Online-Appendix zu

„Mobile App Service Quality Dimensions and Requirements for Mobile Shopping Companion Apps“

Tobias Wulfert

Westphalian Wilhelms-University, Münster

Junior Management Science 4(3) (2019) 339-391

Appendix

A Structured Literature Review Description

As the literature review underlying this master thesis should be conducted in a systematic way, the SLR process by Vom Brocke et al. (2009) is applied. This process is backed by a taxonomy defining the SLR scope by Cooper (1988) and a structured approach for synthesizing the results on a conceptual basis by Webster and Watson (2002). Microsoft Excel is used as a tool to support the SLR. A SLR allows for generating of to some extend repeatable and unbiased results. It should help to reveal potentially open gaps in the existing literature and synthesize the results. This detailed description makes the SLR process transparent and re-executable (Vom Brocke et al. 2009).

A SLR according to Vom Brocke et al. (2009) is an iterative process that comprises of the five phases *definition of review scope*, *conceptualization of topic*, *literature search*, *literature analysis and synthesis* and *research agenda* (fig. 18). The presentation of the results is part of section 3.1 and chapter 4. This description should illustrate the SLR process in more detail compared to the methodology chapter (ch. 3.1).

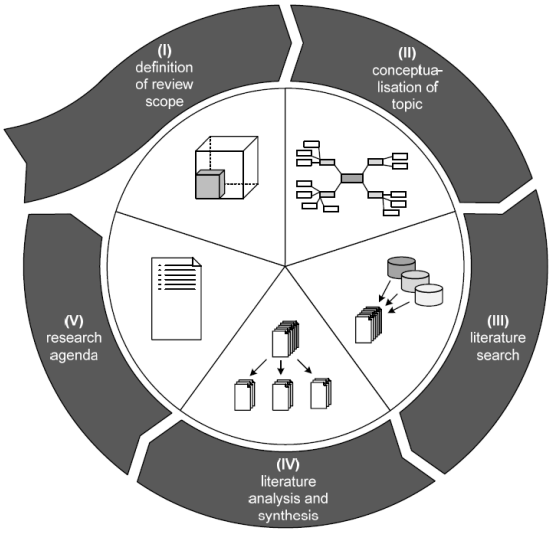

Figure 18 Structured Literature Review Framework (Vom Brocke et al. 2009, p. 8)

A.1 Definition of Review Scope

For a clear definition of the review scope, Vom Brocke et al. (2009) suggest drawing on the renowned taxonomy by Cooper (1988). Defining the review scope is one of the most challenging issues during the SLR (Vom Brocke et al. 2009). Thus, the taxonomy should

guide the reviewer in defining the scope. The taxonomy uses the six dimensions *focus*, *goal*, *organization*, *perspective*, *audience* and *coverage* each having different characteristics (Cooper 1988, p. 108-112). Often the characteristics within one dimension are not "mutually exclusive areas of interest" (Cooper 1988, p. 108). Therefore, there can be more than one characteristic selected for each dimension. The focus of this SLR lies on research outcomes from and theories used in previous papers in the context of ESQ, MSQ and MASQ. The aim of this thesis is to integrate the central issues of the identified literature on a conceptual basis. The results are relevant for specialized scholars and practitioners responsible for mobile app design and development. As the literature is accumulated and synthesized to only a few dimensions while discarding others not relevant for the assessment of MASQ, the perspective is an espousal of position. The SLR is exhaustive but only dimensions relevant for the design of mobile shopping companion apps are presented in detail (tab. 24).

Characteristic	**Categories**			
(1) Focus	*Research outcomes*	Research methods	*Theories*	Applications
(2) Goal	*Integration*	Criticism	*Central issues*	
(3) Organization	Historical	*Conceptual*	Methodological	
(4) Perspective	Neutral representation		*Espousal of position*	
(5) Audience	*Specialized scholars*	General scholars	*Practitioners*	General public
(6) Coverage	Exhaustive	*Exhaustive and selective*	Representative	Central/ pivotal

Table 24 Structured Literature Review Taxonomy

A.2 Conceptualization of Topic

The topic is conceptualized in chapter 2 by introducing definitions for the main terms and constructs. These are mainly the development of SQ towards MASQ and the delimitation of mobile shopping companion apps in the context of m-Commerce. Moreover, the basic terms design requirements, quality and service are defined alongside with online customer reviews in MADPs. The SLR is further led by the two research questions already raised in the introduction:

RQ1. How can the service quality of mobile shopping companion apps be assessed?

RQ2. What are design requirements for a high service quality when developing mobile shopping companion apps?

