

Theory of Knowledge for Literature Reviews: An Epistemological Model, Taxonomy and Empirical Analysis of IS Literature

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Abstract

Literature reviews play an important role in the development of knowledge. Yet, we observe a lack of theoretical underpinning of and epistemological insights into how literature reviews can contribute to knowledge creation and have actually contributed in the IS discipline. To address these theoretical and empirical research gaps, we suggest a novel epistemological model of literature reviews. This model allows us to align different contributions of literature reviews with their underlying knowledge conversions - thereby building a bridge between the previously largely unconnected fields of literature reviews and epistemology. We evaluate the appropriateness of the model by conducting an empirical analysis of 173 IS literature reviews which were published in 39 pertinent IS journals between 2000 and 2014. Based on this analysis, we derive an epistemological taxonomy of IS literature reviews, which complements previously suggested typologies.

Keywords: Literature review, Research methods/methodology, Theory of knowledge

Introduction

The literature review is an established research genre in many academic disciplines. Researchers usually draw on this genre of paper when they start a research study (Okoli and Schabram 2010; Rowe 2014; Sammon et al. 2010) as they “cannot perform significant research without first understanding the literature in the field” (Boote and Beile 2005). Looking at literature reviews does not only help to avoid reinventing the wheel (Zorn and Campbell 2006, p. 173) and thereby marginalizing their own work; it also allows researchers to enhance the body of knowledge by a process of accumulation. From an epistemological perspective, beyond this power of literature reviews to foster the cumulative nature of scientific progress, literature reviews can also (re)vitalize research by enabling the revolutionary nature of scientific progress which occurs “by a method which destroys, changes, and alters” (Popper 1962, p. 129). Synthesizing the potential of literature reviews, we stress that reviews can contribute to scientific progress from both the cumulative and the revolutionary perspective (Kuhn 1970), and revitalize knowledge development (Webster and Watson 2002).

Although literature reviews are commonly acknowledged to play a central role in the development of scientific knowledge (Boell and Cecez-Kecmanovic 2014a; Jennex 2015; King and He 2005; Webster and Watson 2002), to our best knowledge, no epistemological model of literature reviews – consistent with the understanding of epistemology as theory of knowledge (Martinich and Stroll 2014; Moser 2002) – has been suggested so far. The benefits of such a model are manifold: (1) it provides a theoretical foundation of knowledge creation through literature reviews and builds a bridge between the largely unconnected research streams of literature reviews and epistemology; (2) it can be applied in other disciplines so that IS research informs management science and social sciences, for example; (3) it provides a theoretical underpinning for the empirical analysis of how literature reviews have actually contributed to knowledge creation, of whether they have tapped their full potential to create knowledge and of how future literature reviews can exploit neglected opportunities of knowledge creation.

This lack of an epistemological model is accompanied by the challenge that we still have no empirical insights into how literature reviews have contributed to knowledge building in the IS discipline. Our observation is consistent with the lack of (systematic) epistemological analysis of IS research methods that has been identified by Becker and Niehaves (2007), Fitzgerald and Russo (2005), Keen (1980) and Mingers (2001). In this paper, we address the aforementioned research gaps by answering the following research questions:

1. *How can the theory of knowledge be used to develop an epistemological model of knowledge creation through literature reviews?*
2. *How have IS literature reviews contributed to knowledge creation and how can we foster it in future IS literature reviews?*
3. *How can the empirical analysis of knowledge creation through IS literature reviews be used to develop an epistemological taxonomy of literature reviews?*

To answer the research questions, we apply the theory of knowledge creation to literature reviews by aligning types of knowledge conversions with contributions of literature reviews. We empirically validate the resulting epistemological model by reviewing and analyzing 173 literature reviews which have been published in 39 pertinent IS journals between 2000 and 2014.

Our main contributions are (a) the theoretical development of the first epistemological model of literature reviews, (b) the empirical validation of the appropriateness of the model in the most renowned IS journals, (c) the provision of insights into how effective the IS discipline has exploited the potential of literature reviews to create domain knowledge in the past 15 years, and (d) the inductive development of an empirical, taxonomic classification of IS literature reviews, which complements deductive typologies suggested by Grant and Booth (2009), Paré et al. (2015) and Rowe (2014).

