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RECONSTRUCTING THE GIANT: ON THE IMPORTANCE OF RIGOUR IN DOCUMENTING THE LITERATURE SEARCH PROCESS

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RECONSTRUCTING THE GIANT: ON THE IMPORTANCE OF RIGOUR IN DOCUMENTING THE LITERATURE SEARCH PROCESS

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Abstract

Science is a cumulative endeavour as new knowledge is often created in the process of interpreting and combining existing knowledge. This is why literature reviews have long played a decisive role in scholarship. The quality of literature reviews is particularly determined by the literature search process. As Sir Isaac Newton eminently put it: "If I can see further, it is because I am standing on the shoulders of giants." Drawing on this metaphor, the goal of writing a literature review is to reconstruct the giant of accumulated knowledge in a specific domain. And in doing so, a literature search represents the fundamental first step that makes up the giant's skeleton and largely determines its reconstruction in the subsequent literature analysis. In this paper, we argue that the process of searching the literature must be comprehensibly described. Only then can readers assess the exhaustiveness of the review and other scholars in the field can more confidently (re)use the results in their own research. We set out to explore the methodological rigour of literature review articles published in ten major information systems (IS) journals and show that many of these reviews do not thoroughly document the process of literature search. The results drawn from our analysis lead us to call for more rigour in documenting the literature search process and to present guidelines for crafting a literature review and search in the IS domain.

Keywords: literature review, literature search, rigour, IS journals, IS community, research methodology

1 INTRODUCTION

Reviewing the literature has been proposed as a scientific profession a long time ago (Garfield 1977; as cited in Garfield 1987, p. 113), since it represents an “essential first step and foundation when undertaking a research project” (Baker 2000, p. 219). A literature review seeks to uncover the sources relevant to a topic under study and, thus, makes a vital contribution to the relevance and rigour of research: On the one hand, relevance is improved by avoiding the reinvestigation of what is already known (cf. Baker 2000, p. 219). On the other hand, rigour is derived from an effective use of the existing knowledge base (cf. Hevner et al. 2004, p. 88). Hence, it is undisputed that literature reviews generally play a central role in scholarship (cf. e.g., Cooper 1988, pp. 104f.) and in information systems (IS) research in particular (cf. e.g., Levy and Ellis 2006, pp. 181f.; Webster and Watson 2002, pp. xiii f.). However, as the term ‘review’ is one of the “more ambiguous” terms in scholarship (Garfield 1987, p. 114), there is still a significant confusion about the structure and format of literature reviews (Webster and Watson 2002, p. xiv). Nonetheless, it seems clear that in particular the process of literature search plays a fundamental role in crafting a thorough review on a topic (Zorn and Campbell 2006, p. 174).

According to Webster and Watson (2002), a literature search in essence comprises the querying of scholarly databases using keywords and backward or forward searches on the basis of relevant articles. Whereas backward search means reviewing the references of the articles yielded from the keyword search, forward search, in turn, refers to reviewing additional sources that have cited the article (ebenda, p. xvi; also cf. Levy and Ellis 2006, pp. 190ff.). The search process is a challenging part of an IS literature review, as it should include “all sources that contain IS research publications” (Levy and Ellis 2006, p. 183). However, searching for literature is extremely complicated in an emerging field such as IS, because an incredible (and still increasing) number of articles are published in a wide range of sources every year: For example, in 2003 Peffers and Ya identified 326 journals that publish IS research (p. 65), while the *Index of Information Systems Journals* lists 647 active IS journals today.¹ Moreover, Peffers and Hui (2003, p. 168) found that between 1997 and 2001 about 38% more articles were published in ten “pure” IS journals (following Walstrom and Hardgrave 2001, p. 122) when compared to 1987–1991. As a result, conducting a literature search in IS can turn into a Sisyphean task, so that, quite necessarily, a multitude of work has to be omitted in the search process (cf. Cooper 1988, p. 114).

Against this backdrop, we argue that the process of excluding sources (and including respectively) has to be made as transparent as possible in order for the review to proof credibility. Only then are readers able to assess the exhaustiveness of a review and other scholars in the field can more confidently (re)use the results in their own research. Therefore, we set out to explore the methodological rigour of literature reviews in the IS domain. In doing so, we apply typical evaluation criteria, such as reliability and validity, for analysing review articles published in the ten top-ranked IS journals, according to the consolidated list provided by the *Association for Information Systems (AIS)*². We find a surprisingly large number of review publications that do not provide any detail on the underlying literature search.

The remainder of this paper is structured as follows. In the next section, we give an overview of our study and spell out our research approach. In section 3, we then present the results of our analysis of selected literature reviews published in the IS domain. In doing so, we particularly point out shortcomings referring to the documentation of the literature search process. In section 4, we discuss our results and derive three propositions that aim at providing explanations for our results. Implications from our

¹ <http://lamp.infosys.deakin.edu.au/journals/index.php> [2009-03-15]

² <http://ais.affiniscape.com/displaycommon.cfm?an=1&subarticlenbr=432> [2009-03-15]

research are subsequently presented in the form of both guidelines for conducting IS literature reviews, in particular the process of searching the literature, and a plea for more rigour in crafting and documenting a literature search (section 5). We conclude with a short summary and discussion of our work (section 6).