A.3 Literature Search

The literature search consists of the sub phases *journal search*, *database search*, *keyword search* and *back-/ forward search* (fig. 19).

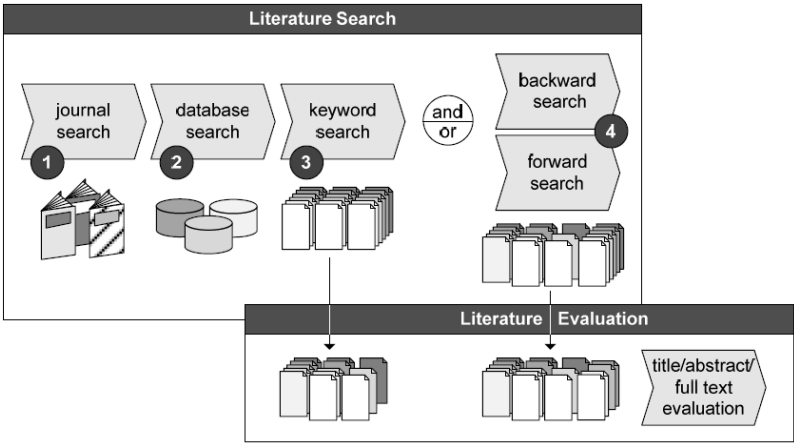

Figure 19 Literature Search Process (Vom Brocke et al. 2009, p. 9)

Journal Search
The topic of SQ has become so present in literature that it created an own literature stream. However, it spreads into many research areas such as retailing, e-Commerce, human-computer-interaction or marketing. Therefore, concerning the searched journals, no restrictions were made during the SLR to allow for an exhaustive coverage.

Database Search
As online databases for the execution of the keyword search four databases are selected. These are EBSCOhost, Scopus and Web of Science for referencing papers from the majority of renowned peer-reviewed, scientific journals including retailing, service and quality related articles. Additionally, the electronic library of the AIS is included to integrate research papers, conference papers and journal articles from the field of IS research. These databases incorporate advanced and expert search functions to specify the following keyword search to the fields required. Furthermore, they allow for exporting citations and the review results.

Keyword Search
Vom Brocke et al. (2009) state that a precise set of keywords should be used in order to find appropriate literature in online databases. Keywords are identified by previously searching relevant literature for keywords that were used frequently in the context of multi-dimensional and hierarchical scales for ESQ, MSQ and MASQ assessment and the two research questions.

Keywords in the context of service quality:

- Service quality
- Electronic service quality, e-service quality
- Mobile service quality, m-service quality
- App service quality

Keywords in the context of mobile shopping:

- Mobile shopping
- Mobile commerce, m-commerce

Keywords indicating the dimensional aspect of service quality:

- Measurement, measure
- Dimension, criteria
- Scale

Fusing these keywords results in the general search string as presented in section 3.1 that needs to be adapted to the specific syntax of each online database. The specific search strings are listed in tables 25 - 28. Each online database is searched for title, abstract and keywords. If the search in an online database produces too many results, the keyword "*service quality"[14] is set to mandatory. This is the case for SCOPUS and AIS Electronic Library.

*TITLE (("app" OR "mobile" OR "electronic" OR "m-" OR "e-") AND ("service quality") AND ("*commerce" OR "*shopping") AND ("criteria" OR "dimension" OR "measure*")) OR ABS (("app" OR "mobile" OR "electronic" OR "m-" OR "e-") AND ("service quality") AND ("*commerce" OR "*shopping") AND ("criteria" OR "dimension" OR "measure*")) AND KEY ("*service quality")*

Table 25 Adapted Search String for SCOPUS

*(("app" OR "mobile" OR "electronic" OR "m-" OR "e-") AND ("service quality") AND ("*commerce" OR "*shopping") AND ("criteria" or "dimension" or "measure*"))*

Table 26 Adapted Search String for AIS Electronic Library

[14] The asterix is a wildcard character representing a string of arbitrary length.

*TS=(("app" OR "mobile" OR "electronic" OR "m-" OR "e-") AND ("service quality") AND ("*commerce" OR "*shopping") AND ("criteria" OR "dimension" OR "measure*")) OR TI=(("app" OR "mobile" OR "electronic" OR "m-" OR "e-") AND ("service quality") AND ("*commerce" OR "*shopping") AND ("criteria" OR "dimension" OR "measure*"))*