The remainder of this article is structured as follows. Section 2 provides the foundations of literature reviews. Section 3 presents the theory of knowledge, which we use to suggest an epistemological model of literature reviews. We draw on this model in Section 4 in order to explore empirically how literature reviews have contributed to the development of knowledge in information systems. We also derive an

epistemological taxonomy of literature reviews. In Section 5, we discuss our results before we conclude our article by outlining its contributions and limitations in Section 6.

Literature Reviews

In this section, we frame literature reviews as our unit of analysis in terms of its definition and classification in this paper. This step is of particular importance in the presence of the large body of literature on literature reviews, which shows a broad range of (partially) divergent understandings and classifications. Furthermore, we summarize how literature reviews contribute to knowledge development by distinguishing six types of contributions.

Definition of Literature Reviews

Literature reviews occur in different forms related to different purposes (Boell and Cecez-Kecmanovic 2014a, p. 260; Okoli 2012, p. 10; Paré et al. 2015, p. 183). For example, they can be a) part of a primary research article (e.g., an article where a literature review is a component of theory building coupled with another epistemological approach, such as a qualitative field study), b) part of a thesis, c) part of a project proposal, or d) an important type of publication in their own right (standalone review). In this article, we focus on standalone literature reviews.

Most scholars agree that a literature review should provide a synthesis of the literature as mandatory contribution (e.g., Fink et al. 2014; Okoli 2012; Schwarz et al. 2007). In addition, several authors require a literature review to provide a contribution that goes beyond the pure summary of existing material. Such an additional contribution can be, for example, the identification of research gaps or the framing of research in theory (Jennex 2015). Blaxter et al. (2010) and Blumberg et al. (2005) refer to the additional contribution as “assessment” and “interpretation”, respectively. Interpretation makes a chart for future research, which is considered mandatory in literature reviews (Rowe 2014; Webster and Watson 2002). Therefore, we require a literature review to include both **synthesis and interpretation (property 1)**. For example, we exclude articles of Harris (2000) and Zviran and Erlich (2003), who provide only a synthesis.

As we are interested in epistemological contributions of literature reviews, we consider only those literature reviews which **focus on domain knowledge (property 2)**, with domain knowledge being understood as the realm of knowledge that researchers have about their particular field of study (cf. Table 1). We acknowledge that other types of papers that review the literature provide valuable contributions – yet, they are not the focus of this paper. For example, we exclude scientometric studies (which analyze meta data, e.g., journals, years, research methodologies and research paradigms), such as that of Serenko et al. (2010), and articles which review the whole IS discipline (as a discipline focus is much broader than a domain focus), such as Hirschheim and Klein (2012).

We require a literature review to be comprehensive with regard to its domain of knowledge; this means that the scope “*is not confined to one research methodology, one set of journals, or one geographic region*” (Webster and Watson 2002, p. xv). Consequently, we exclude studies which limit the set of analyzed studies to those which apply a specific methodology, which include only a narrow set of publication outlets (e.g., Clemmensen (2006), who covers one journal only), and which are geographically limited (e.g., Sellitto (2007), who studies journal publication diversity within the “Australian Information Systems Sphere”). To sum up, for the purpose of validity, we require a literature review to have **property 3: comprehensiveness**. It should be noted that this property does not require a literature review to cite all articles identified in the search process. For example, a comprehensive review can cover the literature exhaustively and cite articles which are representative or pivotal (Cooper 1988). Based on the formulated three properties, we define the scope of literature reviews analyzed in this article as follows:

A literature review provides both a comprehensive synthesis and an interpretation of the body of knowledge of a specified domain. (Definition 1)

Our definition covers various types of literature reviews, which can differ along several dimensions. In the following, we briefly present those dimensions which found consensus in the literature and which deem relevant for our purpose of analyzing the epistemological contributions of literature reviews.

Classifications of Literature Reviews

In research literature, a diverse range of types of literature reviews exists. In order to structure the literature review landscape, scholars have suggested many dimensions and, based on these, classifications of literature reviews. Although it is beyond the scope of this paper to provide a complete overview, we briefly present some of the most acknowledged approaches in the literature.