2 STUDY OVERVIEW

A literature review can be defined as “a summary of a subject field that supports the identification of specific research questions” (Rowley and Slack 2004, p. 31). The primary objective of this paper is to explore the methodological rigour in conducting literature reviews as part of IS research. More specifically, we focus on the process of literature search (cf. Levy and Ellis 2006, pp. 185ff.), which involves both the identification of high quality papers and the evaluation of their applicability to the study. Similar to ‘traditional’ research methods or studies, the term ‘rigour’ refers in particular to the reliability and validity of the search process (cf. Levy and Ellis 2006, pp. 183ff.; Pateli and Giaglis 2004, p. 304). As such, validity characterises the degree to which the literature search accurately uncovers the sources that the reviewer is attempting to collect. The basic question is ‘Does the reviewer search right?’; it reflects decisions such as the selection of databases, publications (i.e. journals, conferences or books) and keywords, as well as the period covered, the articles considered in the literature search, and the application of backward or forward searches (Cooper 1988, p. 114; Levy and Ellis 2006, pp. 185ff.; Torraco 2005, p. 360; Webster and Watson 2002, p. xvi). Reliability, in turn, describes the replicability of the search process, hence, making it substantial for any review article to comprehensively document the literature search. “The literature is the data of an integrative literature review” and “learning about [it] and how it was obtained, including the keywords and databases used, is of particular interest to readers, who may wonder if the literature they are familiar with was examined” (Torraco 2005, p. 360). It is also obvious that evaluating the exhaustiveness of a literature review is complicated without a thorough documentation of the search process. That being said, other researchers in the field can hardly ground their own work on the review without sufficient knowledge on where and how authors have already searched for literature.

Consequently, the guiding research question of this paper is ‘*Do IS researchers comprehensibly document the process of literature search in their review articles?*’ and, therefore, we investigate the degree of methodological rigour, i.e. the replicability and evidence, of IS reviews. In other words, we review IS review literature. Our own process of literature search and the results drawn from the analysis are described in the next section.

3 REVIEWING IS REVIEW LITERATURE

As commonly recommended, in the following we focus on review articles of high quality (Rowley and Slack 2004, p. 32). However, identifying high quality IS literature is complicated as there is not only a vast amount of potentially relevant sources but also a great deal of literature of diverse quality (Levy and Ellis 2006, pp. 183 & 185ff.). To this end, IS scholars are frequently evaluating the quality of IS journals in order to provide rankings, e.g. Ferratt et al. (2007, p. 716), Hardgrave and Walstrom (1997, pp. 121f.), Lowry et al. (2004, pp. 52ff.), Peffers and Ya (2003, p. 70), and Willcocks et al. (2008, pp. 165f.). A number of those rankings have been synthesised by Carol Saunders for the AIS, which resulted in a comprehensive list of more than 100 top-tier IS journals. We decided to include in our literature review the ten top-ranked, peer-reviewed IS journals according to this consolidated list. However, as *Harvard Business Review (HBR)* (#8) is not a peer-reviewed journal and because the *IEEE Transactions* (#9) subsume various journals of differing quality and relevance for IS research (e.g. the *IEEE Transactions on NanoBioscience*), these journals were not considered in our review. This selection led us to explore the ten journals displayed in Figure 1. The figure also outlines the accessed databases as well as the searching functionality applied and the period covered in the review. The key phrase we used in all searches was ‘literature review.’

Journal	Database	Search	Coverage	Hits ³	Reviewed
Artificial Intelligence (AI)	ScienceDirect	,all fields'	since 1970	6	0
AI Magazine (AIMAG)	EBSCOhost (Business Source Premier)	,all fields'	since 1996	0	0
Communications of the ACM (CACM)	ACM Digital Library	,any fields'	since 1958	28	1
Decision Sciences (DSC)	Wiley InterScience	,all fields'	since 1970	0	0
Decision Support Systems (DSS)	ScienceDirect	,all fields'	since 1985	212	8
European Journal of Information Systems (EJIS)	Palgrave Macmillan	,all fields'	since 1991	76	3
Information Systems Research (ISR)	Informa	,text abstract title'	since 1990	30	0
Journal of Management Information Systems (JMIS)	EBSCOhost (Business Source Premier)	,all fields'	since 1984	3	1
Management Information Systems Quarterly (MISQ) ⁴	Journal Homepage	—	—	—	8
Management Science (MS)	Informa	,text abstract title'	since 1954	108	3

