration rate	21	84
Stakeholder's relationship	18	72	Stakeholder's satisfaction rate	15	60
Participation to the social initiative	18	72	Total participation social initiative national and local level	14	56
Inclusion of employees in the decision process	15	60	Employee integration rate	11	44
Social marketing policies	14	56	Customer satisfaction index	10	40

Table 3: Frequency distribution of KPIs in the social dimension (cf. Hristov and Chirico, 2019, p. 10)

4.2.2. Clustering by SDG-related fields

With the goal of covering all three scopes of social impact a different approach was taken by Schanz (cf. 2022, pp. 22-23). He clustered the areas of social impact into actions related to the dimensions of people and prosperity. Figure 10 shows the SDGs that were identified in relation to the people dimension and have laid out the areas of strategic goals. The SDGs were divided into three sub-fields of the people dimension, namely dignity and equality, health and well-being and an overarching people pillar. Table 4 shows the core metrics that are proposed to measure social impact in all three categories. An example is the ratio of Chief Executive Officer (CEO) compensation to average employee compensation in the dignity and equality bucket. The KPIs proposed serve as an inspiration that can be adapted by insurers to fit their specific needs and business model. They are not ranked or presented in a specific order but rather represent an incomprehensive list of suggestions.

The second dimension that was further analyzed by Schanz (cf. 2022, p. 23) with regards to social impact is prosperity which is related to the SDGs 1, 8, 9 and 10 as displayed in Figure 11. This dimension is characterized by the creation of long-term value by companies towards the benefit of employees and society (cf. Schanz, 2022, p. 23). There are fewer specific metrics attached to this dimension but suggestions include the turnover rate of employees, diversity indicators and the economic value a company generates and distributes. For insurers, this is specifically related to the payment of claims and benefits to customers and the development of better products and services (cf. Schanz, 2022, p. 23).

The last aspect mentioned with regard to social prosperity is the investment in communities and society (cf. Schanz, 2022, p. 23). There are many opportunities to do this that range from special tax payments to the funding and sponsoring of social or employee initiatives. This is also consistent with the goal of social marketing policies by Hristov et al. (cf. 2019, p. 10). This endeavour is of specific importance as it serves two purposes. One, it generates social impact and two, it allows a very strategic positioning of the company in the market towards the customer and the own employees. There are few other goals that have the same amout of leverage and traction while holding a strong balance between reputation and impact.

4.2.3. Discussion on social factors

The clustering along the impact areas of SDGs instead of strategic goals allows for a structured and holistic approach. In combination with the scope model for social impact, a distinct and clear process can be defined that covers the areas of social impact in depth and clarity. Ideally, companies should take the SDGs related to social sustainability as a basis and then meticulously work out strategic goals for all three scopes of social sustainability. The presentation of strategic goals by Hristov et al. (cf. 2019, p. 10) will help to navigate a balance between economic prosperity and social impact. In combination, the synthesis of these two papers serves as a blueprint for the development of social sustainability KPIs by insurance companies.

4.3. Governance factors

Governance factors are generally thought of as being the hardest to grasp and understand. Several metaphors exist to describe the relevance of governance factors, all with loss of accuracy. The dimension of governance is more all-encompassing and can be seen as a structuring and more strategic element incorporating both, environmental and social aspects. Figure 12 shows the development of the occurrence of the combination of the keywords "governance" and "strategy" in academic literature and strongly underlines the trend towards the integration of governance processes in strategy. The steeper increase of the graph quantitively underlines the need for a comprehensive approach to the governance dimension by insurance companies.

Figure 10: SDGs in relation to the social dimension of sustainability (cf. World Economic Forum, 2020)

Dignity and Equality	• The percentage of employees per employee category by indicators of ethnicity • The ratio of the basic salary and remuneration for each employee category by significant locations of operation for women to men, minor to major ethnic groups, and other relevant equality areas • Ratios of standard entry-level wage by gender compared to local minimum wage • Ratio of the annual total compensation of the CEO to the median of the annual total compensation of all its employees • An explanation of the operations and suppliers considered to have significant risk for incidents of child labor, forced or compulsory labor
Health and well-being	• The number and rate of fatalities as a result of work-related injury • High-consequence work-related injuries (excluding fatalities) • An explanation how the organization facilitates worker's access to non-occupational medical and healthcare services • The scope of access provided for employees and workers
People pillar	• Average hours of training per person undertaken by the company's employees during the reporting period, by gender and employee category • Average training and development expenditure per full time employee

Table 4: Proposed core metrics related to the identified SDG dimensions based on Schanz (2022, p. 22)

Figure 11: SDGs related to social prosperity (cf. World Economic Forum, 2020, p. 37)

