

A Framework for Rigorously Identifying Research Gaps in Qualitative Literature Reviews

Completed Research Paper

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Abstract

Identifying research gaps is a fundamental goal of literature reviewing. While it is widely acknowledged that literature reviews should identify research gaps, there are no methodological guidelines for how to identify research gaps in qualitative literature reviews ensuring rigor and replicability. Our study addresses this gap and proposes a framework that should help scholars in this endeavor without stifling creativity. To develop the framework we thoroughly analyze the state-of-the-art procedure of identifying research gaps in 40 recent literature reviews using a grounded theory approach. Based on the data, we subsequently derive a framework for identifying research gaps in qualitative literature reviews and demonstrate its application with an example. Our results provide a modus operandi for identifying research gaps, thus enabling scholars to conduct literature reviews more rigorously, effectively, and efficiently in the future.

Keywords: Research methods/methodology, Literature review, Literature analysis, Research gap

Introduction

A literature review “is an essential feature of any academic project” (Webster and Watson 2002, p. xiii). Most literature reviews in information systems (IS) research use the framework proposed by Webster and Watson’s (2002). However, their framework includes little information about how to rigorously identify research gaps when conducting literature reviews. As Webster and Watson note, “a review should identify critical knowledge gaps and thus motivate researchers to close this breach” (Webster and Watson 2002, p. xix). However, they do not propose a *modus operandi* for ensuring rigor and replicability in that process. However, for conducting literature reviews rigor (e.g., Cooper 1998; Levy and Ellis 2006) and systematicity (Rowe 2014) are essential as they enhance the quality of the review since rigorous and systematic reviews are more useful and replicable (Wolfswinkel et al. 2013; Rowe, 2014).

Based on the finding that “the identification of such [research] gaps has not been completed in a systematic way” (Robinson et al. 2011, p. 1325), Robinson et al. (2011) developed a framework for rigorously identifying research gaps. In addition, they point out that as researchers aim for conducting relevant future research, it is important to provide them with research gaps that are rigorously identified and characterized. However, their framework solely focuses on quantitative literature reviews (meta-analyses) in the health care domain. Hence, there is a need for a framework that helps scholars to identify research gaps in qualitative literature reviews whose objective is to summarize extant theory to identify gaps in theory or research. The development of such a framework needs to be informed by justificatory knowledge. In order to gather this knowledge, this paper analyzes how research gaps are identified in current literature reviews using grounded theory. We assume that these literature reviews contain implicit or explicit knowledge about the process of identifying research gaps. Subsequently, these findings will be used to build a comprehensive framework for identifying research gaps in literature reviews. Therefore, this paper aims at answering two research questions:

Research question 1: *How are research gaps being identified in state-of-the-art literature reviews?*

Research question 2: *How can research gaps be rigorously identified from literature reviews?*

The second research question leads to the main contribution of our article, which is a framework that increases researchers’ ability to rigorously identify research gaps in literature reviews. We seek to improve researchers’ effectiveness in conducting literature reviews by facilitating a literature synthesis that is systematically targeted on identifying research gaps. To demonstrate the application and usefulness of the framework, we will provide a brief example about how to employ the framework.

This paper focuses on literature reviews in the IS domain. Although this particular field of research has distinctive features, such as its interdisciplinary character (Levy and Ellis 2006), the results of this paper might as well be applicable in other domains, especially in the social sciences.

The remainder of this paper is organized as follows. In the next section we outline the theoretical background. We then explicate our research approach. In the next section we present the findings on which the framework for identifying research gaps is developed and applied. The paper concludes with a discussion and implications for researchers.

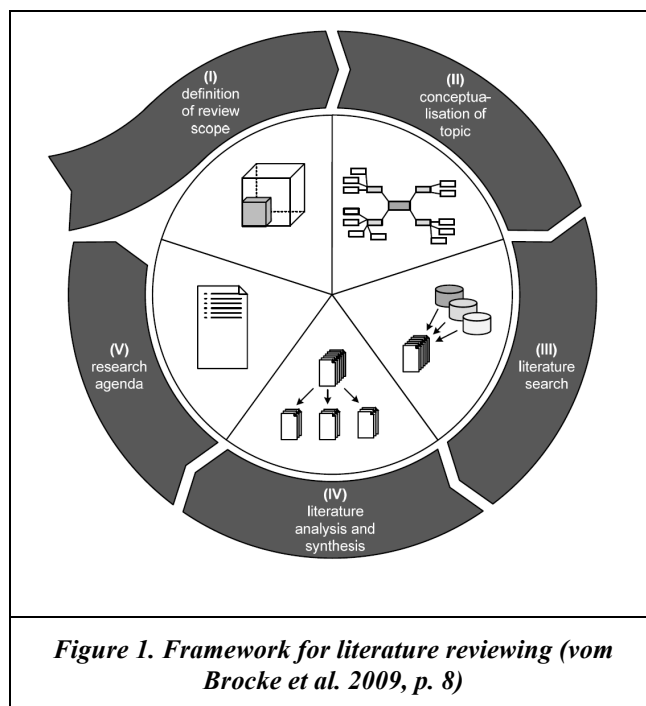
Theoretical Background

Goals and Process of Literature Reviews

Hart (2009, p.13) defines a *literature review* as “the selection of available documents (both published and unpublished) on the topic, which contain information, ideas, data and evidence written from a particular standpoint to fulfill certain aims or express certain views on the nature of the topic and how it is to be investigated, and the effective evaluation of these documents in relation to the research being proposed”. Yet, this definition does not refer to the importance of rigor for thorough literature reviews. As Cooper (1998, p. 3) notes, “research synthesists must be required to meet the same rigorous methodological standards that are applied to primary researchers”. In this regard, literature reviews also refer to systematicity, as systematicity implies reproducibility (Rowe 2014). Furthermore, a literature review should not only examine past research, but also identify research gaps (Hart 2009; Rowe 2014; Webster

and Watson 2002) that can be derived from the synthesis of existing research (Cooper 1998). A synthesis should provide guidance on where future research would be most effective (Eagly and Wood 1994).