Table 27 Adapted Search String for Web of Science

*TI(("app" OR "mobile" OR "electronic" OR "m-" OR "e-") AND ("service quality") AND ("*commerce" OR "*shopping") AND ("criteria" OR "dimension" OR "measure*")) OR AB(("app" OR "mobile" OR "electronic" OR "m-" OR "e-") AND ("service quality") AND ("*commerce" OR "*shopping") AND ("criteria" OR "dimension" OR "measure*")) OR KW(("app" OR "mobile" OR "electronic" OR "m-" OR "e-") AND ("service quality") AND ("*commerce" OR "*shopping") AND ("criteria" OR "dimension" OR "measure*"))*

Table 28 Adapted Search String for EBSCOhost

After searching the databases with the adapted search strings, predefined inclusion and exclusion criteria have to be applied to the results of the keyword search to reduce number of findings to relevant papers (Vom Brocke et al. 2009). The following criteria are applied on titles, abstracts and keywords of the articles:

Inclusion criterion:

- Paper focused on the development, assessment and application of ESQ, MSQ and MASQ

Exclusion criteria:

- Not concerned with the concept of SQ in the context of e-services and m-services
- SQ dimensions not generally applicable or in the context of shopping or commerce (not only to single or small aspect e.g. virtual customer chat)
- Focus of the papers has to be on B2C (not business-to-business or consumer-to-consumer)
- Grey literature or more specifically non-peer-reviewed papers that are not published in scientific journals or conference proceedings such as white papers for practitioners and consultancy reports and studies

- Not mentioning distinct SQ dimensions for assessment or only repeating dimensions and criteria that were developed earlier
- Non-English papers are excluded from the review
- Papers not accessible through the university's network were excluded from the review
- Papers that are (almost) duplicates of previously included papers, thereby excluding papers which do not add additional value

Back- and Forward Search
After applying the in- and exclusion criteria to the results of the keyword search, a back- and forward search is executed on the preliminary set of relevant papers. For the backward search, the references of the preliminary set are checked for relevant papers using the aforementioned in- and exclusion criteria. The forward search identifies further papers that use one or more of papers from the preliminary set of relevant papers as reference.

A.4 Literature Analysis and Synthesis

In total, the SLR results in 35 relevant scales each using a different set of dimensions and related items. During the literature analysis, these scales are compared to identify commonly used dimensions. The dimensions are compared not only based on their denotation but also on a definition-base using a conceptual matrix introduced by Webster and Watson (2002). For the comparison, the MSQ measurement scale by Stiakakis and Petridis (2014) and its secondary dimensions are chosen as reference dimensions. It is a multi-dimensional and hierarchical scale consisting of three primary and eleven secondary dimensions (tab. 29) with a total of 40 items as manifestations of the dimensions (Stiakakis and Petridis 2014). This particular scale is chosen as reference for the comparison as the scale is empirically tested and builds upon prior research on MSQ (e.g., Lu et al. 2009). Furthermore, it is developed for measuring the SQ in the context of m-services. Thus, it provides a comprehensive overview on the SQ of general mobile apps incorporating all e-Commerce phases.

The synthesis reveals that the following dimensions[15] are commonly used for assessing ESQ or MSQ. Commonly in this context means that a secondary dimension has to be present in around 40 percent of all scales under investigation:

- *Problem solving* (84.8%)

[15] The percental appearance of each dimension in other scales is denoted in brackets.

Dimension	Description
Interaction quality	*"The functional dimension of the perceived service quality model, reflects all the quality characteristics of a customer's interaction with the m-service provider"*
- Expertise	*"The extent of the provider's knowledge regarding the service"*
- Problem solving	*"The provider's ability to handle the user's problems promptly and effectively"*
- Information	*"The provision of accurate and precise information by the provider"*
- Security/ Privacy	*"The protection of system and network resources from any external or internal attack and the protection of the users' personal data"*
- Customization/ Personalization	*"The process of modifying services to suit the users' specifications / the process of providing services that are tailored to users"*
Environment quality	*"The context in which m-services are delivered, as well as quality characteristics of the equipment used in the m-service delivery"*
- Equipment	*"The quality of both the wireless telecommunication network of the service provider and the mobile device of the user"*
- Design	*"The quality of the mobile device's user-interface design"*
- Context	*"The specific conditions under which the service is used"*
Outcome quality	*"The quality of everything provided (or left) to the customer at the end of the service delivery, such as evidence of the delivery, valence, etc."*
- Reliability	*"The completion of the service in consistency with the provider's promises/guarantees"*
- Tangibles	*"Any kind of evidence that the service has been successfully delivered"*
- Valence	*"The final impression of the user upon the completion of the service delivery"*

Table 29 Reference Dimension Descriptions (Stiakakis and Petridis 2014)

- *Information* (75.8%)
- *Security/privacy* (78.8%)
- *Customization/personalization* (42.4%)
- *Equipment* (48.5%)
- *Design* (78.8%)
- *Reliability* (75.8%)
- *Valence* (39.4%)

The remaining dimensions *Expertise* (21.2%), *Content* (9.1%) and *Tangibles* (12.1%) are only rarely used for SQ measurement (app. C).
Moreover, the literature synthesis has shown that for some of the reference dimensions other denotation are more popular. Therefore, problem solving is denoted as *Responsiveness* and equipment is further denoted as *Performance*.