Figure 1. Considered journals

As outlined in the previous section, a literature search involves both identifying and evaluating scholarly literature and, accordingly, we applied a similar procedure in our own review. As the search phrase 'literature review' has been used in a range of contributions, many of which cannot be labelled as review articles, the contributions identified by keyword search ('hits,' cf. Figure 1) have subsequently been evaluated, based on their abstracts, in order to assess their relevance for this study. The then remaining articles became the basis of our review ('reviewed'). Subsequently, we analysed whether the identified review articles meet, i.e. document, the requirements explained in the previous section, namely: the (number of) articles considered in the review, the period covered, the (number of) journals and databases explored, the keywords used for the database and/or journal search, and, finally, whether a backward and/or forward search were conducted. The results drawn from our analysis are summarised in Figure 2; they show that 6 articles – or one fourth of the examined review literature – do not provide any information on the underlying search process. At least, 15 publications accurately document how many articles were included in the review. However, among these, there are only 11 reviews that state precisely, *which* articles were included. Whereas, more or less, half of the examined articles explicate the examined period of time, the number of databases queried has merely been stated in 7 articles. However, in many cases it again remains unclear, *which* databases were actually accessed. For example, Melville et al. (2004, p. 322) searched journal databases which "included" *Business Source Premier* and *JSTOR* and Pateli and Giaglis (2004, p. 304) explored "several" sources "such as" *ScienceDirect*, *JSTOR*, and *InterScience*. Perhaps even more notably, many reviewers conducted a journal search instead of a database search, though there is "no justification for searching by journal instead of searching by topic" (Anonymous; cited in Webster and Watson 2002, p. xvi), except when the goal of the review gives sufficient reasoning for such a proceeding (e.g. Jaspersen et al. 2002, p. 403, or the review at hand).

All in all, some inaccuracies in documenting the search process can be found in all sources. For example, Leidner and Kayworth (2006) – whose review is still among the best-documented ones – examined "the leading journals in our field dating back to the early 1990s." They apply search phrases

³ These numbers have been checked and double-checked on 2009-01-15. However, when finalising this paper and reviewing the results once more on 2009-03-15, it turned out that some of them have considerably changed, in particular when again searching *Informa* (*ISR* and *MS*) and *ScienceDirect* (*DSS*). Referring to *ScienceDirect*, these differences can, at least partly, be reasoned by new issues released in the meantime. However, the results gained from the two *Informa* queries differ so significantly (*ISR*: 30 vs. 46 hits; *MS*: 108 vs. 228 hits) that we are likely to assume that the underlying searching mechanisms have somehow been changed in recent times (since our license contracts with both providers definitely stayed the same). Therefore, please note that the numbers described in Figure 1 have been gained on 2009-01-15.

⁴ Since 2001, the MISQ provides a special review section. Therefore, keyword search has not been applied for searching MISQ. However, all articles published in the MISQ review section have been considered in this review.

“such [...] as ‘IT culture’, ‘information systems culture,’ and ‘IT values’” and conducted a search of *ABI/Inform* and *Business Source Premier* and “similar searches” in *ScienceDirect*. Furthermore, they “looked through” the references of “key articles” to not “overlook other articles” (pp. 360ff.). That being said, though they applied a backward search (as one of only a few articles), it is not fully replicable, as is the entire search process. However, most striking is the fact that only 2 articles comprehensibly document the underlying search phrases (Gerwin and Barrowman 2002, p. 942, and Ngai and Gunasekaran 2007, p. 4). So even though we firmly believe that all the above listed contributions represent fundamental and way-leading reviews in their particular fields, we herein question whether it is in fact sufficient to state that “key words from our definition of IT business value” (Melville et al. 2004, p. 322) were used or that the search was conducted “by using relevant keywords” (Xiao and Benbasat 2007, p. 140). In the same way, Pateli and Giaglis (2004, p. 304) claim that “the selection phase is critical, since decisions made at this stage undoubtedly have a considerable impact on the validity of the literature review results.”

Journal	Article	(Number of) Articles		Period Covered	(Number of) Journals		(Number of) Databases	Keywords	Backward Search	Forward Search
CACM	Glass et al. (2004)	1,485	-	-	> 11	+/-	journal search only	not required	-	-
	Eierman et al. (1995)	15	+	1975-1990	6	+	journal search only	-	-	-
DSS	Guo et al. (2008)	> 100	-	-	-	-	-	-	-	-
	Lin et al. (2008)	50	+	1980-2007	database search only		3	+	+/-	-
	Ngai and Gunasekaran (2007)	149	+	2000-2003	database search only		12	+	+	-
	Pervan (1998)	234	-	1984-1996	13	+	journal search only	-	-	-
	Pinsonneault and Kraemer (1989)	-	-	-	-	-	-	-	-	-
	Powell and Johnson (1995)	104	+	-	-	-	-	-	-	-
	Tung and Turban (1998)	-	-	-	-	-	-	-	-	-
	Ahuja (2002)	-	-	-	-	-	-	-	-	-
EJIS	Pateli and Giaglis (2004)	29	+	-	database search only		> 3	+/-	+/-	-
	Petter et al. (2008)	90	+	1992-2007	-	-	3	+	+/-	-
JMIS	Fjermestad and Hiltz (1998)	200	+	no constraint	-	-	-	-	-	-
MISQ	Alavi and Leidner (2001)	-	-	-	-	-	-	-	-	-
	Jaspersion et al. (2002)	82	+	1980-1999	12	+	journal search only	-	-	-
	Leidner and Kayworth (2006)	79	+	early 1990s-2004	> 6	+/-	3	+	+/-	+/-
	Melville et al. (2004)	202	-	no constraint	> 11	+/-	> 2	+/-	+/-	+
	Piccoli and Ives (2005)	69	+/-	-	11	+	journal search only	+/-	+	-
	Te'eni (2001)	-	-	-	-	-	-	+/-	-	-
	Wade and Hulland (2004)	-	-	-	-	-	-	-	-	-
	Xiao and Benbasat (2007)	48	+	early 1990s-?	-	-	-	-	-	-
MS	Elmaghraby and Keskinocak (2003)	-	-	-	-	-	-	-	-	-
	Gerwin and Barrowman (2002)	25	+	1990-?	15	-	1	+	+	-
	Krishnan and Ulrich (2001)	~200	-	1988-1998	> 9	+/-	journal search only	not required	+	-

Figure 2. Results from analysis

Concluding, even though a review article, which considers “everything that we could locate, published in English and available by mid-1998” (Fjermestad and Hiltz 1998, p. 9) is most likely to be valid, whenever the search process is only described very briefly, the search cannot be replicated and, thus, it can hardly be considered rigour. Drawing on these results, the question emerges: ‘Why is it that many IS researchers do not comprehensively document their literature search process?’