Regarding literature reviews in the field of IS, Webster and Watson's (2002) seminal paper is widely regarded as the standard approach (Wolfswinkel et al. 2013). The paper's main contribution are guidelines that assist scholars in conducting literature reviews in the domain of IS. According to vom Brocke et al. (2009), a literature review in the field of IS consists of five phases (see Figure 1). Initially, the scope of the review needs to be determined. Second, the topic should be conceptualized. This also includes providing definitions of the key terms (Zorn and Campbell 2006). Third, a literature search needs to be conducted. In the fourth step, the literature is analyzed and synthesized. Finally, a research agenda is derived from the synthesis (vom Brocke et al. 2009).



Thus, identifying research gaps forms part of the last step (phase V) of von Brocke et al.'s framework. It is important to note that the process of identifying research gaps is different from the process of literature analysis and synthesis (phase IV). As noted above, research gaps are derived from the synthesis (Cooper 1998). In contrast to the process of identifying research gaps, the process of literature analysis and synthesis has been more thoroughly investigated and methods have been identified (e.g., Webster and Watson 2002; Wolfswinkel et al. 2013).

Distinguishing Research Gaps, Research Problems, and Research Agenda

Robinson et al. (2011, p. 1325) define that a *research gap* arises „when the ability of the systematic reviewer to draw conclusions is limited“. Nevertheless, a research gap also holds a function as a starting point for research. While Robinson et al. (2011) emphasize that research gaps represent an *output* (of literature reviews), we also perceive them as an *input* as they can motivate further research. The term *research problem* might occasionally be used as a synonym for research gaps. However, it focuses on the function as input for research, since a research problem is a problem statement that is resolved by means of research (Jacobs 2011). A problem statement represents “a gap in sets of information that, when examined carefully, results in a call for action or resolution” (Jacobs 2011, p. 127), and “research seeks to resolve the disparate sets of information through the generation of new knowledge and the introduction of theory” (Jacobs 2011, p. 128). As Jacobs notes, research problems must be derived, e.g., by means of literature reviews. Therefore, research problems can also be conceived as an output.

We integrate the definitions by Robinson et al. (2011) and Jacobs (2011) for our paper. While the definition by Robinson et al. (2011) focuses on research gaps as a result of the process of reviewing literature, Jacobs (2011) emphasizes the formation of research problems and how these problems might be resolved. Hence, a research gap arises when there is a gap in sets of information that is derived from a literature synthesis and requires further research to be resolved. It might be argued that it is possible to derive research gaps from other sources than literature syntheses. Yet, the definition above does neither object nor claim exclusiveness. It merely states *one major* possibility of how a research gap may arise.

A *research agenda* is a set of questions for further research (vom Brocke et al. 2009). However, the literature does not provide information whether a set of research gaps may therefore be called research agenda. Whereas research gaps can directly lead to questions for further research, this does not necessarily mean that all questions for further research are derived from research gaps. Thus, it can be assumed that research gaps are a part of research agendas, but not necessarily exclusively.

Classifying and Identifying Research Gaps

Characterizing research gaps deepens the understanding of how research gaps may be constituted and may thus help to identify research gaps in literature reviews.

Jacobs (2011) identifies six kinds of research problems. While research problems are not necessarily research gaps, they might be synonymous with research gaps in this case, as most researchers do not distinguish between the two terms. Jacobs identifies six forms of research problems: Provocative exception, contradictory evidence, knowledge void, action-knowledge conflict, methodological conflict, and theoretical conflict.

A provocative exception arises if a new research finding contradicts widely accepted conclusions. Jacobs notes that the provocative exception usually does not stand out prominently in the literature. To uncover these exceptions, it is necessary to carefully analyze and scrutinize even subtle discrepancies. Contradictory evidence is related to the provocative exception. It occurs if results from studies allow for conclusions in their own right, but are contradictory when examined from a more abstract point of view. The identification of contradictory evidence starts with analyzing each research stream. Subsequently, the results from these analyses need to be synthesized in order to reveal contradictory evidence. Whereas Jacobs doubts that there are many knowledge voids, he presents two settings where knowledge voids might occur. First, knowledge may not exist in the actual field of research but in a related research domain. In this case, it may be necessary for scholars to refer to theories and literature from related research domains. Second, it might be the case that results of a study differ from what was expected. This kind of discrepancy can motivate new research in this direction. An action-knowledge conflict arises when the actual behavior of professionals is different from their advocated behavior. In this case, research could seek to determine the scope of the conflict and to uncover the reasons for its existence. It is also possible that a methodological conflict occurs due to the influence of methodology on research results. Jacobs notes that it might be useful to vary methods, especially if certain research topics have been mainly explored using a certain method. Finally, if one phenomenon is being explained through various theoretical models, there might be a theoretical conflict. Scholars could examine whether one of those theories is superior regarding its explanatory force.

To the best of our knowledge, only one approach exists for identifying research gaps in qualitative literature reviews. This approach is called chart method, also often referred to as concept matrix (see Table 1). The underlying principle is to chart each source “according to predetermined categories” (Imel 2011, p. 152). Webster and Watson (2002) recommend establishing categories so that it adds value to the review. For instance, categories could feature “types of variables examined, level of analysis, gaps in the literature, or other important theoretical issues” (Webster and Watson 2002, p. xviii).