Cooper (1988) characterizes a literature review according to several dimensions, such as its focus (e.g., theories vs. methods), its goal (e.g., integration vs. criticism), its perspective (neutral vs. espousing a particular position), its coverage (ranging from exhaustive to pivotal), its organization (e.g., conceptual vs. historical) and its audience (e.g., scholars vs. practitioners). Similarly, Rowe (2014) suggests classifying along the goal with respect to theory (describing, understanding or explaining), breadth (e.g., confined problem vs. discipline), systematicity (e.g., inclusion criteria and quality assessment) and argumentative strategy. King and He (2005) distinguish reviews along techniques and sketch a methodological continuum which ranges from qualitative and narrative to quantitative, statistical synthesis approaches. With regard to philosophy of science, there are different paradigmatic stances, for example a literature review might adopt a positivist or an interpretivist perspective (Boell and Cecez-Kecmanovic 2014a); while meta-analyses adopt a positivist approach and focus on empirical evidence, some narrative reviews involve a researcher's personal interpretation and judgement. A recent overview of dimensions of literature reviews is provided by Paré et al. (2015).

These dimensions can be used to develop classifications of literature review types. For example, Rowe (2014) uses four dimensions to distinguish the review types *Mayring ideal type*, *descriptive review*, *new framework-based review for understanding*, *theory-based explanatory review*. Grant and Booth (2009) develop a classification that consists of 14 types, many of which "fall short of being mutually exclusive" (p. 106). This deficiency was addressed by Paré et al. (2015), who adapt the typology of Grant and Booth (2009) to the IS domain. The typology of Paré et al. (2015) comprises nine types: *narrative review*, *descriptive review*, *scoping review*, *meta-analysis*, *qualitative systematic reviews*, *umbrella review*, *theoretical review*, *realist review* and *critical review*.

Although no commonly agreed classification of literature reviews exist, the review literature acknowledges the particular importance of goals of literature reviews. Deepening this understanding and adopting an epistemological perspective, we analyze contributions of literature reviews in the next subsection.

Contributions of Literature Reviews

Analyzing the literature on literature reviews, we find a broad spectrum of potential contributions:

First, there is consensus in the literature on reviews (e.g., Blumberg et al. 2005; Cooper 1998; Fink 2013; Hart 1998; Webster and Watson 2002) that the **synthesis (contribution 1)** of what the literature has found is a mandatory contribution (cf. Definition 1, Property 1). Synthesizing the body of domain knowledge can occur in different forms. A synthesis might begin by clarifying fundamental aspects, such as definitions (Webster and Watson 2002), variables relevant to the domain (Hart 1998), relationships between concepts (Okoli 2012) and subject vocabulary in general (Hart 1998). In addition, good reviews uncover central issues (Cooper and Hedges 2009; Cooper 1998; Garfield 1987) and research streams (Okoli and Schabram 2010). Depending on the existing body of knowledge, unification and inference of general statements might be possible (Jackson 1980; Schwarz et al. 2007). Literature reviews may also point out why different contributions to the body of knowledge are incommensurable (Cooper 1998). Most importantly, synthesizing the literature should provide transparency with regard to the current state and progress of domain knowledge (Hart 1998; Schwarz et al. 2007; vom Brocke et al. 2009).

Second, **adopting a new perspective (contribution 2)** is a powerful way of interpreting the literature, whereas the new perspective serves as an instrument of synthesizing literature results. This interpretation of literature findings can be conducted by applying new angles or different macro-concepts that enable a view which has not previously been explicated (Boell and Cecez-Kecmanovic 2014b; Boote and Beile 2005; Cooper and Hedges 2009; Hart 1998; Lather 1999; Rowe 2012; Strike and Posner 1983). For example, Jasperson et al. (2002) adopt a new perspective by reviewing the literature on the relationships between power and information technology impacts, development or deployment, and management or use. The authors apply two sets of lenses separately to examine the literature findings:

one set of lenses includes the technological imperative, organizational imperative and emergent perspectives, and is used to understand the causal structure between IT and organizational power. A second set of lenses includes the rational, pluralist, interpretive, and radical perspectives, and it is used to focus on the role of power and different IT outcomes. The authors draw on the same sets of lenses to discuss the similarities and differences that occur when the two sets of lenses are simultaneously applied. The review of Jasperson et al. (2002) supports cumulative knowledge building as they “*apply each lens separately to describe patterns emerging from the previous power and IT studies*” (p. 398).