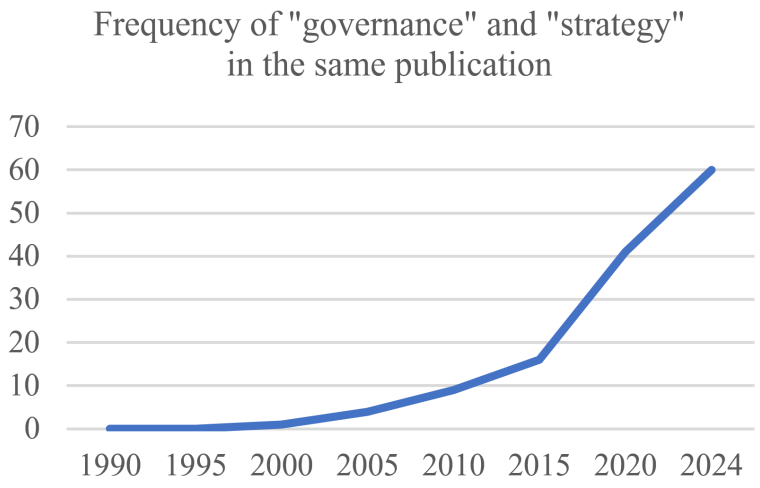

Figure 12: Frequency of the occurrence of the keywords “governance” and “strategy” in the same publication

Hristov et al. (cf. 2019, p. 9) use the same approach as before to identify clear strategic goals for the governance[12] dimension. They were not able to define specific strategic goals and instead described the strategic mission as the “ [...] capacity to create durable growth of the main economic indicators [...] [while] sustain[ing] the population, enhancing territorial uniqueness and efficiently employing resources [...]” (Hristov & Chirico, 2019, p. 9).

Table 5 shows the specific goals and KPIs derived from this underlying mission. Notably, more agreement than in the social goals and KPIs can be observed. All managers agreed on the prioritization of the goal “Trend of the financial indicators” with the linked KPI “ROI related to sustainable investments”. This is apparent as this goal is designed to measure and improve economic output and growth. While sustainable behavior is increasingly important to companies, they also need to make sure that their underlying fundamentals are strong to ensure stable operations in the future.

The remaining goals and associated KPIs are mostly related to quality aspects with links to product, marketing, training and communication. The mention of revenues invested in training provides an important approach that is prevalent in academic literature. It is one of the few ways to quantitatively prove to the market that you are not only applying measures towards social and environmental impact in your operations, product development etc. but also shifting the mentality of your firm and educate your personnel.

Another relevant aspect is the updating of policies towards ESG measures mentioned by Stricker et al. (cf. 2022, p. 14). They stress the importance of policies that are reviewed and updated to reflect sustainability issues. This is especially important for insurers considering their business model. Overall, insurers deal with risks in all kinds of categories. That means that the inclusion of potentially disrupting ESG risks across all policies will serve to increase the stability of the business and ensure long-term success.

While these KPIs are covering specific measures that could be undertaken by insurers, Schanz (cf. 2022, p. 38) has taken a different approach and evaluated the governance dimension as an enabler for KPIs from other dimensions[13]. He stresses the importance of embedding the orientation towards sustainability at the top-level management, the board of directors and senior executives. Further, he recommends the appointment of ESG market leads and the enablement of responsible decision-making (cf. Schanz, 2022, p. 38). While not clearly stated, this entails the allowance of room for difficult decisions which might require investments that will only pay out on a long-term basis and more importantly, it allows for the commitment of leaders to sustainability topics.

Supporting literature has shown that some insurers go even further and commit to the appointment of a Chief Sustainability Officer (CSO) who streamlines and coordinates ESG efforts (cf. Sherwood and Sullivan, 2021, pp. 3-10). And while this is a clear commitment, research has also shown that these CSOs tend to struggle with similar hurdles as the ones that have been described before. Observations include a lack of clear definitions, metrics and resources (cf. Sherwood and Sullivan, 2021, pp. 3-10). The overcoming of these aspects will be discussed in the next section on the successful integration of sustainability measures into strategy and further summarized in the proposed roadmap in section 5.

A last, highly debated and critical, aspect that Schanz (cf. 2022, p. 38) mentions is the linkage of top management compensation with targets related to sustainability. This is confirmed by Stricker et al. (cf. 2022, p. 16) who state that

[12] Hristov et al. (2019) have worked with the three dimensions environmental, social and economic. In chapter 3.3 an explanation is provided for the placement of the economic dimension int the governance dimension.

[13] Schanz (2022) focuses on the social dimension of sustainability. As he regards the governance dimension as an enabler, all measures will be used in this paper generically for both, the environmental and the social dimension.

Goal	Frequency	%	KPI	Frequency	%
Trend of the financial indicators	25	100	ROI related to sustainable investments	25	100
Products quality	24	96	Check on products quality	21	84
Revenues invested in training, R&D, Marketing and Communication	20	80	Revenues invested rate	15	60
Communication technology process	20	80	Ratio of investments to it, infrastructures and web on total sales	14	56
The quality of the process	18	72	Sustainability and quality of the post-sale technical assistance rate	12	48

Table 5: Frequency distribution of KPIs in the governance dimension (cf. Hristov and Chirico, 2019, p. 10)

the integration of sustainability into the leadership culture of the company is key. Board remuneration based on sustainability criteria is identified as one of the levers to achieve this (cf. Stricker et al., 2022, p. 8). Linking compensation to sustainability incentives has been a highly discussed topic for years and will likely gain more traction in the future. While not necessarily common practice at this time, this can be expected to change rather soon. Creating a strategy in regard to this allows companies to gain a competitive advantage and establish credibility among their stakeholders and in the market.