Sources	Concept			
	Concept 1	Concept 2	Concept 3	...
Source 1	X			
Source 2		X	X	
Source 3		X		
...				

Table 1. Concept matrix (based on Webster and Watson 2002, p. xvii)

However, neither Webster and Watson (2002) nor Imel (2011) provide insight into the concrete process of identifying research gaps by means of the chart method. Vom Brocke et al. (2009) offer a rough idea on how the process might work. During the fourth phase of their framework, prior literature is analyzed and synthesized. For this stage, vom Brocke et al. (2009) propose employing a concept matrix. In the last phase, the synthesis is supposed to result into a research agenda. Referring to the matrix, they note that “certain fields [...], which remain ‘blank’ during a literature study, often highlight research areas that are significantly under-researched” (vom Brocke et al. 2009, p. 10). Thus, the framework leaves scholars with a rather incomplete idea on how the identification of research gaps might be executed.

Methodology

Research Approach

The goal of this paper is to propose a framework to identify research gaps when conducting literature reviews. However, as outlined above, the explicit knowledge in the literature about how research gaps are being identified is limited. Thus, additional information is required to enable the construction of the framework. We therefore review literature reviews to examine how research gaps are identified. The underlying rationale is that, while the research on how to identify research gaps is limited, literature reviews might contain implicit or explicit knowledge on how researchers identified research gaps. Following Wolfswinkel et al. (2013), this paper employs grounded theory as a method.

The underlying principle of grounded theory is to generate theory from data (Glaser and Strauss 2008). Glaser and Strauss (2008, p. 31) contend that “grounded theory can be presented either as a well-codified set of propositions or in a running theoretical discussion, using conceptual categories and their properties”. For this paper, the latter approach will be used for presenting the grounded theory since we conduct a literature review before coding. This is necessary to explore the topic and to detect the potential lack of research on the topic. As McGhee et al. (2007, pp. 339) put it: “Grounded theory is an appropriate approach when there is little extant knowledge of the issue, but how can this paucity of knowledge be ascertained unless an initial review of literature is undertaken?”

Our research approach resembles that of vom Brocke et al. (2009). They also analyze literature reviews to enhance the methodological rigor of future reviews. However, their focus is on the literature search process, not on the process of identifying research gaps.

Literature Search

Webster and Watson (2002) suggest starting the search for relevant literature in leading journals. Therefore, we analyzed the AIS “basket” of 8¹. We did not engage in forward and backward search (Webster and Watson 2002) since our goal is not to identify articles about a certain topic, but articles with a certain methodology. As literature reviews characteristically investigate the literature on a particular topic (but not in terms of methodology), forward and backward search would be of little value for our purpose. The terms that we used in the search process were keywords that we found to be typical of literature reviews. We searched for papers including the terms *literature* and *review*, or *literature* and *analysis*, or *research* and *roadmap*, or *research* and *agenda* in the abstract. We limited the search to

¹ www.aisnet.org/?SeniorScholarBasket

articles published from 2000 on to emphasize the state-of-the-art character of the review. Thus, forthcoming articles are also included. Overall, 198 articles were identified during the literature search (see Table 2).

Journal	Database	Identified	Selected
European Journal of Information Systems (EJIS)	Palgrave Macmillan	24	4
Information Systems Journal (ISJ)	Wiley Online Library	29	2
Information Systems Research (ISR)	INFORMS	15	5
Journal of the Association for Information Systems (JAIS)	AISel	16	3
Journal of Information Technology (JIT)	Palgrave Macmillan	47	10
Journal of Management Information Systems (JMIS)	Business Source Premier	11	1
Journal of Strategic Information Systems (JSIS)	ScienceDirect	30	5
MIS Quarterly (MISQ)	Business Source Premier	26	10
Total		198	40

Table 2. Literature search and selection

Literature Selection

As we defined the search criteria rather broadly, relevant articles from the initial sample of 198 articles had to be identified. We deem an article as relevant, if its major goal is to systematically review the prior literature. Overall, we identified 40 articles as ‘pure’ literature reviews which were selected for further analysis (see Table 2 and Table 3).

The Coding Process

After identifying all relevant excerpts from the data (i.e., the literature reviews), two different coding approaches were employed. This was expedient as Jacobs (2011) already proposed a classification on how research gaps may be characterized. Hence, in our case the theory did not directly emerge from the data. Instead, we aim at refining existing theory using our sample of literature reviews. For this purpose, a coding approach called *elaborative coding* was employed, which is defined as “the process of analyzing textual data in order to develop theory further” (Auerbach and Silverstein 2003, p. 104).

Apart from that, we employed *open coding* and *axial coding* using the software tool *NVivo 10*. While “open coding is the analytical process of generating higher-abstraction level type categories from sets of concepts/variables” (Wolfswinkel et al. 2013, p. 51), axial coding is “the act of relating concepts/categories to each other” (Corbin and Strauss 2008, p. 198).

Although our review cannot claim to be exhaustive, we could well reach a point of theoretical saturation with the selected articles. Theoretical saturation is reached, when no new categories and properties emerge from the data (Glaser and Strauss 2008). During the process of coding, the sample appeared to be sufficient for theoretical saturation. Thus, no further data was required.

Findings

A total of 555 research gaps were identified from the selected literature reviews (see Table 3), equaling an average of approximately 14 gaps per paper. However, the amount of research gaps that each literature review contains varies considerably. For instance, while the literature review by Mbarika et al. (2005) features 49 research gaps, the literature review by Dhillon and Backhouse (2001) contains only 2 research gaps.