4 DISCUSSION

When crafting a literature review on a topic, one should be aware of the fact that, unlike for other empirical studies, there are only few explicit methods or standardized guidelines (cf. Bem 1995; Jackson 1980, p. 440; Torraco 2005, p. 359). In 2002, Webster and Watson remarked: “as the initial senior editors for *MISQ Review*, we quickly learned that many IS scholars are not familiar with the structure and format of reviews” (p. xiv). This leads us to formulate a first proposition for explaining our results: (1) *IS researchers cannot refer to established guidelines for documenting the literature search process.*

Our second proposition provides an alternative reasoning: (2) *IS researchers are not fully aware of the importance of rigorously documenting the literature search.* Please note that it is not our intention to imply that IS researchers are unwilling to conduct their search process in a rigorous way – in particular referring to the outstanding contributions described above. However, conducting and documenting a literature search are two sides of the same coin and perhaps IS authors sometimes in fact prefer ‘the pears to the apples,’ i.e. they rather put emphasis on rigorously summarizing and synthesizing findings gained from the literature search than on documenting the long way they walked along for uncovering them.

Finally, our analysis also revealed that review articles in IS research differ considerably in terms of length, reaching from six pages (Glass et al. 2004) to 143 pages (Fjermestad and Hiltz 1998). Furthermore, there are many review articles that are not even longer than twenty pages. However, it is undisputed that literature reviews commonly require far more pages than ‘regular’ articles (cf. e.g., the *MISQ* submission guidelines). Consequently, the question arises ‘Why are so many review articles that short (and exclude the process of searching the literature), assuming that IS researchers know how (ad 1) and are willing (ad 2) to rigorously document their literature search process?’ We believe the answer is most likely to be found in the submission guidelines and page limitations provided by various IS outlets. More specifically, information on the literature search process, which exists in the beginning, might be excluded during the subsequent editing process in order to free space for addressing the reviewers’ comments. Only three of the journals we examined provide a special review section (*CACM*, *AI* and *MISQ*) and only another three journals (*DSCI*, *EJIS* and *ISR*), more or less, welcome review articles in their editorial statements. Please also note that – according to the results gained from our analysis – in the case of four of the journals in our sample no review articles were published at all. This leads us to question whether literature reviews play the key role they undoubtedly deserve in IS research and to formulate a third proposition: (3) *It is the conditions of the publication process that often prevent a detailed description of the literature search.* For example, Kari and Rozenberg (2008, p. 83) acknowledge this perception by stating that “the upper-bound placed on the number of [40] references” turned out to be a “real limitation” for their review published in the *CACM*.⁵

In summary, we conclude that IS reviewers may sometimes be either (1) unable to refer to adequate guidelines for rigorously documenting the literature search, (2) not fully aware of its importance or (3) hindered to transparently describe their literature search in its full extent due to editorial constraints. Here, we do not aim to evaluate our propositions, but rather formulate both guidelines for crafting an IS literature review and search (ad 1) as well as a plea for more comprehensive documentation of the search process (ad 2 & 3).

5 IMPLICATIONS

5.1 Guidelines for Literature Reviews

In response to proposition 1, we propose in the following a framework for conducting IS literature reviews, with particular focus on the process of searching the literature. The framework is displayed in Figure 3 and reflects a “circularity that exists when [...] undertaking a literature review” (Baker 2000, p. 221). That being said, as things use to change and knowledge continuously grows, literature reviews often become out-of-vogue after a certain time, giving reason for an extension and update of the review (cf. Pervan 1998, p. 158).

A major challenge in reviewing the literature lies in defining an appropriate scope and flavour of the review (phase I). Reviews can be critical, interpretive, speculative, state of the art, and historical and

⁵ Note that this review could not be identified following our search strategy (limitations are discussed in the next section).

can vary referring to subject matter, period covered, and degree of coverage of sources (Manten 1973; Woodward 1972; as cited in Garfield 1987, p. 114). Furthermore, literature reviews can serve a wide range of, sometimes very different, purposes, reaching from gaining new and synthesising existing research outcomes to identifying research methodologies or techniques commonly used in a field (cf. Hart 1998, pp. 27ff.). In order to clearly define the scope of a review, we propose to draw on an established taxonomy for literature reviews presented by Cooper (cf. Cooper 1988, pp. 109ff., and Figure 4 in the follow-up). Cooper's taxonomy is comprised of six constituent characteristics, each containing certain categories, some of which are mutually exclusive (perspective and coverage), while others can be combined (audience, organisation, goal, and focus). The focus (1) of a literature review is concerned with what is of utmost importance to the reviewer. Most literature reviews focus on research outcomes, research methods, theories, and/or applications (cf. Bem 1995; Torraco 2005, p. 361). Common goals (2) of literature reviews include summarising, criticising, and/or integrating findings (cf. Jackson 1980, p. 438). For organising a literature review (3), Cooper suggests a historical, conceptual or methodological structure. The perspective (4) of a review reflects whether a certain position is espoused or not; the audience (5) particularly determines the writing style of the author(s) (cf. Bem 1995, pp. 173f.).