4.3.1. ESG in risk management

One of the main aspects of sustainability governance is the risk management. Stricker et al. (cf. 2022, pp. 9-10) have developed a roadmap for the risk management of insurance companies. This roadmap has been transferred into a graphical representation shown in Figure 13. Each bullet point mentioned can be transferred into a KPI for general management. As an example, the hiring of staff with expertise in sustainability risks (bucket 1) can be linked to a number of new hires or a percentage of total staff having this expertise. Similarly, the inclusion of sustainability risks in internal and external sustainability reporting (bucket 4) is to be translated into a number of risks and factors that are accounted for.

The formulation of these risks is consistent with further streams of literature and is one of the most researched areas with regard to sustainability. Schanz (cf. 2022, p. 38) is confirming the importance of the inclusion of ESG dimensions into risk strategies in his paper at the governance level as one of the main enablers of successful sustainability practices.

While the roadmap in Figure 13 does not specify KPIs, it leads a way for companies to include these steps into their core business. The exact formulation of KPIs will be up to the respective company but in that, the framework underlines its usefulness. It can be freely adapted to the needs of each individual insurer while making sure that a holistic approach is taken and the risk management is sufficiently covered in a sustainability strategy.

4.3.2. ESG in underwriting

Lastly, the underwriting practices of insurance companies should be evaluated with a focus on the governance dimension. The decision to include this into the generic part of governance was taken as underwriting allows no clear clustering into the environmental or social dimension but should rather take into account all three ESG dimensions.

Similar to their roadmap for risk management (Figure 13), Stricker et al. (cf. 2022, p. 10) have also developed a roadmap for underwriting practices of insurance companies. They divide the process into five key steps. First, a thorough ESG due diligence has to take place with experts from different focus areas that identify ESG risks and reputational issues. Second, specific criteria and metrics for the assessment of ESG risks have to be defined. It is suggested to consult external sources like UNEP-FI (cf. 2023a) or Allianz (cf. 2021). Third, the inclusion of sustainability in the assessment of risks is proposed (cf. Stricker et al., 2022, p. 10). That refers to the inclusion of ESG factors but also the provision of tools to access information concerning the information related to ESG risks that are relevant to underwriting processes. Next, a clear decision-making process should be defined. That also includes thresholds for decision making in single cases and escalation procedures. And lastly, ESG expertise should be delivered to customers. This is targeted towards the dialogue but also insurance solutions that are supporting the sustainable transition of the company (cf. Stricker et al., 2022, p.10).

The sustainable transformation of underwriting practices is largely focused on environmental issues given that the cost to the insurance sector that is caused by severe weather events could exceed 1 trillion United States Dollar (USD) per year by 2040 (cf. Dlugolecki, 2008, p. 87). Yet, it has also been stressed that the consideration of social factors is highly