Third, literature reviews can also serve as vehicles for **theory building (contribution 3)** by adapting existing theories, building new theories or synthesizing multiple theories (Cooper 1998; Jackson 1980; LePine and Wilcox-King 2010; Okoli 2012; Paré et al. 2015; Petticrew and Roberts 2008; Randolph 2009; Rowe 2014; vom Brocke et al. 2015; Webster and Watson 2002). When building or contributing to new theories occurs, different types of theories can be involved, such as the five types suggested by Gregor (2006). In contrast to literature reviews that adopt a new perspective (an instrument for the synthesis), a contribution to theory building emerges from the literature (partly as a result of the synthesis). These reviews go beyond what has been found by other researchers and speculate on new insights. Thereby, they propose new hypotheses and make suggestions on how to close corresponding research gaps. Development of theories can be seen as an output of the process of synthesizing literature results. One example of literature reviews that contribute to (more cumulative) theory building is the work of Soh and Markus (1995); the authors review models on IT business value, analyze the models with regard to process and variance theory characteristics, and finally suggest a new process theory by integrating the models and resolving some of their contradictions. Finally, Leidner and Kayworth (2006) develop a theory of IT, values and conflict as well as propositions concerning three types of cultural conflict and the results of these conflicts. The suggested theory is more revolutionary than cumulative as it “*suggests that the reconciliation of [...] [cultural] conflicts results in a reorientation of values*.” (p. 357)

Fourth, when a sufficient amount of empirical evidence has accumulated in the literature, reviews can serve the purpose of **testing theories (contribution 4)** that have previously been suggested (Cohn and Becker 2003; Cooper 1998; Green and Hall 1984; Jackson 1980; King and He 2005; Okoli 2012; Petticrew and Roberts 2008; Rowe 2012, 2014; vom Brocke et al. 2009). Theory testing, which has been influenced by the application of the evidence-based practice paradigm in several disciplines, including medicine and education (Oates 2011; Paré et al. 2015), usually involves gathering existing studies, appraising the quality of the empirical evidence, determining aggregate effect sizes and testing specific theoretical relationship among previously defined concepts. Theory testing reviews are confirmatory, employ evidence from past research to support its hypotheses and explanations and thus include only empirical studies. Thereby, they support cumulative knowledge building. An exemplary theory testing review is provided by Wu and Lederer (2009), who conduct a meta-analysis to test the effect of voluntariness in information technology acceptance.

Fifth, while the synthesis refers to what has been done, the **identification of research gaps (contribution 5)** is related to what needs to be done (Arksey and O’Malley 2005; Baker 2000, p. 221; Hart 1998, p. 27; Jennex 2015). This contribution is expected to stimulate research by substantiating a need for research and motivating researchers to close the gaps (Boote and Beile 2005; Chalmers et al. 2002; Gall et al. 1996; Levy and Ellis 2006; Neely and Cook 2011; Randolph 2009; Schwarz et al. 2007; Webster and Watson 2002). In addition, good reviews show “where excess research exists” (Levy and Ellis 2006; Webster and Watson 2002), which parts of the body of knowledge have “fallen behind the research front” (Cooper 1998; Price 1965) and which research approaches are unlikely to be successful (e.g., “cul-de-sacs” identified by Lacity et al. (2011)). There are two types of research gaps: the first type is identified by spotting gaps in the existing body of knowledge (Alvesson and Sandberg 2011; Sandberg and Alvesson 2011) and the second type is related to a) criticizing or problematizing certain (possibly unrecognized) assumptions (Alvesson and Sandberg 2011; Boell and Cecez-Kecmanovic 2014a; Hart 1998; Rowe 2012; Sandberg and Alvesson 2011), b) showing that knowledge related to the targeted problem is in some ways inadequate (Alvesson and Sandberg 2011; Boell and Cecez-Kecmanovic 2014a), and c) addressing methodological, logical or conceptual problems that have prevented a topic area from progressing (Cooper and Hedges 2009; Cooper 1998; Rowe 2014). While the first type of research gaps is likely to enable a cumulative extension of existing knowledge, the second type is more revolutionary and likely to be irreconcilable with some parts of the current body of knowledge. For example, Dahlberg et al. (2008) review the literature on mobile payments and identify factors that were underrepresented. By