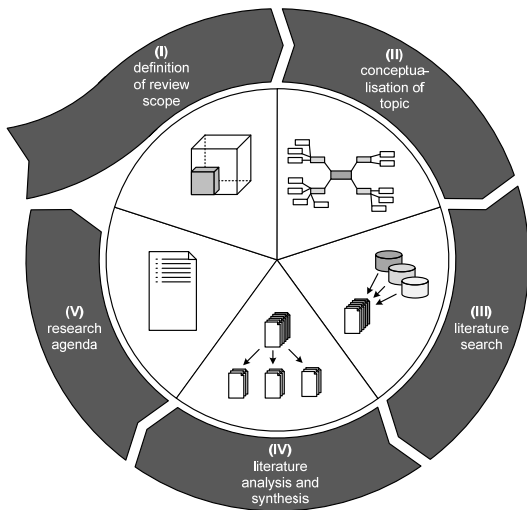


Figure 3. Framework for literature reviewing

This paper is based on the perception that in particular the degree of coverage of sources (6) is crucial for reviewing the literature on a topic. According to Cooper, four levels of coverage can be distinguished, namely: exhaustive (including the entirety of literature on a topic or at least most of it), exhaustive with selective citation (considering all the relevant sources, but describing only a sample), representative (including only a sample that typifies larger groups of articles), and central (reviewing the literature pivotal to a topic) (Cooper 1988, pp. 110f.).

Characteristic		Categories			
(1)	focus	research outcomes	research methods	theories	applications
(2)	goal	integration	criticism	central issues	
(3)	organisation	historical	conceptual	methodological	
(4)	perspective	neutral representation		espousal of position	
(5)	audience	specialised scholars	general scholars	practitioners/politicians	general public
(6)	coverage	exhaustive	exhaustive and selective	representative	central/pivotal

Figure 4. Taxonomy of literature reviews (following Cooper 1988, p. 109)

While the above framework does not provide immediate answers to the questions of literature search, its application is a necessary first step of clarification in any literature review, which bears implications for the later search process. An exemplary application of Cooper's taxonomy is also given in

Figure 4 by highlighting categories that characterise our own literature review presented in section 2: We did not focus (1) on the research outcomes or theories described or applied in the above analysed articles, but rather on their underlying research methodology. We criticized (2) the way these reviews document the literature search process, since it was our position (4) that such documentation is crucial to ensure the replicability of the literature search. As the purpose of our review was not to summarise or synthesise, but rather to evaluate scholarly literature, the categories proposed by Cooper relating to organisation (3) can hardly be applied to our case. It is hoped that our results are of some value for the whole IS community (5) – even though we did not consider all IS review articles ever published in our study, but restricted the analysis to a small sample of literature reviews only. However, this proceeding can be reasoned by the fact that it was our explicit objective to analyse high-quality review articles that may be considered as representative (6) for the IS domain.

In a next step, attention should be paid to the fact that a review must begin with “a broad conception of what is known about the topic and potential areas where knowledge may be needed” (phase II) (Tor-raco 2005, p. 359). Therefore, working definitions of the key terms should be provided at this point (Zorn and Campbell 2006, p. 175). Baker (2000, p. 222) suggests that one should firstly consult “those sources most likely to contain a summary or overview of the key issues relevant to a subject,” such as seminal textbooks, encyclopaedias, or handbooks. A reasonable way for identifying key concepts is represented by concept mapping, which also provides the opportunity to uncover relevant search terms (in particular related concepts or synonyms and homonyms) that can be applied in the subsequent literature search (cf. Rowley and Slack 2004, p. 36). Accordingly, we began our study by consulting the seminal textbooks on literature reviews by Arlene Fink (2005) and Christopher Hart (1998) and introduced a working definition of the term ‘literature review’ in section 2. However, the various synonyms of the term ‘literature review’, such as ‘meta-analysis’ or ‘research synthesis,’ have been disregarded in our study. Therefore, it is possible (or indeed even likely) that several articles which may be labelled as ‘literature reviews’ have not been included in our study, which again shows that our search strategy can hardly be labelled as exhaustive – even referring to the small sample of IS journals examined.

As we already noted, the search process (phase III) involves database, keyword, backward, and forward search, as well as an ongoing evaluation of sources (cf. Figure 5).