The extracted data is visualized in a concept-oriented way using a spreadsheet structure (fig. 20) including the aforementioned dimensions (Webster and Watson 2002).

Table 2. Concept Matrix

Articles	Concepts				
	A	B	C	D	…
1		✖	✖		✖
2	✖	✖			
…			✖	✖	

Figure 20 Concept Matrix Structure (Webster and Watson 2002, p. xvii)

B Mobile Shopping Companion Apps under Investigation

The following section provides a brief overview of the three mobile shopping companion apps under investigation. The apps are provided by Walmart, Tesco and M&S. Within this section some details on the analyzed app versions and their key features are given as well as further retail-related apps offered by the three retailers. Each of the three mobile shopping companion apps is freely available on the MADPs App Store and Play Store.

B.1 Walmart: In-Store & Online Shopping. Easy Reorders

Key Features (according to Mobile App Store Descriptions (Walmart 2017c))

- Online shop comprising the whole Walmart assortment, free 2-day shipping and possibility to pick up online orderings in a store
- Location finder for closest shop, in-store inventory, aisle location and opening hours
- Administer and monitor orders
- Notifications about weekly ads and rollbacks
- Search functionality and bar-code scanner

App Information (retrieved: 23th June 2017)

	Apple App Store	Google Play Store
Category	Shopping	Shopping
Version	17.9 (13th June 2017)	17.9 (13th June 2017)
Total number of Ratings	70,834	412,363
Overall Rating	3 / 5	4.5 / 5
First Release	2011	

Table 30 Walmart App Information

Further retail-related apps provided by Walmart

- WM1 (Organizing app for staff and associates)
- Walmart Scan & Go (self-check-out using the smart phone – yet only available at four Walmart locations)
- Walmart Grocery (dedicated app for grocery e-shopping – delivery either in car for free or to the home)

B.2 Tesco Groceries - Order food shopping

Key Features (according to Mobile App Store Descriptions (Tesco 2017d))

- Online shop for food and drinks offering delivery to the household including the selection of a convenient delivery slot or the pick up at a store near you
- Location finder for closest shop
- Using previous orders as favorites for re-ordering
- Store Tesco Clubcard information such as vouchers and rewards directly within the app
- Administer and monitor existing orders
- Search functionality and bar-code scanner

App Information (retrieved: 23th June 2017)

	Apple App Store	Google Play Store
Category	Shopping	Shopping
Version	10.1 (22th May 2017)	10.1 (16th May 2017)
Total number of Ratings	8,684	21,457
Overall Rating	4.5 / 5	3.9 / 5
First Release	2010	

Table 31 Tesco App Information

Further retail-related apps provided by Tesco

- Tesco Clubcard (Manage Tesco Clubcard and coupons on the smartphone)
- PayQwig (Can be used as paying media in every Tesco store and petrol station with a linked Tesco.com account)
- Tesco Scan as you Shop (Self-check-out using the smartphone – only available in a few stores but also supported by additional hand-held devices)
- Tesco Finder (Find the next Tesco brick-and-mortar store and the shelf number of the item)
- Wine Finder (Search for wine by scanning the label of the bottle)

B.3 M&S App

Key Features (according to Mobile App Store Descriptions (M&S 2017b))

- Online Shop including clothes, food, wine, beauty products, shoes, flowers
- Location finder for closest shop
- Integration of membership program (Sparks)
- Customization of highlight page possible integrating user's favorites
- Notifications on product updates and promotions, newsletter and location-based updates
- Search functionality and barcode scanner

App Information (retrieved: 23th June 2017)

	Apple App Store	Google Play Store
Category	Shopping	Shopping
Version	iOS: 5.2.0 (26th May 2017))	5.0.0.132 (14th June 2017))
Total number of Ratings	5,477	7,198
Overall Rating	4 / 5	4.3 / 5
First Release	2012	

Table 32 M&S App Information

Further retail-related app provided by M&S

- Cook With M&S (providing cooking recipes and step-by-step cooking instruction with a personalized shopping list for use in M&S stores)