defining corresponding research questions that refer to the effects of certain environmental factors, such as cultural or infrastructural aspects, on the success of mobile payments, the authors encourage an incremental extension of existing knowledge. Second, we found some reviews, which identify research gaps by problematizing underlying assumptions. For example, Lacity et al. (2010), who review the effects of different variables on IT outsourcing decisions, reject the common assumption that the client size or the size of the IT department are useful to explain outsourcing decisions. While challenging these factors in a revolutionary way, the authors draw attention to related factors, such as the contract time, that were heretofore inconclusive but are suggested to be promising research gaps.

Finally, literature reviews that identify research gaps can go a step further and guide future research by **providing a research agenda (contribution 6)** (Bandara et al. 2011; Chiasson et al. 2009; Leedy and Ormrod 2005; Levy and Ellis 2006; Rowe 2012, 2014; vom Brocke et al. 2009; Webster and Watson 2002). The task of those reviews is not to actually close research gaps or to answer research questions, but to show research avenues for other researchers and to make recommendations on how to close the gaps. Literature reviews lay out various paths for future research, and thereby contribute to research landscaping. When authors provide a research agenda, they go beyond the pure identification of research gaps and include specific research propositions, research questions, hypotheses and suggestions in terms of research directions. Although it is usually not considered a mandatory task of literature reviews, several authors develop a research agenda. For example, Smith et al. (2011) distinguish different levels of analyzing information privacy. As very few studies were conducted on the group level, the authors identify a significant research gap. By providing further insights into the difficulties of corresponding research, by discussing different research settings and by suggesting adequate research designs, the authors transform this research gap into an actionable research agenda. This allows researchers to tackle more transparent research gaps and thereby, to cumulatively extend information privacy research to the group level. Authors might also develop a more revolutionary research agenda. For example, Piccoli and Ives (2005) challenge a central assumption of research on the strategic impact of IT, namely the “easily replicable hypothesis” (Carr 2003). To substantiate their claim, the authors refer not only to high failure rates of IT projects in general, but they also outline a well-known example. To guide future research, the authors encourage rigorous studies and suggest an approach to test their ideas.

Theory of Knowledge

In the previous section, we discussed literature reviews as our object of analysis. As one of our research goals is the provision of an epistemological model of literature reviews, in this section we discuss the theory of knowledge as our theoretical foundation.

As formulated in Definition 1, our understanding of literature reviews is that they focus on the body of knowledge in a certain domain. In this paper, we adopt a traditional epistemological definition of knowledge (Greco and Sosa 1999, p. 104; Nonaka 1994): *Knowledge is “justified true belief”*. (Definition 2) Beliefs refer to the attitude of individuals, “*roughly, whenever [they] take something to be the case or regard it as true*” (Schwitzgebel 2014). Acknowledging that the qualification as “justified true” has been subject to extensive philosophical debates (Greco and Sosa 1999, p. 162), we briefly discuss justification and truth. Concerning justification, there are several approaches (Moser 2002, p. 204), such as rationalism or empiricism. In a scientific context, knowledge is justified if it results from the rigorous application of methods and if it has not been refuted by repeated criticism and attempts of falsification (Moser 2002, p. 390; Popper 1962; Slife and Williams 1995, p. 169). With respect to truth, different epistemic theories show that there is no consensus on what is true (Becker and Niehaves 2007; Hassan 2011; Meredith et al. 1989; Mingers 2001; Moser 2002, p. 386; Yadav and Gupta 2008). Therefore, knowledge should not be subject to an absolute and static conception of truth (Nonaka 1994), but it should rather be assessed in the light of an appropriate theory of truth. Hence, when defining knowledge as “justified true belief”, we acknowledge that there are different types of knowledge that are based on different methods of justification and different theories of truth.