Author(s)	Source	Title	# Research gaps
Aksulu and Wade (2010)	JAIS	A Comprehensive Review and Synthesis of Open Source Research	8
Arnott and Pervan (2005)	JIT	A critical analysis of decision support systems research	4
Gefen et al. (2008)	JMIS	A Research Agenda for Trust in Online Environments	15
D'Arcy and Herath (2011)	EJIS	A review and analysis of deterrence theory in the IS security literature: making sense of the disparate findings	16
Leidner and Kayworth (2006)	MISQ	A Review of Culture in Information Systems Research: Toward a Theory of Information Technology Culture Conflict	13
Lacity et al. (2010)	JIT	A review of the IT outsourcing empirical literature and future research directions	8
Jeyaraj, et al. (2006)	JIT	A review of the predictors, linkages, and biases in IT innovation adoption research	6
Conboy (2009)	ISR	Agility from First Principles: Reconstructing the Concept of Agility in Information Systems Development	4
Lacity et al. (2011)	JIT	Business process outsourcing studies: a critical review and research directions	14
von Krogh et al. (2012)	MISQ	Carrots and Rainbows: Motivation and Social Practice in Open Source Software Development	19
Wareham et al. (2005)	JIT	Critical themes in electronic commerce research: a meta-analysis	9
Dhillon and Backhouse (2001)	ISJ	Current directions in IS security research: towards socio-organizational perspectives	2
Schneider and Sunyaev (2014)	JIT	Determinant factors of cloud-sourcing decisions: reflecting on the IT outsourcing literature in the era of cloud computing	18
Tilson et al. (2010)	ISR	Digital Infrastructures: The Missing IS Research Agenda	42
Vodanovich et al. (2010)	ISR	Digital Natives and Ubiquitous Information Systems	13
Bélanger and Carter (2012)	JAIS	Digitizing Government Interactions with Constituents: An Historical Review of E-Government Research in Information Systems	13
Xiao and Benbasat (2007)	MISQ	E-Commerce Product Recommendation Agents: Use, Characteristics, and Impact	12
Schultze (2010)	JIT	Embodiment and presence in virtual worlds: a review	18
Xiao et al. (2013)	JIT	ICT innovation in emerging economies: a review of the existing literature and a framework for future research	13
Avgerou (2008)	JIT	Information systems in developing countries: a critical research review	4
Whittington (2014)	JSIS	Information Systems Strategy and Strategy-as-Practice: A joint agenda	8
Merali et al. (2012)	JSIS	Information systems strategy: Past, present, future?	2
Chen et al. (2010)	MISQ	Information Systems Strategy: Reconceptualization, Measurement, and Implications	4
Melville and Kraemer (2004)	MISQ	Information Technology and Organizational Performance: An Integrative Model of IT Business Value	16
Crowston and Myers (2004)	JSIS	Information technology and the transformation of industries: three research perspectives	4
Piccoli and Ives (2005)	MISQ	IT-Dependent Strategic Initiatives and Sustained Competitive Advantage: A Review and Synthesis of the Literature	9
Alavi and Leidner (2001)	MISQ	Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues	22
Tams et al. (2014)	JSIS	Modern information technology in an old workforce: Toward a strategic research agenda	32
Dimoka et al. (2012)	MISQ	On the Use of Neurophysiological Tools in IS Research: Developing a Research Agenda for NeuroIS	43
Chiasson et al. (2008)	ISJ	Pluralist action research: a review of the information systems literature	4
Bélanger and Crossler (2011)	MISQ	Privacy in the Digital Age: A Review of Information Privacy Research in Information Systems	35
Ba et al. (2001)	ISR	Research Commentary: Introducing a Third Dimension in Information Systems Design—The Case for Incentive Alignment	26
Schryen (2013)	EJIS	Revisiting IS business value research: what we already know, what we still need to know, and how we can get there	13

Pavlou (2011)	MISQ	State of the Information Privacy Literature: Where are we now and Where Should we go?	3
Besson and Rowe (2012)	JSIS	Strategizing Information Systems-Enabled Organizational Transformation: A Transdisciplinary Review and New Directions	10
Overby et al. (2010)	ISR	The Design, Use, and Consequences of Virtual Processes	9
Weerakkody et al. (2009)	JIT	The diffusion and use of institutional theory: a cross-disciplinary longitudinal literature survey	7
Mbarika et al. (2005)	JAIS	The Neglected Continent of IS Research: A Research Agenda for Sub-Saharan Africa	49
Keutel et al. (2014)	EJIS	Towards mindful case study research in IS: a critical analysis of the past ten years	4
Ahuja (2002)	EJIS	Women in the information technology profession: a literature review, synthesis and research agenda	12

Table 3. Analyzed articles and amount of identified research gaps

We found two main categories of research gaps: *Characterization* and *Presentation*. Table 4 presents the categories and their respective sub-categories, as well as the frequency with which they occur (also see Appendix 1 for illustrating examples).

Category	Sub-category	Definition	# Research gaps
Characterization		The reason for the existence of a research gap.	
	Contradictory evidence	Results from studies allow for conclusions in their own right, but are contradictory when examined from a more abstract point of view.	7
	Knowledge void	Desired research findings do not exist.	467
	Action-knowledge conflict	Professional behavior or practices deviate from research findings or are not covered by research.	3
	Methodological conflict	A variation of research methods is necessary to generate new insights or to avoid distorted findings.	36
	Evaluation void	Research findings or propositions need to be evaluated or empirically verified.	11
	Theory application void	Theory should be applied to certain research issues to generate new insights.	31
Presentation		The approach that is used to present a research gap in a research paper.	
	Parallel presentation	Synthesis and research gaps are presented alternately.	21
	Sequential presentation	The synthesis is presented first, being followed by the presentation of research gaps.	30

Table 4. Research gaps categories and their sub-categories

Characterization of Research Gaps

As noted above, we refined Jacobs' (2011) approach to characterize research problems based on our data sample of literature reviews. It emerged that, in addition to four of the sub-categories that Jacobs identified, two more sub-categories were required in order to achieve theoretical saturation. These sub-categories, *evaluation void* and *theory application void*, are defined below. Two sub-categories proposed by Jacobs (2011), *theoretical conflict* and *provocative exception*, could not be identified. Hence, six types of research gaps emerged from the data.