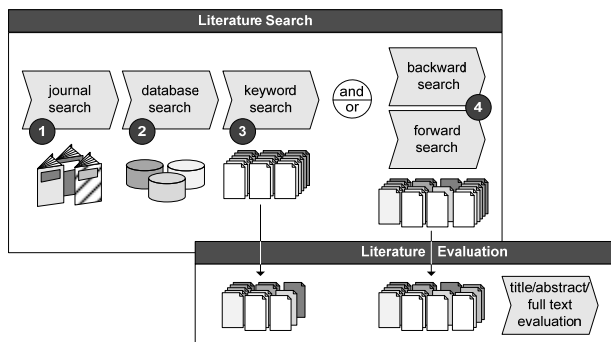


Figure 5. Literature search process

As they have typically been peer-refereed before publication, it is commonly recommended to focus on articles published in scholarly journals (Rowley and Slack 2004, p. 32) or proceedings of renowned conferences (Webster and Watson 2002, p. xvi). However, one should note that the quality of contributions in conference proceedings is usually considered lower and less mature than those in journals (cf. Levy and Ellis 2006, p. 187). Thus, authors who intend to include conference articles in their reviews should concentrate on the better ones (e.g., Walstrom and Hardgrave (2001, p. 121) and Willcocks et al. (2008, p. 166) provide rankings for IS conferences). Consequently, the identification of journals makes up the first sub phase of our framework – even though we would agree that it rather makes sense to query scholarly databases allowing for a topic-based search (cf. Webster and Watson 2002, p. xvi). However, one challenge definitely lies in identifying proper databases. We propose to

search those databases (sub phase 2) providing access to the leading IS journals (identified in sub phase 1) – a proceeding which finally allows for ensuring that all the top-tier sources are included in the review. The identified databases have then to be queried on the basis of a keyword search (sub phase 3). It is commonly recommended to use a precise (set of) search phrase(s) in order to exclude contributions covering topics or research questions which are not necessarily relevant (Rowley and Slack 2004, p. 35). Querying *EBSCOhost* using the search term ‘literature review,’ for example, reveals hundreds of possible information sources; when adding the term ‘information systems’ however, the amount of literature is significantly reduced. By also adding the supplementary search phrase ‘Europe,’ the huge pool of potentially relevant articles is finally restricted to merely a handful of papers. This example illustrates that keyword search is crucial, since the selection and combination of the search phrases sets “the parameters of the research itself” (Baker 2000, p. 222). Thus, particularly the applied keywords have to be documented precisely, so that other scholars can evaluate whether they sufficiently match the topic under investigation. According to Webster and Watson (2002, p. xvi), the process of backward search refers to reviewing older literature cited in the articles yielded from the keyword search and forward search means reviewing additional sources that have cited the article (sub phase 4), e.g. by querying the *ISI Web of Knowledge* by *Thomson Reuters* (note that Levy and Ellis (2006, pp. 190ff.) discuss additional forms of backward and forward search in detail). Evaluation in all phases means limiting the amount of literature identified by keyword search as well as backward and forward search to only those articles relevant to the topic at hand. We therefore propose an evaluation of the articles’ contents, which may mean to analyse their titles, abstracts or even full texts. As described above, the review at hand is based on applying a keyword search (‘literature review’) to a sample of ten journals. That being said, though these journals were accessed via online databases, a ‘pure’ database search has not been conducted. Moreover, backward or forward searches were also not part of our literature search strategy.

After collecting sufficient literature on a topic it has to be analysed and synthesised (phase IV). As we focus on the search process, we herein only briefly touch upon this phase. For the analysis, a concept matrix, as developed by Salipante et al. (1982) and adapted for IS literature reviews by Webster and Watson (2002, p. xvii), can be used, which subdivides topic-related concepts into different units of analysis (cf. Figure 6). This allows for arranging, discussing, and synthesising prior research.

Articles	Concepts														
	A			B			C			D			...		
unit of analysis	O	G	I	O	G	I	O	G	I	O	G	I	O	G	I
1					X				X						X
2	X				X	X		X							
...							X	X			X				

Figure 6. Concept matrix (Webster and Watson 2002, p. xvii)

However, as underpinned by several IS reviews (e.g., Ahuja 2002, pp. 30ff.), the synthesis of literature is further expected to result into a research agenda (phase V), comprised of sharper and more insightful questions for future research (Webster and Watson 2002, p. xix). The research agenda provides the basis for extending the review in order for the IS community to keep up-to-date and it may be developed based on the proposed concept matrix. That being said, certain fields of the matrix, which remain ‘blank’ during a literature study, often highlight research areas that are significantly under-researched.

5.2 A Plea for More Rigour in Searching the Literature

We hope that the above section provides some insights on how to rigorously conduct a literature review and search in the IS domain. However, we did not intend to present ‘yet another guideline’ for reviewing the literature – we rather consider our explanations as both a rationale for our own literature study and a response to scholars who are likely to estimate our first proposition to be the most striking one (‘IS researchers cannot refer to adequate guidelines for rigorously documenting the literature

search'). Nonetheless, we think that most IS scholars – and in particular those very renowned ones cited above – indeed have a good understanding of how to conduct a literature search. Moreover, we firmly believe that the literature search process underlying (at least most of) the analysed articles is certainly a highly rigorous one. However, it is simply not *documented* rigorously enough, leading us to question the role the literature search process plays in the IS domain. Thus, one may also consider this paper as 'yet another call' for more rigour in IS research; in this case, for documenting a literature search. In the following, we appeal to the authors of IS articles (proposition 2) as well as to the editors of IS journals (proposition 3) to not only conduct and write (or support the writing of) literature reviews that are of high quality, i.e. reviews that are thoroughly crafted, useful and interesting, but also to allow for adequate documenting of the review process, including the specifics of the search process.