Having defined our understanding of knowledge, we draw on the theory of (organizational) knowledge creation (Nonaka 1994) to develop a two-dimensional model of knowledge which is based on two constituent dimensions: codification and abstraction of knowledge (cf. Figure 1). With regard to the first dimension (codification of knowledge), we adopt the distinction between *explicit* and *tacit* knowledge (Polanyi 1967). Nonaka (1994, p. 15) argues that “[t]his distinction represents what could be described as

the epistemological dimension to organizational knowledge creation." While explicit, codified knowledge is transmittable in formal, systematic language (Nonaka 1994, p. 16) and is accessible to others (Griffith et al. 2003, p. 270; Leonard and Sensiper 1998), tacit knowledge has a personal quality, is hard to formalize and communicate, and is rooted in action, commitment, and involvement in a specific context (Nonaka 1994, p. 16). It involves cognitive elements (schemata, paradigms, and viewpoints) as well as technical elements (know-how, and skills) (Nonaka 1994, p. 16). Conceptualizing tacit knowledge in the context of literature reviews is useful because (1) it is essential for problem framing and innovation (Leonard and Sensiper 1998) and (2) literature reviews can convert tacit into explicit knowledge (cf. Figure 2).

Based on the distinction between explicit and tacit knowledge, Nonaka (1994, p. 18) postulates four different modes of knowledge conversion between these two types: (1) "socialization" converts tacit knowledge into tacit knowledge, (2) "externalization" converts tacit knowledge into explicit knowledge, (3) "internalization" converts explicit knowledge into tacit knowledge, and (4) "combination" converts explicit knowledge into explicit knowledge. While Nonaka (1994) presents knowledge types and their conversions at the individual and organizational level, he also argues that the conceptualization of knowledge creation through conversion even extends to the level of society. In our context of scholarly publications, including literature reviews, we find all three levels: the authors correspond to the individual level, the journals are related to an organization (with editors, reviewers etc. being actors with well-defined relationships, and reviewing and publication processes being part of the organizational structure), and the scholarly community represents the society.

With regard to the second dimension (abstraction of knowledge), we distinguish domain knowledge from domain metaknowledge, i.e., knowledge about (domain) knowledge (Evans and Foster 2011, p. 721). Although not explicitly mentioned, Nonaka (1994) addresses issues of metaknowledge when he considers directions "toward purposeful knowledge creation" (p. 31) and stresses the importance of asking questions such as "What do we need to know? Where should we be going?" (p. 31). We conceptualize (domain) metaknowledge in the context of contributions of literature reviews because "*as metaknowledge grows [...] it will enable researchers to reshape science—to identify areas in need of reexamination [...] and point out new paths.*" (Evans and Foster 2011, p. 721).

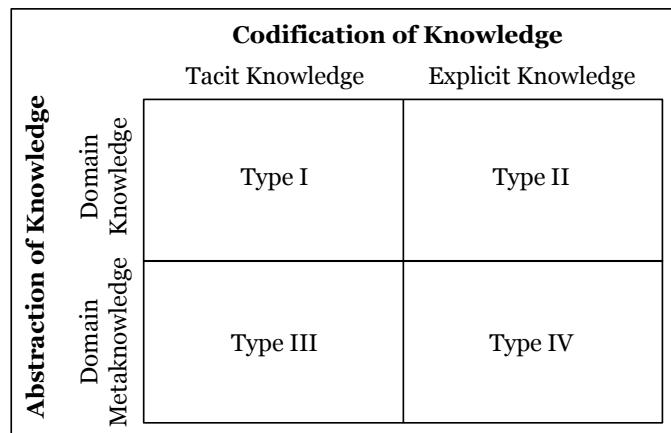


Figure 1. Framework of knowledge types

The resulting two-dimensional model (shown in Figure 1 and explained in Table 1) leads to the conceptualization of four knowledge types. We draw on the DeLone and McLean model of IS success (1992) to illustrate all of these four knowledge types (cf. Figure 1). In this seminal paper, the authors make the six major dimensions or categories of IS success explicit and propose a descriptive model of IS success. Thereby, they provide explicit knowledge in the domain of IS success (type II). This model was generic and contained knowledge that is applicable to many subdomains of IS success, including e-commerce. However, while knowledge on general IS success was made explicit, the IS success model also enabled readers to acquire tacit knowledge on the success of e-commerce initiatives (type I) which was made explicit (through model extensions) by Molla and Licker (2001) and Wang (2008). The research of Molla and Licker was inspired by a survey conducted by Benbasat et al. (2000), who identified e-commerce success as an important research issue. Thereby, the authors made missing knowledge on e-