An evaluation void occurs when research findings or propositions need to be evaluated or empirically verified. For example, Piccoli and Ives (2005) find that “no study to date has directly attempted to evaluate the ability of the IT project barrier to produce response lag. [...] Yet, without rigorous studies confirming or challenging the notion [...], no such conclusion is warranted.”

A theory application void arises when theory should be applied to certain research issues in order to generate new insights. For instance, Arnott and Pervan (2005) find that “DSS researchers need to

embrace contemporary research in psychology, management and related fields to provide a stronger theoretical basis for projects.”

An example of contradictory evidence can be found in the article by Xiao and Benbasat (2007): “While many studies have shown that recommendation agents use did result in improved decision quality and decreased decision effort, there also exists some counter evidence.”

Bélanger and Crossler (2011) identify a knowledge void: “Even if other streams of IS research suggest that intentions lead to behaviors, the privacy paradox should be explored further to provide an understanding as to why such is not the case with information privacy.”

An action-knowledge conflict can be found in the literature review by Gefen et al. (2008): “As e-commerce moves from primarily new and search products to experience products, trust as related to product understanding and its underlying dimensions are likely to have a different role that could be the topic of future research.”

An example of methodological conflict is part of the paper by Arnott and Pervan (2005): “Another strategy for improving the relevance of DSS research is to increase the number of case studies, especially interpretive case studies. DSS is lagging behind general IS in the adoption of this research paradigm.”

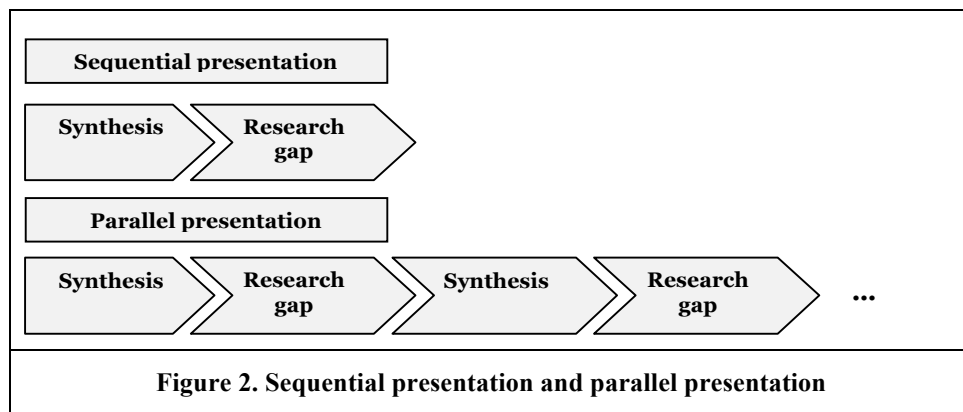
We find that, contrary to Jacobs’s (2011) belief, knowledge voids are not occurring infrequently. In fact, knowledge voids account for 467 (84 percent) of all research gaps. A reason for this finding might be the dynamics of the IS field (Swanson 1994), that tends to be recurrently under-researched due to the sustained emergence of new research topics.

Presentation of Research Gaps

While the presentation of research gaps is not synonymous with the identification of research gaps in the narrower sense, we assume that the identification of research gaps leads to the question on how to present research gaps in the respective literature review. Researchers make various choices about how they present research gaps. Thus, a classification is necessary to enable researchers to make informed decisions about the presentation of research gaps.

We identified two possibilities of presenting research gaps from our sample: A *sequential presentation* occurs when the synthesis is presented first, being followed by the presentation of research gaps. We refer to *parallel presentation* when synthesis and research gaps are presented interchangeably and hence are not clearly separated from each other. Both forms of presenting research gaps are visualized in Figure 2.