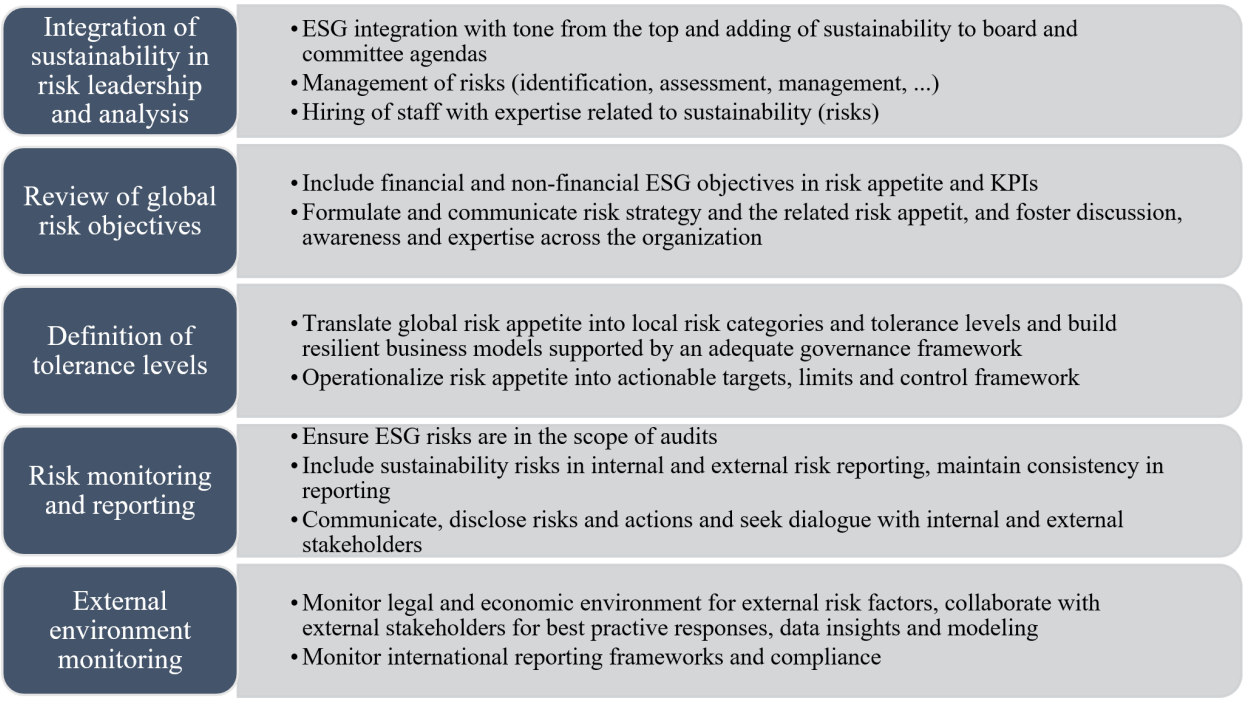

Figure 13: Roadmap for risk management based on Stricker et al. (cf. 2022, pp. 9-10)

relevant. Schanz (cf. 2022, p. 7) calls for action on the algorithms that underwriting practices are based on to ensure that the risk of exclusion of certain customer groups is managed. The paper even establishes challenges related to the social impact of underwriting as one of the main challenges in the daily business of insurers in the next five to ten years (cf. Schanz, 2022, p. 25).

Underwriting practices regarding a transformation towards sustainability are still limited today. Yet, it has been repeatedly established that the integration of ESG factors is increasingly taking place (cf. Marti et al., 2024, p. 204). Taking action now will allow a competitive edge in the market and bears potential for a market-leading position.

4.3.3. Discussion on governance factors

The governance dimension of ESG is an incredibly broad one. Governance is seen as a strategic element that allows the positioning of a company in the market and enables the integration of environmental and social aspects into the business of insurers. The strategic KPIs and goals should therefore always be aligned with business fundamentals.

One important measure to highlight is the training and qualification of employees as well as the creation of sustainability-related roles as a way to credibly signal the importance of sustainability topics within the operations of your firm to the market and competitors. The integration of sustainability throughout the whole company ties into this argument. It entails the integration into policies but also the involvement of top management and the possible linkage of management or board remuneration with ESG performance.

Lastly, the fields of risk management and underwriting have been examined in greater detail. A clear roadmap and specific KPIs in these areas will ensure the resilience of the business.

In conclusion, comprehensive governance mechanisms that are transparent and cover all aspects of the company value chain, strategic goals and risk categories will enable a competitive edge. Implementing these policies with the necessary finesse and credibility will be a challenge for years to come but will also allow companies to take a market-leading position if they start focusing on the execution now.

4.4. Integration of ESG dimensions into strategy

As a last step, insurers need to integrate the identified KPIs into their "[...] culture, core business, strategy and structure" (Johannsdottir & McInerney, 2018, p. 1253). It is commonly understood that "executing strategy is just as important, if not more important, than formulating strategy" (Higgins, 2005, p. 3). This stresses the importance of companies having access to a comprehensive roadmap for integration after the successful development of a strategy.

Barriers that firms see themselves confronted with range from structural dimensions over political, human and cultural dimensions to dimensions that are out of a company's control such as regulation and market conditions (cf. Stewart et al., 2016, pp. 25-26.

To ensure that companies are successful in the integration of sustainability practices by strategy, Johannsdottir and McInerney (cf. 2018) have developed the so-called 5 C Framework to implement sustainability strategies in insurance companies.

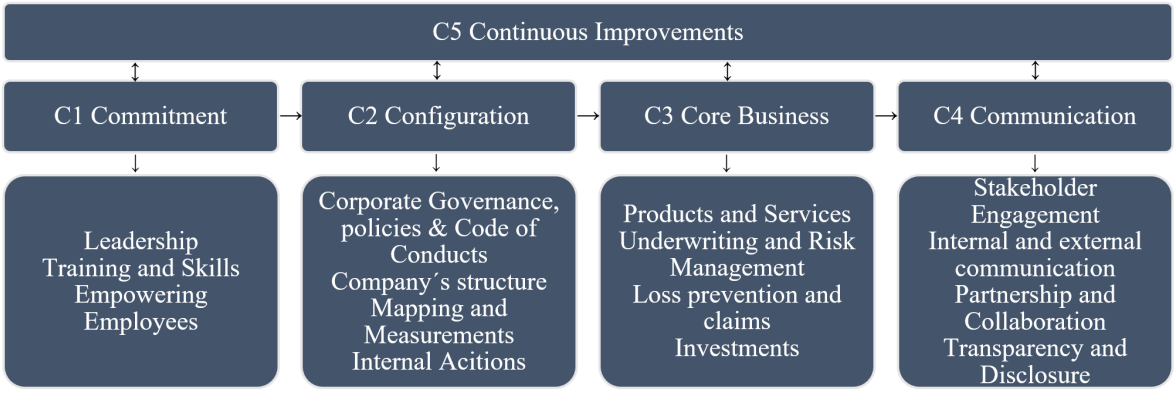

Figure 14: Insurer's Five C Framework of implementing environmental sustainability strategies (cf. Johannsdottir and McInerney, 2018, p. 1259)