commerce knowledge (metaknowledge) explicit (type IV). This metaknowledge had already existed in the minds of the participants of the survey – as tacit metaknowledge (type III) – but had not been made explicit.

Term	Definition	Examples
Explicit Knowledge	Knowledge is explicit if it is externalized knowledge that is accessible to others (Nonaka 1994, p. 16), i.e., if it has been codified and published.	<ul style="list-style-type: none"> The constructs and relationships of the DeLone and McLean IS success model (2003) are codified and accessible to others. The research agenda for social software in knowledge management (von Krogh 2012) is codified and accessible to others.
Tacit Knowledge	Knowledge is tacit if it has not (yet) been published. It has a personal quality, is hard to formalize and communicate, and is rooted in action, commitment, and involvement in a specific context (Nonaka 1994, p. 16).	<ul style="list-style-type: none"> Prior to writing their literature review, Schultze and Leidner (2002) developed a personal understanding of the differences in underlying assumptions and the structure of the different scientific discourses of knowledge management by immersing themselves in the literature – thereby, the authors got deeply involved in this particular domain.
Domain Knowledge	Domain knowledge is defined as the realm of knowledge researchers have about their particular field of study (Alexander and Judy 1988; Alexander 1992). Questions of domain knowledge are commonly distinguished from interrelated questions of epistemology, methodology and socio-political affairs (Gregor 2006).	<ul style="list-style-type: none"> In open source research, an example for domain knowledge is the holistic framework of Aksulu and Wade (2010), which situates open source systems in a larger environmental context by conceptualizing feedback loops and resource flows.
Domain Metaknowledge	Domain Metaknowledge is knowledge about (domain) knowledge and it results from the critical assessment of existing knowledge (Evans and Foster 2011).	<ul style="list-style-type: none"> An example for domain metaknowledge can be found in the article of Tams (2013), who present conceptual and empirical gaps in the knowledge on the effects, modern information technologies have on a “graying workforce”.

Table 1. Dimensions of knowledge

An Epistemological Model for Contributions of Literature Reviews

Having discussed literature reviews as objects of analysis and the theory of knowledge as the theoretical basis of our model in the previous sections, we now integrate both streams of research – i.e., the literature on literature reviews and the literature on epistemology – by providing an epistemological model of literature reviews (see Figure 2). With this model we theorize on how literature reviews can contribute to knowledge conversion between and inside the four knowledge types. In particular, we align the six types of contributions of literature reviews as identified in the second section with the framework of knowledge types as shown in Figure 1. We explain how the contributions of literature reviews implement the types of knowledge conversion.