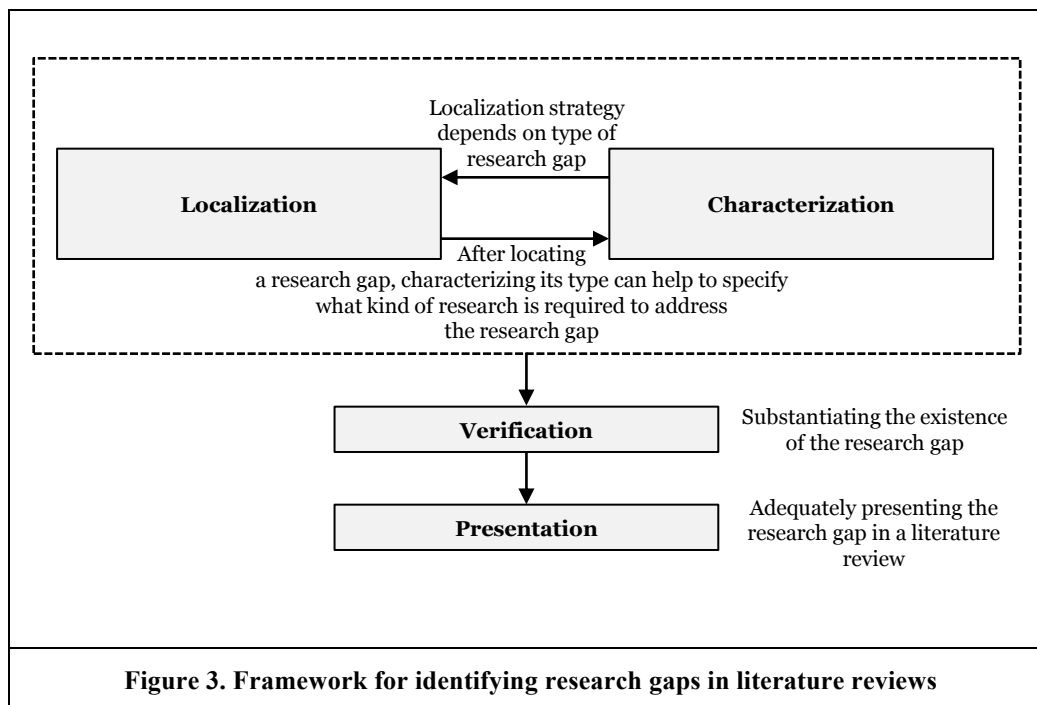
30 articles (75 percent) employ a sequential presentation, while 21 articles (53 percent) employ a parallel presentation. Hence, there are 11 articles (28 percent) that employ both presentation approaches. This means that they present research gaps during the synthesis as well as after the synthesis.



Towards a Framework for Identifying Research Gaps

For the framework, a distinction is being made between the *identification* of research gaps in the broader and the *localization* of research gaps in the narrower sense. We refer to localization when sets of information that were derived from the reviewed literature are classified as gaps that require further research to be resolved. The term identification is being used in the broader sense. This includes localization, but also characterization, verification, and presentation.

The construction of the framework is based on the findings from our analysis of literature reviews. The framework consists of four components (see Figure 3). The initial stage is the localization of research gaps, which is informed by the characterization of research gaps. After this stage has been completed, research gaps may need to be verified. Subsequently, scholars might want to present the research gaps that could be verified. In the following, the four components of the framework are discussed in detail.



Localization

Vom Brocke et al.'s (2009) framework suggests that the process of creating a research agenda starts after the literature synthesis has been undertaken (see Figure 1). However, we posit that the localization of the research gaps already commences when the literature is being synthesized. As researchers constantly scrutinize concepts that emerge from the literature, they already start to uncover potential gaps in the literature. The lack of methodological literature on this topic suggests that this procedure is often creative, implicit, and informal. The chart method (see Table 1) illustrates how the processes of synthesizing the literature and localizing research gaps are intertwined. The chart method can be used for literature synthesis and for research gap localization (vom Brocke et al. 2009; Webster and Watson 2002). When researchers start to chart the reviewed literature according to various concepts, they already perceive blank fields in the chart, which may indicate research gaps. The process of localizing research gaps is being informed strongly by the characterization of research gaps. The interaction of these two concepts is explored in the next section.

Characterization

In the context of this framework, *characterization* means to classify research gaps owing to the reasons of their existence. Following Robinson et al. (2011), we assume this is an integral aspect of identifying research gaps. As the literature review above revealed, we identified six different types of research gaps. Research gaps are defined as gaps in ‘sets of information’. This gives rise to two questions. What kinds of sets of information are related to each other, and how are they related? We believe that the various forms of research gaps might be useful indicators to answer these questions.

For instance, it is possible to systematically analyze the methods that the reviewed literature has employed. If literature on a certain topic always uses the same research approach, most likely there is a research gap in the direction of methodology. For the identification of contradictory evidence, it is reasonable to synthesize key findings of the reviewed literature concept-wise, e.g., by means of the chart method, and to scrutinize the synthesis in terms of contradictions. For the identification of knowledge voids, an approach for localization might be to analyze the literature concept-wise and to look for research fields that feature specific gaps or are under-researched. The localization of action-knowledge conflicts requires information about action, for instance, the behavior of professionals. While this kind of information may be derived from the literature, it is also likely that in this case the reviewer’s personal experiences play an important role. For evaluation voids, a reasonable localization strategy might be to analyze whether research findings have been evaluated and empirically verified. In order to localize theory application voids, researchers should analyze theories already employed to explain particular phenomena and try to identify potential theories that might offer a complementary perspective.

These examples illustrate that the answers to the questions posed above depend on the examined type of research gap. Different types of research gaps require different localization strategies (see Table 5). Thus, the concept of characterization is capable of enhancing the process of localizing research gaps. When trying to localize research gaps, researchers can constantly refer to the concept of characterization.

Type of Research Gap	Localization Strategy
Methodological conflict	Scrutinize if findings on a certain topic are inconclusive with regard to applied research methods.
Contradictory evidence	Synthesize key findings and determine contradictions.
Knowledge void	Analyze literature with regard to theoretical concepts (e.g., using the chart method) and look for specific gaps or under-researched areas of research.
Action-knowledge conflict	Collect information about action and relate this information to the knowledge base.
Evaluation void	Analyze if research findings have been evaluated and empirically verified.
Theory application void	Analyze the theories that have been employed to explain certain phenomena and identify further theories that might contribute to the knowledge base as well.

Table 5. Types of research gaps and corresponding localization strategies

The two concepts of localization and characterization are also related vice versa: The characterization of research gaps might enable scholars to specify what kind of research is required to resolve the respective research gap. For instance, a methodological conflict indicates that there is a need to vary research methods. For contradictory evidence, new theories that enable the incorporation of all evidence and possibly explain the reasons for the existence of that particular contradictory evidence may be needed.