The general process can be seen in Figure 14. The first step towards successful integration of sustainability is the definite commitment of the leaders. It is their "[...] role to establish environmental strategy, vision, mission and goals" (Johannsdottir & McInerney, 2018, p. 1259). The second step is the configuration of the business. That refers to the integration of ESG factors into corporate governance and the company structure as well as the steering of internal actions concerning sustainability (cf. Johannsdottir and McInerney, 2018, p. 1260). The third aspect suggests that to maximize their impact, companies will have to integrate sustainability into their core business (cf. Johannsdottir and McInerney, 2018, p. 1260). The last driver that is integrated vertically is internal and external communication. This can be through a special spokesperson, partnerships or concise sustainability reports (cf. Johannsdottir and McInerney, 2018, pp. 1260-1261).

The last dimension of this framework is C5 – Continuous Improvements. It integrated horizontally and stresses the need for constant monitoring and reevaluation of sustainability measures and risks (cf. Johannsdottir and McInerney, 2018, p. 1261). The integration into business structures is of utmost importance as sustainability is a highly complex field that requires periodic reassessments.

This framework is a valuable roadmap for all insurance companies trying to integrate sustainability into their day-to-day business and core values. Defining measures and steps for all five dimensions will enable the successful integration on a long-term basis.

5. Discussion and development of a strategy roadmap

To conclude this work, a roadmap towards a sustainable strategy in the insurance industry has been created. The thorough research of all three dimensions of ESG within this work has been used to develop a comprehensive roadmap which can be seen in Table 6. It provides a clear framework within which companies will be able to steer towards a sustainable future. This is aimed to bridge a gap between the development of strategic goals, the definition of KPIs and the subsequent integration into strategy.

The roadmap has been divided into six strategic steps, namely the preparation and commitment, the research and benchmarking, the definition of KPIs, the definition of measurement and targets, the implementation and integration into strategy and lastly, the monitoring and continuous improvement. The last step is to be interpreted as a continuous loop that can trigger the reiteration of specific strategic steps or the start of a new process. The roadmap further defines the actions, the responsible stakeholders and the desired outcome for the goals of each strategic step. It therein provides a fully holistic approach that can be adjusted and personalized by each company. The definition of the triad of action, responsibility and outcome further ensures that companies can monitor their progress before entering the next step. If necessary, they are able to revisit specific steps instead of rushing through the process prematurely.

While the roadmap does not feature specific strategic goals or KPIs, it aims to provide a practical implementation guide for insurance companies seeking to transform their business. The definition of KPIs is and will remain highly customized to each organization. A more streamlined set of goals and indicators can be expected to develop in the coming years, but until then, this roadmap serves as an enabler for insurance companies of all sizes to take their own steps towards a more sustainable future.

6. Conclusion and outlook

The relevance of the topic of sustainability to the insurance industry has been stressed repeatedly throughout all chapters. Managing risks is fundamental to the business of insurers and being able to predict these risks forms the core. Naturally, this makes them one of the most exposed industries with regard to sustainability risks and reinforces the role they should be taking on as market leaders in the ongoing sustainability transformation.