C Conceptual Matrix on Mobile App Service Quality Dimensions

Author	Year	Expertise	Problem solving	Information	Security/ privacy	Personalization	Equipment	Design	Context	Reliability	Tangibles	Valence
Yoo and Donthu	2001	-	-	-	X	-	X	X	-	-	-	-
Aladwani	2002	-	X	X	X	-	-	X	-	-	-	-
Barnes and Vidgen	2002	X	X	X	X	X	-	X	-	X	-	X
Francis and Lesley	2002	X	X	X	X	-	X	X	-	X	-	-
Gefen	2002	-	X	X	X	-	-	X	-	X	-	X
Janda et al.	2002	-	X	X	X	-	X	X	-	X	-	-
Madu and Madu	2002	X	X	X	X	X	X	X	-	X	-	-
Wolfinbarger and Gilly	2002	-	-	X	X	-	-	X	-	X	-	-
Cai and Jun	2003	-	X	X	-	X	-	X	-	X	-	X
Santos	2003	-	X	X	X	-	-	X	-	X	-	-
Wolfinbarger and Gilly	2003	-	X	-	X	-	-	X	-	X	-	-
Jun et al.	2004	X	X	-	X	X	X	X	-	X	-	-
Long and McMellon	2004	-	X	X	X	-	X	X	-	X	-	-
Webb and Webb	2004	X	X	X	X	X	-	-	-	-	-	-
Cao et al.	2005	-	X	X	-	-	-	-	-	-	-	X
Kettinger and Lee	2005	X	X	-	-	-	-	-	-	X		-
Lee and Lin	2005	-	X	-	X	X	-	X	-	X	-	X
Parasuraman et al.	2005	-	X	-	X	-	X	-	-	X	-	-

Author	Year	Exper-tise	Problem solving	Infor-mation	Security/ privacy	Personali-zation	Equipment	Design	Context	Relia-bility	Tangibles	Valence
Bauer et al.	2006	-	X	X	X	X	X	X	-	X	-	-
Collier and Bien-stock	2006	X	X	X	X	-	X	X	X	X	X	-
Fassnacht and Koese	2006	-	-	X	-	-	X	X	-	X	X	X
Bressolles et al.	2007	-	-	X	X	X	-	X	-	X	-	-
Cristobal et al.	2007	-	X	X	X	X	-	X	-	X	-	-
Loiacono et al.	2007	-	-	X	X	-	X	X	-	-	-	X
Holloway and Beatty	2008	-	X	X	X	-	-	X	-	X	-	-
Li and Leng	2008	-	X	X	-	-	X	X	-	X	X	X
Tan and Chou	2008	-	X	X	-	X	X	X	-	-	-	X
Vlachos and Vre-chopoulos	2008	-	X	X	X	-	X	X	-	-	-	-
Swaid and Wigand	2009	-	X	X	X	X	-	X	-	X	-	-
Ding et al.	2011	-	X	X	-	-	-	-	-	X	-	X
Vlachos et al.	2011	-	X	X	X	X	-	X	-	-	-	X
Huang et al.	2015	-	X	-	X	-	X	-	-	X	-	-
Kuo et al.	2016	-	X	-	X	X	X	-	-	X	X	-
Percentages:		21.2	84.8	75.8	78.8	42.4	48.5	78.8	9.1	75.8	12.1	39.4

Table 33 Conceptual Matrix on Mobile App Service Quality Dimensions

D Definition of Mobile App Service Quality Dimensions

The following table is a summarizing overview of the MASQ scale developed in chapter 4 presenting the denotation and definition of each primary and secondary dimension. The primary dimensions are highlighted in bold. It is the result of the dimension comparison in the conceptual matrix (appendix C) and the QCA on the online customer reviews of the three mobile shopping companion apps. Some denotations and definitions are similar to the MSQ scale presented by Stiakakis and Petridis (2014) as it is chosen as reference scale for the conceptual matrix (section 4.1).

Dimension	Description
Interaction quality	Reflects all the quality characteristics of a customer's interaction with the m-service provider
Responsiveness	The retailer's ability to promptly and politely solve a customer's issues related with the mobile app
Information	The provision of accurate and precise information by the retailer
Security and Privacy	The protection of system and network resources from any external or internal attack and the protection of the customers' personal data
Environment quality	Reflects the context in which mobile apps are delivered, and quality characteristics of the equipment that affect the mobile apps delivery
Design	The aesthetics features and layout of the user interface design
Performance	The performance of the mobile app and its resource requirements
Outcome quality	Reflects the technical quality of the service delivery and the customer's satisfaction with the mobile service
Technical reliability	The accurate and consistent operation of the mobile app and the services provided
Valence	The final impression of the customer upon the completion of the service delivery

Table 34 Definition of Mobile App Service Quality Dimensions