Verification

After research gaps have been localized, they may need to be verified. In this context, *verification* means to ensure that the research gap does indeed exist. It may be argued that literature reviews should synthesize all relevant literature and integrate all knowledge that exists in the respective research field. Thus, there would be no need for verification, as research gaps would emerge from a synthesis of the entire relevant knowledge. However, not all literature reviews are exhaustive, meaning that not the entire relevant literature is included (Cooper 1988). If a literature review is not exhaustive, however, there is a need to verify the research gaps derived from the synthesis since papers may have been overlooked that reveal that the research gaps were closed before.

For verification, it may be reasonable to conduct a forward search, based on the articles from which the respective research gaps emerged or that are closely linked to the research gap. The rationale of this approach is that other researchers who may have closed the research gap would also quote the articles from which the research gap emerges to justify their studies. In case the research gap does not directly emerge from specific research papers, it might help to search relevant databases or scan prevailing textbooks for search terms that refer to the research gap. In addition, the researcher might need to undertake further efforts beyond this proposed approach if there is an indication that the potential research gap may have already been closed.

It is also possible that the verification process reveals that other reviewers have identified the respective research gap before. This would not necessarily challenge the existence of the research gap. However, this information would still be of good use, as it would highlight the relevance of the research gap. Furthermore, if other scholars have identified the respective research gap, this may be an indication that the research gap may indeed exist.

Verification could also go beyond mere literature analysis. In this regard, we believe triangulation has the potential to increase validity of the identified research gaps. For instance, a survey or a focus group with practitioners could be very helpful to assess and discuss the validity, applicability, and also priority of the research gaps.

The approach of verifying research gaps has the advantage of enabling researchers to substantially reduce the likelihood that the respective research gaps have been closed or do not exist, while not requiring an exhaustive literature review. While it may be argued that literature reviews should always be exhaustive, we reckon that analyzing all prior research is neither always possible nor economical and necessary.

Presentation

As noted above, there are two approaches to present research gaps in literature reviews, sequential presentation and parallel presentation. We believe that scholars should make a well-founded decision about the approach they employ for presenting research gaps. Thus, there is a need to discuss the characteristics of both approaches.

Parallel presentation features the research gaps during the discussion of the synthesis. As argued above, the processes of research synthesis and research gap localization cannot be separated. Thus, the parallel presentation may be a more 'natural' approach, as it allows researchers to illustrate how the research gaps unfold as a result from the synthesis. Parallel presentation facilitates the comprehensive disclosure of the sets of information that the research gap stems from, allowing readers to recognize the origins of the respective research gap and to gain a better understanding for what reasons the gap exists.

Sequential presentation describes the research gaps after the synthesis, such that the research gaps are presented separately from the synthesis. Hence, readers can quickly locate research gaps in the review. Furthermore, this form of research gap presentation resembles the framework for literature reviewing by vom Brocke et al. (2009), as it considers the act of setting a research agenda as following the research synthesis. Thus, it may be argued that the sequential presentation is a more structured approach to present research gap compared to parallel presentation.

In our opinion, both approaches complement each other. Thus, literature reviews would benefit from employing parallel presentation to demonstrate the origins of the research gaps and additionally present them separately to facilitate finding the research gaps in the paper. A helpful example of this approach can be found in Schneider and Sunyaev (2014).

Demonstrating the Framework

In this section, the framework for identifying research gaps is demonstrated to show how the framework can be used by further research. For the demonstration, the identification of the research gap that motivated this paper is being discussed. The research gap has emerged from a review of literature about the methodology of literature reviews.

The research gap has been localized using the framework of vom Brocke et al. (2009). The framework features five stages for literature reviewing (see Table 6). The goal was to identify methodological

guidance for each of the five stages. However, as Table 6 illustrates, we were unable to locate a specific method for conducting stage five of the framework. This concept-driven analysis revealed that there was no method for identifying research gaps when conducting qualitative literature reviews. Thus, a knowledge void has been localized (Localization).

Phase	Task	Sources offering methodological guidance
1	Definition of review scope	Cooper (1988)
2	Conceptualization of topic	Rowley and Slack (2004); Zorn and Campbell (2006)
3	Literature search	vom Brocke et al. (2009); Webster and Watson (2002)
4	Literature analysis and synthesis	Webster and Watson (2002); Wolfswinkel et al. (2013)
5	Research gap identification	No method

Table 6. Demonstration of research gap localization

In our case, the localization of the research gap was not directly informed by its characterization. However, another benefit from the characterization process could be seized. As the research gap was a knowledge void, it was clear that its closure required generating additional knowledge. This finding subsequently led to the idea that literature reviews may possibly contain the required knowledge, at least implicitly (Characterization).

Subsequently, the potential research gap required verification. In this process, we found a framework for identifying research gaps (Robinson et al. 2011). Although Robinson et al.'s (2011) framework focuses on quantitative literature reviews in the health care domain, we reckon that researchers who might have addressed the same research gap we had localized would refer to this paper. Thus, we conducted a forward search for this article. Furthermore, we searched *Google Scholar* for papers that might be relevant and additionally scanned prevailing textbooks on literature review methodology. In this process of verification, we did not find a framework for identifying research gaps from qualitative literature reviews. Hence, we consider our research gap as verified (Verification).

In the last step of our framework, there may be a need to present the research gap. However, in our particular case, the research gap was not part of a 'pure' literature review as argued above. Instead, the research gap motivated this article. Thus, the final step of our framework (Presentation) is not applicable in this paper.

Discussion

Our paper sought to answer two research questions: For answering the first question regarding how prior literature reviews identified research gaps, we thoroughly reviewed the IS literature. Employing a grounded theory approach, two categories (characterization and presentation) and their respective sub-categories were identified from a sample of 40 literature reviews published in leading IS journals. Based on these insights, we subsequently developed a framework for identifying research gaps from literature reviews to address the second research question.