Strategic Step 1: Preparation and Commitment			
	Action	**Responsibility**	**Outcome**
ESG vision and strategic goals	Define and outline ESG vision and strategic goals of the company	Top management (and key stakeholders in the company)	ESG vision and mission statement that will serve as a guidance
Leadership Commitment	Top-level management and board have to plead commitment to ESG initiatives	CEO and board of directors	Formal statement confirming commitment of time and resources
Appointment of ESG leaders	Allocation of roles, ESG team appointment	Top management	Clearly defined ESG team leading the process
Strategic Step 2: Research and Benchmarking			
	Action	**Responsibility**	**Outcome**
Benchmarking and Review	Review of industry standards, best practices and peer performance	ESG (research) team	Extensive understanding of current ESG practices, benchmarking with peers and identification of gaps & room for improvement
Strategic Step 3: KPI Definition			
	Action	**Responsibility**	**Outcome**
Identification of strategic goals for each ESG dimension	Definition of strategic goals for environmental, social and governance dimension	ESG team in cooperation with appointed leaders from respective departments	Strategic goals in the environmental, social and governance dimension that sets a framework for the consecutive definition of specific KPIs
Development of clearly defined KPIs for each strategic goal	Definition of specific KPIs based on the strategic goals and the mission statement	ESG team in cooperation with departments and cross-functional teams	KPIs for the environmental, social and governance dimension
Strategic Step 4: Measurements and Targets Definition			
	Action	**Responsibility**	**Outcome**
Definition of Measurement	Establish clear methods to quantitatively and qualitatively measure the KPIs	ESG team and respective departments	Transparent process of measuring the KPIs (can be published in sustainability report if desired)
Setting of targets	Based on the KPIs and the process of measuring them, define targets and timeline for them	ESG team in cooperation with respective departments and top management in next step	Tables with environmental, social and governance targets (see Appendix 2)
Strategic Step 5: Implementation and Integration			
	Action	**Responsibility**	**Outcome**
Integration of KPIs into Daily Business Processes	Integrate the KPIs into daily operations and business planning, link them to performance management	All departments under the guidance of the ESG team	Transformation into a sustainable business
Development of Reporting and Communication Framework	Creation of a framework for reporting and ESG communication with internal and external stakeholders	ESG team with reporting and communication departments	Clearly defined reporting framework and communication channels & timeline
Strategic Step 6: Monitoring and Continuous Improvement			
	Action	**Responsibility**	**Outcome**
Monitor performance to review and adjust KPIs	Regularly scheduled monitoring of market + periodic performance review to adjust KPIs and targets.	ESG team with relevant departments. Adjustment of KPIs in cooperation with top management	Continuous improvement and periodic performance reports
Engagement of Stakeholders	Engagement with stakeholders to collect feedback on ESG policies and ensure involvement of employees	ESG team and if required specific departments	Enhanced relationships with internal and external stakeholders

Table 6: Roadmap towards the sustainable transformation of insurers (own illustration)

To be able to achieve this positioning, guidance and research is needed so that insurance companies of all sizes are able to succeed in the adaption of ESG measures. But while there has been a high amount of research on the topic of sustainability there is still a large gap regarding concrete steps towards realizing a sustainable transformation. This work contributes to bridging this gap by providing a framework that companies will be able to freely adapt and tailor while ensuring that a holistic picture will be kept at all times.

Through a systematic literature review encompassing more than 5.500 papers, KPIs for all three ESG dimensions have been evaluated quantitatively and qualitatively. Combined with a consideration of strategy implementation, an action plan has been developed that helps firms to identify strategic goals, related KPIs and their measurements. As a last step, the framework enables the successful integration of measures and KPIs into strategy.

Regarding the environmental dimension, it has been found that the reduction of CO_2 emissions is the main strategic goal from which all kinds of measures and KPIs will stem. For this dimension, the consideration of credibility and the avoidance of greenwashing policies is of high importance as mere compensation of emissions is not sufficient anymore.

The social dimension is less straightforward and harder to grasp. It has been established that evaluating the social impact based on the related SDGs allows for a structured approach. Combined with the adapted scope model (see Figure 9) a clear guideline for the definition of strategic goals and KPIs is provided. Exploring a similar approach of using the related SDGs as a basis for the definition of environmental KPIs like Allianz has been doing (cf. 2021, p. 10) would be of great value for future research.

Lastly, the governance dimension is potentially the most critical. Without proper integration of sustainability values into policies across the organization and embedding of sustainability values throughout the organization, efforts towards a sustainable transformation are likely to fail. Board and top management remuneration is an important aspect that will gain traction in the future and provides credibility to internal and external stakeholders.

Positioning the firm in the market as a sustainability leader is not an easy task but given the current traction, this will be a differentiating factor in the coming years. Sustainability has always been a long-term concern which makes it harder for firms to commit to it but in the light of recent developments this can be expected to change. Additionally, increasing reporting requirements and customer demands will further force companies into a transformation and already having appropriate systems in place will be of huge advantage by then.

Future research should be conducted in the area of implementation and evaluation of KPIs. Long-term and empirical studies tracking the ESG performance of companies over several years are needed. The precise measurement of acceptance, usefulness and impact on economic performance of applied KPIs is critical. Currently, no comprehensive evaluation of these factors exists, especially in regard to insurance companies. Conducting studies on this topic will be highly valuable to industry peers and prove useful within and beyond the insurance sector.

Building up on this, a set of follow-up case studies on the application of the framework that has been developed within this work is needed to evaluate its usefulness in the market. The definition of KPIs will always need to be customized but it is crucial to investigate the usefulness of these framework in guiding a sustainability transformation.

While the literature that has been reviewed had no clear geographic focus, it mostly covers examples and research of countries considered industrial nations. This limits the applicability of the developed frameworks and identified KPIs to developing countries. Further research on the unique situation that insurers face in developing countries is critical in this regard. The precarity of the social and environmental dimensions should be closely monitored in the next years. It is essential that comprehensive guidelines on managing sustainability risks in developing countries are established in the coming years.