When writing a literature review, we advocate authors to invest in planning and describing the literature search process in detail. In the majority of cases, literature reviews serve as *the* means to reveal open research gaps and are part of a larger research endeavour. Planning and accomplishing the literature search process in a rigorous manner will help to discover similar research endeavours early and prevent the researcher from doing redundant work. Moreover, it will allow for a better understanding of where to find relevant articles in the jungle of different sources available and how to retrieve them later. Rigorously documenting the literature search in particular means to share these experiences with the community. As a result, a well-documented review will be gladly used, extended and cited by other researchers, which will in turn positively affect scientific impact.

We hope for more editors to consider establishing a dedicated literature review category within their journals. Moreover, the rigorous accomplishment of a literature review should not be impeded by article length or reference restrictions. One possible solution may be the publication of two versions of the same review – a shorter one that contains the major findings and is published in the printed version and a comprehensive one that outlines the whole literature search process and states how and where the sources were discovered and which is published online (see Kari and Rozenberg (2008) for an example). Moreover, we suggest demanding the documentation of the literature search process as an important review criterion for judging the quality of literature reviews.

6 CONCLUSION

Research is a collaborative endeavour, since each researcher builds on what has been developed and worked out before. Thus, literature reviews play an important role in scholarship. In this paper we argued that documenting the literature search process is a crucial part in any review article. However, drawing on the results gained from an analysis of literature reviews published in ten of the most important IS outlets, we showed that many of these reviews do not thoroughly document the process of literature search, e.g. by not comprehensively explicating the queried databases, the applied keywords or the examined period of time. This is why we presented both guidelines for conducting a literature search and review as well as a plea for more rigour in documenting the search process.

Certainly, most IS scholars know what it actually takes to craft high-quality reviews, and we would agree that our suggestions are likely to further impede this challenging task. But our guidelines do not intend to imply that conducting a literature search means to uncover and analyse all sources ever published. A review that considers only five research papers, but sufficiently states which ones were chosen for whatever sensible reasons, may be of more value to both its authors and the community than a review that analyses a broad range of contributions, without providing sufficient information on where, why and what literature was obtained, hence, making it hard to judge its quality and the scope of its contribution. In addition, a well documented literature search offers the potential to being extended and transferred to, for instance, other domains, additional journals, or newer/older volumes. Against this background, search results are better comparable and a well-documented search process thus provides the basis for a review article to contribute to a cumulative effort of reviewing literature.

References

- Ahuja, M.K. (2002). Women in the information technology profession: a literature review, synthesis and research agenda. *European Journal of Information Systems*, 11 (1), 20-34.
- Alavi, M. and Leidner, D.E. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *MIS Quarterly*, 25 (1), 107-136.
- Baker, M.J. (2000). Writing a Literature Review. *Marketing Review*, 1 (2), 219-247.
- Bem, D.J. (1995). Writing a Review Article for Psychological Bulletin. *Psychological Bulletin*, 118 (2), 172-177.
- Cooper, H.M. (1988). Organizing knowledge syntheses: A taxonomy of literature reviews. *Knowledge in Society*, 1, 104-126.
- Eierman, M.A., Niederman, F. and Adams, C. (1995). DSS theory: A model of constructs and relationships. *Decision Support Systems*, 14 (1), 1-26.
- Elmaghraby, W. and Keskinocak, P. (2003). Dynamic Pricing in the Presence of Inventory Considerations: Research Overview, Current Practices, and Future Directions. *Management Science*, 49 (10), 1287-1309.
- Ferratt, T.W., Gorman, M.F., Kanet, J.J. and Salisbury, W.D. (2007). IS Journal Quality Assessment Using the Author Affiliation Index. *Communications of the Association for Information Systems*, 19 (34), 710-724.
- Fink, A. (2005). *Conducting Research Literature Reviews: From the Internet to Paper*, 2nd edition, Sage Publications, London.
- Fjermestad, J. and Hiltz, S.R. (1998). An assessment of group support systems experimental research: methodology and results. *Journal of Management Information Systems*, 15 (3), 7-149.
- Garfield, E. (1977). Proposal for a new profession: scientific reviewer. *Essays of an Information Scientist*, 3, 84-87.
- Garfield, E. (1987). Reviewing Review Literature. Part 1. Definitions and Uses of Reviews. *Essays of an Information Scientist*, 10, 113-116.
- Gerwin, D. and Barrowman, N.J. (2002). An Evaluation of Research on Integrated Product Development. *Management Science*, 48 (7), 938-953.
- Glass, R.L., Ramesh, V. and Vessey, I. (2004). An analysis of research in computing disciplines. *Communications of the ACM*, 47 (6), 89-94.
- Guo, H., Zhang, J. and Koehler, G.J. (2008). A survey of quantum games. *Decision Support Systems*, 46 (1), 318-332.
- Hardgrave, B.C. and Walstrom, K.A. (1997). Forums for MIS scholars. *Communications of the ACM*, 40 (11), 119-124.
- Hart, C. (1998). *Doing a literature review: releasing the social science research imagination*, Sage Publications, London.
- Hevner, A.R., March, S.T., Park, J. and Ram, S. (2004). Design Science in Information Systems Research. *MIS Quarterly*, 28 (1), 75-105.
- Jackson, G.B. (1980). Methods for Integrative Reviews. *Review of Educational Research*, 50 (3), 438-460.
- Jasperson, J., Carte, T.A., Saunders, C.S., Butler, B.S., Croes, H.J.P. and Zheng, W. (2002). Review: Power and Information Technology Research: A Metatriangulation Review. *MIS Quarterly*, 26 (4), 397-459.
- Kari, L. and Rozenberg, G. (2008). The many facets of natural computing. *Communications of the ACM*, 51 (10), 72-83.
- Krishnan, V. and Ulrich, K.T. (2001). Product Development Decisions: A Review of the Literature. *Management Science*, 47 (1), 1-21.
- Leidner, D.E. and Kayworth, T. (2006). Review: A Review of Culture in Information System Research: Toward a Theory of Information Technology Culture Conflict. *MIS Quarterly*, 30 (2), 357-399.
- Levy, Y. and Ellis, T.J. (2006). A Systems Approach to Conduct an Effective Literature Review in Support of Information Systems Research. *Informing Science*, 9, 181-212.