The framework comprises four steps: Localization, characterization, verification, and presentation. The term localization is employed to describe the identification of research gaps in a narrower sense, i.e., scrutinizing the sets of information that were classified by the reviewed literature as gaps meaning that they require further research to be resolved. The stage of localization is informed by the characterization of research gaps, which means to classify research gaps according to the reasons why they exist. In a third step the research gaps should be verified to substantiate their existence. The fourth step of the framework entails presenting the research gaps. After introducing the framework, we exemplarily demonstrated how the framework could be applied.

Implications

An essential aspect of reviewing the literature is to identify research gaps (Webster and Watson 2002). While reviews ought to be conducted rigorously (e.g., Fink 2010), there has been a lack of methodological support for the process of identifying research gaps. Our framework offers researchers important

guidelines to identify research gaps and enhance the rigor of the identification process. This increases the quality of the review as “better legitimization of every choice made during the review process enhances the value of the review” (Wolfswinkel et al. 2013) and as a consequence the chance of getting published. Furthermore, the framework enables researchers to conduct their reviews more efficiently, as awareness of the types of research gaps can help to guide the synthesis. Syntheses can be tailored to search for and potentially reveal research gaps using the localization strategies.

An objection to scientific guidelines for the identification of research gaps that may possibly arise is that they stifle creativity. However, Cooper (1998, p. 184) notes that “rigorous criteria will not produce syntheses that are mechanical and uncreative”. Instead, our framework aims to offer support for the creativity of researchers. Furthermore, as the demonstration above indicates, the framework is not a ‘straitjacket’. It merely represents a guideline that may be altered depending on the requirements of the reviewer’s purpose. Therefore, researchers should feel free to adjust the framework according to the particular characteristics of their respective reviews.

Limitations and Future Research

This paper has several limitations, thus providing numerous opportunities for further research. First, the approach of analyzing literature reviews in terms of how they identified research gaps did not always lead to the desired results. For instance, it was not possible to isolate the act of localization from our data. This aspect clearly requires further scrutiny, as it is pivotal for the identification of research gaps. An approach that may provide illuminating results is to interview scholars about how they localized research gaps. The findings from such interviews could then be employed to refine the framework. Second, the process of verifying research gaps is not grounded in the data as well. While we believe that this paper provides substantial arguments for the inclusion of this process, the aspect certainly requires further examination. Third, while the applicability of the framework is exemplarily demonstrated in our paper, it requires further evaluation. Fourth, as argued above, the processes of literature synthesis and research gap localization are closely intertwined. Future research could investigate this relation more intensely, especially regarding various approaches for literature syntheses such as grounded theory.

As the analysis of the sample of literature reviews revealed, a predominant number of research gaps are knowledge voids, hence indicating that a more granular classification for knowledge voids may be possible. The feasibility of such a classification could be discussed in this context as well. Furthermore, it could be analyzed why such a large number of research gaps are knowledge voids.

Conclusion

This paper’s main contribution is a framework that should enable researchers to identify research gaps more rigorously from qualitative literature reviews in the IS domain. While it is widely acknowledged that literature reviews should identify research gaps, we found that there were no guidelines for this process. As literature reviews need to be conducted rigorously, such a framework fills a gap in the literature.

In order to build the framework, we identified the relevant justificatory knowledge. As prior methodological literature was rather silent on how research gaps were identified, we conducted a literature review analyzing 40 papers to search for explicit or implicit knowledge on this topic. We employed a grounded theory approach, leading to two categories, characterization and presentation, and six and two respective sub-categories from our sample of literature reviews.

We hope that our framework provides researchers guidance for the essential task of identifying research gaps in a more rigorous, effective, and efficient manner. We further hope that our paper serves as a starting point for a scholarly debate on the important, yet understudied, topic of rigorously identifying research gaps in literature reviews.

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Appendix 1

Category	Sub-category	Definition	Example
Characterization		The reason for the existence of a research gap.	
	Contradictory evidence	Results from studies allow for conclusions in their own right, but are contradictory when examined from a more abstract point of view.	“While many studies have shown that recommendation agents use did result in improved decision quality and decreased decision effort, there also exists some counter evidence.” (Xiao and Benbasat 2007)
	Knowledge void	Desired research findings do not exist.	“Even if other streams of IS research suggest that intentions lead to behaviors, the privacy paradox should be explored further to provide an understanding as to why such is not the case with information privacy.” (Bélanger and Crossler 2011)
	Action-knowledge conflict	Professional behavior or practices deviate from research findings or are not covered by research.	“As e-commerce moves from primarily new and search products to experience products, trust as related to product understanding and its underlying dimensions are likely to have a different role that could be the topic of future research.” (Gefen et al. 2008)
	Methodological conflict	A variation of research methods is necessary to generate new insights or to avoid distorted findings.	“Another strategy for improving the relevance of DSS research is to increase the number of case studies, especially interpretive case studies. DSS is lagging behind general IS in the adoption of this research paradigm.” (Arnott and Pervan 2005)
	Evaluation void	Research findings or propositions need to be evaluated or empirically verified.	“[...] no study to date has directly attempted to evaluate the ability of the IT project barrier to produce response lag. [...] Yet, without rigorous studies confirming or challenging the notion [...], no such conclusion is warranted.” (Piccoli and Ives 2005)
	Theory application void	Theory should be applied to certain research issues to generate new insights.	“DSS researchers need to embrace contemporary research in psychology, management and related fields to provide a stronger theoretical basis for projects.” (Arnott and Pervan 2005)