Despite the inclusion of an extensive amount of academic literature in this review, the rapid evolution of sustainability topics may have led to the disregard of relevant studies. Future research using similar approaches will therefore be appreciated in this highly dynamic field. Tailoring the keyword lists to specific research objectives will be a good starting point for evaluating the different dimensions more closely.

While this work provides a starting point towards a sustainability transformation in the insurance industry, it cannot be considered as a single source of truth. The conduction of future research will help to identify focus areas and allow the further development of the roadmap.

References

Allianz. (2021). Allianz Group Sustainability Report 2021: Building Confidence in tomorrow. Retrieved May 27, 2024, from https://www.allianz.com/content/dam/onemarketing/azcom/Allianz_com/sustainability/documents/Allianz_Group_Sustainability_Report_2021-web.pdf

BaFin. (2020). Merkblatt zum Umgang mit Nachhaltigkeitsrisiken. Retrieved June 24, 2024, from https://www.bafin.de/ref/19598538

Behera, P. K., Jain, S. J., & Kumar, A. (2023). Visual Exploration of Literature Using Connected Papers: A Practical Approach. *Issues in Science and Technology Librarianship*, *104*, 1–8.

Bogage, J. (2023). Home insurers cut natural disasters from policies as climate risks grow. Retrieved June 17, 2024, from https://www.washingtonpost.com/business/2023/09/03/natural-disaster-climate-insurance/

COSO & WBCSD. (2018). Enterprise Risk Management: Applying enterprise risk management to environmental, social and governance-related risks. Retrieved June 17, 2024, from https://docs.wbcsd.org/2018/10/COSO_WBCSD_ESGERM_Guidance.pdf

Directorate-General for Communication European Commission. (2024). Corporate sustainability due diligence. Retrieved June 19, 2024, from https://commission.europa.eu/business-economy-euro/doing-business-eu/corporate-sustainability-due-diligence_en

Dlugolecki, A. (2008). Climate Change and the Insurance Sector. *The Geneva Papers*, *33*, 71–90.

Eling, M., & Lehmann, M. (2018). The Impact of Digitalization on the Insurance Value Chain and the Insurability of Risks. *The Geneva Papers on Risk and Insurance—Issues and Practice*, *43*, 359–396.

European Banking Authority. (2020). EBA Discussion Paper on management and supervision of ESG risks for credit institutions and investment firms. Retrieved June 16, 2024, from https://eba.europa.eu/sites/default/files/document_library/Publications/Discussions/2021/Discussion%20Paper%20on%20management%20and%20supervision%20of%20ESG%20risks%20for%20credit%20institutions%20and%20investment%20firms/935496/2020-11-02%20%20ESG%20Discussion%20Paper.pdf

European Environment Agency. (2017). Climate change, impacts and vulnerability in Europe 2016. Retrieved June 22, 2024, from https://www.eea.europa.eu/publications/climate-change-impacts-and-vulnerability-2016

European Insurance and Occupational Pensions Authority. (2019). EIOPA's Technical Advice on the integration of sustainability risks and factors in the delegated acts under Solvency II and IDD. Retrieved June 15, 2024, from https://www.eiopa.europa.eu/publications/technical-advice-integration-sustainability-risks-and-factors-solvency-ii-and-insurance-distribution_en

European Insurance and Occupational Pensions Authority. (2022). European insurers' exposure to physical climate change risks. Retrieved June 12, 2024, from https://www.eiopa.europa.eu/publications/discussion-paper-physical-climate-change-risks_en

Federal Ministry of Labour and Social Affairs. (n.d.). Supply Chain Act. Retrieved May 28, 2024, from https://www.csr-in-deutschland.de/EN/Business-Human-Rights/Supply-Chain-Act/supply-chain-act.html

Figge, F., Hahn, T., Schaltegger, S., & Wagner, M. (2002). The Sustainability Balanced Scorecard - Linking Sustainablity Management to Business Strategy. *Business Strategy and the Environment*, *11*, 269–284.

Hansen, J., Sato, M., & Ruedy, R. (2024). *Global Warming Acceleration: Causes and Consequences* [Working Paper, Columbia University 2024].

Higgins, J. M. (2005). The Eight 'S's of Successful Strategy Execution. *Journal of Change Management*, *5*, 3–13.

Hohnen, P. (2007). *Corporate Social Responsibility: An Implementation Guide for Business*. IISD. Retrieved June 23, 2024, from https://www.iisd.org/system/files/publications/csr_guide.pdf

Hristov, I., & Chirico, A. (2019). The Role of Sustainability Key Performance Indicators (KPIs) in Implementing Sustainable Strategies. *Sustainability*, *20*, 1–19.

Hristov, I., Chirico, A., & Appolloni, A. (2019). Sustainability Value Creation, Survival, and Growth of the Company: A Critical Perspective in the Sustainability Balanced Scorecard (SBSC). *Sustainability*, *7*, 1–19.