- Lin, C., Standing, C. and Liu, Y. (2008). A model to develop effective virtual teams. *Decision Support Systems*, 45 (4), 1031-1045.
- Lowry, P.B., Romans, D. and Curtis, A. (2004). Global Journal Prestige and Supporting Disciplines: A Scientometric Study of Information Systems Journals. *Journal of the Association for Information Systems*, 5 (2), 29-77.
- Manten, A.A. (1973). Scientific literature review. *Scholarly Publishing*, 5, 75-89.
- Melville, N., Kraemer, K. and Gurbaxani, V. (2004). Review: Information Technology and Organizational Performance: An Integrative Model of IT Business Value. *MIS Quarterly*, 28 (2), 283-322.
- Ngai, E.W. and Gunasekaran, A. (2007). A review for mobile commerce research and applications. *Decision Support Systems*, 43 (1), 3-15.
- Pateli, A.G. and Giaglis, G.M. (2004). A research framework for analysing eBusiness models. *European Journal of Information Systems*, 13 (4), 302-314.
- Peffer, K., Hui, W. (2003). Collaboration and Author Order: Changing Patterns in IS Research. *Communications of the AIS*, 11 (10), 166-190.
- Peffer, K. and Ya, T. (2003). Identifying and evaluating the universe of outlets for information systems research: Ranking the journals. *Journal of Information Technology Theory and Application*, 5 (1), 63-84.
- Petter, S., DeLone, W. and McLean E. (2008) Measuring information systems success: models, dimensions, measures, and interrelationships. *European Journal of Information Systems*, 17 (3), 236-263.
- Pervan, G.P. (1998). A review of research in group support systems: leaders, approaches and directions. *Decision Support Systems*, 23 (2), 149-159.
- Piccoli, G. and Ives, B. (2005). Review: IT-Dependent Strategic Initiatives and Sustained Competitive Advantage: A Review and Synthesis of the Literature. *MIS Quarterly*, 29 (4), 747-776.
- Pinsonneault, A. and Kraemer, K.L. (1989). The impact of technological support on groups: an assessment of the empirical research. *Decision Support Systems*, 5 (2), 197-216.
- Powell, P.L. and Johnson, J.E.V. (1995). Gender and DSS design: the research implications. *Decision Support Systems*, 14 (1), 27-58.
- Rowley, J. and Slack, F. (2004). Conducting a literature review. *Management Research News*, 27 (6), 31-39.
- Salipante, P., Notz, W. and Bigelow, J. (1982). A Matrix Approach to Literature Reviews. *Research in Organizational Behavior*, 4, 321-348.
- Te'eni, D. (2001). Review. A Cognitive Affective Model of Organizational Communication for Designing IT. *MIS Quarterly*, 25 (2), 251-312.
- Torraco, R.J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review*, 4 (3), 356-367.
- Tung, L.-L. and Turban, E. (1998). A proposed research framework for distributed group support systems. *Decision Support Systems*, 23 (2), 175-188.
- Wade, M. and Hulland, J. (2004). Review: The Resource Based View and Information Systems Research Review, Extension, and Suggestions for Future Research. *MIS Quarterly*, 28 (1), 107-142.
- Walstrom, K.A. and Hardgrave, B.C. (2001). Forums for information systems scholars: III. *Information & Management*, 39 (2), 117-124.
- Webster, J. and Watson, R.T. (2002). Analyzing the Past to Prepare For the Future: Writing a Literature Review. *MIS Quarterly*, 26 (2), xiii-xxiii.
- Willcocks, L., Whitley, E.A. and Avgerou, C. (2008). The ranking of top IS journals: a perspective from the London School of Economics. *European Journal of Information Systems*, 17 (2), 163-168.
- Woodward, A.M. (1972). Review literature: characteristics, sources and output in 1972. *Aslib Proceedings*, 26 (9), 367-376.
- Xiao, B. and Benbasat, I. (2007). E-Commerce Product Recommendation Agents: Use, Characteristics, and Impact. *MIS Quarterly*, 31 (1), 137-209.
- Zorn, T. and Campbell, N. (2006). Improving the Writing of Literature Reviews Through a Literature Integration Exercise. *Business Communication Quarterly*, 69 (2), 172-183.