IPCC. (2023). Climate Change 2023 Synthesis Report. Retrieved June 14, 2024, from https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf

Johannsdottir, L., & McInerney, C. (2018). Developing and using a Five C framework for implementing environmental sustainability strategies: A case study of Nordic Insurers. *Journal of Cleaner Production*, *183*, 1252–1264.

Lee, K.-H., Min, B., & Yook, K.-H. (2015). The impacts of carbon (CO2) emissions and environmental research. *Int. J. Production Economics*, *167*, 1–11.

Lyon, T. P., & Montgomery, A. W. (2015). The Means and End of Greenwash. *Organization & Environment*, (2), 223–249.

Marti, A., Bastida-Vialcanet, R., & Marimon, F. (2024). A systematic literature review: ESG criteria implementation in the insurance industry. *Intangible Capital*, *20*, 193–214.

McKenzie, S. (2024). *Social Sustainability: Towards some definitions* [Working Paper, Hawke Research Institute 2004].

Orgeolet, L., Foulquier, N., Misery, L., Redou, P., Pers, J.-O., Devauchelle-Pensec, V., & Saraux, A. (2019). Can artificial intelligence replace manual search for systematic literature? Review on cutaneous manifestations in primary Sjögren's syndrome. *Rheumatology*, (4), 811–819.

Pati, D., & Lorusso, L. N. (2018). How to Write a Systematic Review of the Literature. *Health Environments Research & Design Journal*, (1), 15–30.

PwC. (2022). Next in Insurance - ESG: A growing sense of urgency. Retrieved June 14, 2024, from https://www.pwc.com.cy/en/services/assets/pwc-next-in-insurance-esg.pdf

Rahlfs, C. (2007). *Redefinition der Wertschöpfungskette von Versicherungsunternehmen*.

Sato, M., & Seki, M. (2010). Sustainable Business, Sustainable Planet—A Japanese Insurance Perspective. *The Geneva Papers*, *35*, 325–335.

Schanz, K.-U. (2022). The Role of Insurance in Promoting Social Sustainability. *The Geneva Association*. Retrieved May 13, 2024, from https://www.genevaassociation.org/sites/default/files/2022-11/social_sustainability_report.pdf

Sherwood, D., & Sullivan, K. B. (2021). Building a more sustainable insurance industry. *Deloitte Insights*. Retrieved June 12, 2024, from https://www2.deloitte.com/jp/en/pages/financial-services/articles/ins/inclusive-and-sustainable-insurance.html

Stewart, R., Bey, N., & Boks, C. (2016). Exploration of the barriers to implementing different types of sustainability. *Procedia CIRP*, *48*, 22–27.

Stricker, L., Pugnetti, C., Wagner, J., & Röschmann, A. Z. (2022). Green Insurance: A Roadmap for Executive Management. *Journal of Risk and Financial Management*, (5), 1–19.

The Geneva Association. (n.d.). About us. Retrieved May 13, 2024, from https://www.genevaassociation.org/about-us

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, *14*, 207–222.

Trichet, J.-C. (2005). Financial Stability and the Insurance Sector. *The Geneva Papers*, *30*, 65–71.

UNEP-FI. (n.d.). About Us. Retrieved June 17, 2024, from https://www.unepfi.org/about/

UNEP-FI. (2023a). Nature-Positive Insurance: Evolving Thinking. Retrieved June 17, 2024, from https://www.unepfi.org/industries/insurance/nature-positive-insurance-evolving-thinking-and-practices/

UNEP-FI. (2023b). UN-convened Net-Zero Insurance Alliance Target-Setting Protocol. Retrieved June 17, 2024, from https://www.unepfi.org/wordpress/wp-content/uploads/2023/01/NZIA-Target-Setting-Protocol-Version-1.0.pdf

United Nations Department of Economic and Social Affairs. (2024). THE 17 GOALS. Retrieved May 10, 2024, from https://sdgs.un.org/goals

Verdantix. (2017). Sustainability Reporting Hits A Plateau As The Number Of Reports Using The GRI Guidelines Falls For The First Time. Retrieved June 6, 2024, from https://www.sustainability-reports.com/sustainability-reporting-hits-a-plateau-as-the-number-of-reports-using-the-gri-guidelines-falls-for-the-first-time/

Wagenhofer, A. (2024). Sustainability Reporting: A Financial Reporting Perspective. *Accounting in Europe*, (1), 1–13.

World Business Council for Sustainable Development and World Resources Institute. (2004). Retrieved May 24, 2024, from https://files.wri.org/d8/s3fs-public/pdf/ghg_protocol_2004.pdf

World Commission on Environment and Development. (1987). Our Common Future. Retrieved May 11, 2024, from https://www.are.admin.ch/are/en/home/media/publications/sustainable-development/brundtland-report.html

World Economic Forum. (2020). Measuring Stakeholder Capitalism: Towards Common Metrics and Consistent Reporting of Sustainable Value Creation. Retrieved June 25, 2024, from https://www3.weforum.org/docs/WEF_IBC_Measuring_Stakeholder_Capitalism_Report_2020.pdf