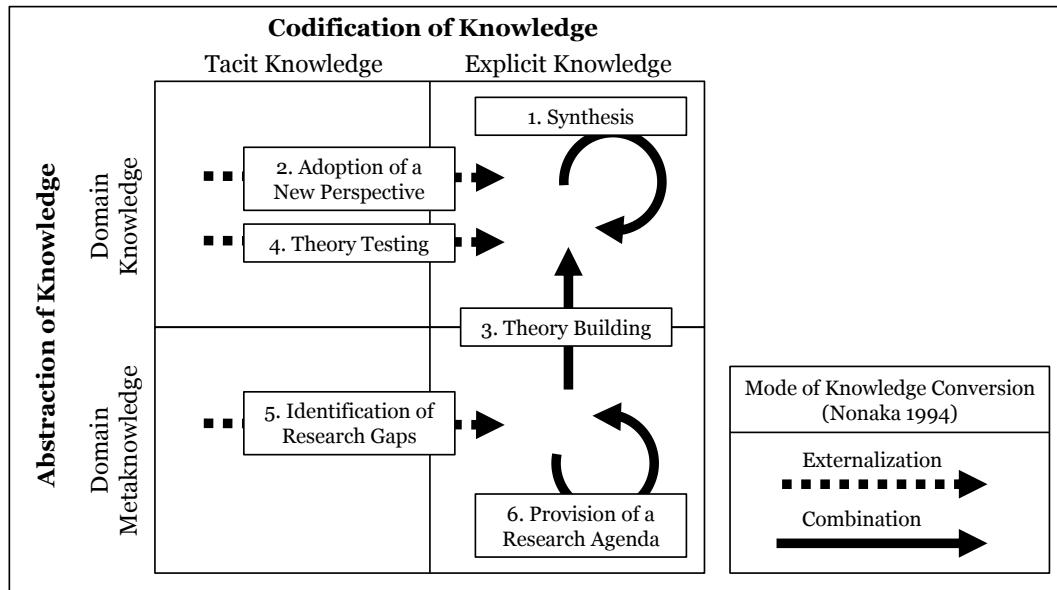


Figure 2. Epistemological model of literature reviews

Contribution 1: Synthesis From an epistemological perspective, a synthesis provides a structured presentation of domain knowledge that has already been made explicit by other researchers in their publications. Although knowledge is not synthesized independently of a researcher's personal interpretation (i.e., tacit knowledge), a synthesis mainly provides a conversion from explicit domain knowledge to explicit domain knowledge. Thereby, it corresponds to "combination" as the underlying mode of knowledge conversion. For example, by synthesizing financial, size and industry attributes of firms as determinants of IT outsourcing, Lacity et al. (2009) structure explicit domain knowledge and make it more transparent. As synthesis is a mandatory contribution, according to our understanding of literature reviews, each review implements at least the combination mode of knowledge conversion.

Contribution 2: Adoption of a new perspective By adopting a new perspective, authors of a literature review apply new angles or different macro-concepts which have not previously been explicated (Boote and Beile 2005; Cooper and Hedges 2009; Hart 1998; Lather 1999; Rowe 2012; Strike and Posner 1983). Thereby, the authors make personal insights in domain knowledge (i.e., tacit domain knowledge) explicit, which corresponds to the "externalization" mode of knowledge conversion. For example, Ba et al. (2001) go beyond the established software engineering and user-acceptance perspective and suggest that the alignment of incentives is an essential dimension which should be considered carefully in information systems design and evaluation. Although knowledge on organizational incentive alignment had already been developed before writing the literature review, the authors explicitly frame it in a new context.

Contribution 3: Theory building Literature reviews which contribute to theory building commonly suggest new domain artefacts, such as classifications, explanation and/or prediction models, design principles, etc., which still need to be validated in future research. In this light, novel research hypotheses are suggested. As Evans and Foster (2011) point out, these novel theoretical hypotheses are enabled by a growing body of metaknowledge which comprises revealed assumptions, research gaps and previously

unconsidered research paths. Literature reviews which explicate new theoretical approaches therefore convert explicit domain metaknowledge into explicit domain knowledge (corresponding to the “combination” mode of knowledge conversion). For example, Piccoli and Ives (2005) draw on meta-level insights that extant research on IT-dependent strategic initiatives and competitive advantage was partly unconnected and spread over three disciplines. By suggesting an integrative theoretical framework, the authors convert their domain metaknowledge to conceptual domain knowledge.

Contribution 4: Theory testing When a certain amount of empirical studies has accumulated, theory testing reviews (often referred to as meta-analyses) uncover heretofore hidden regularities or irregularities in a domain (Evans and Foster 2011). Specifically, these reviews aggregate and validate empirical relationships across studies and thereby make previously unknown effect sizes explicit, reveal file-drawer problems and quantify the extent to which existing research supports a particular theoretical hypothesis. Theory testing makes conjectural, tacit domain knowledge explicit, which corresponds to the “externalization” mode of knowledge conversion. For example, Guinea et al. (2012) investigated the effects of virtualness on team functioning. The existence of conflicting research findings – of which the authors probably developed a tacit understanding before conducting the meta-analysis – is externalized in the form of effect sizes and differing support for several of the hypothesized relationships.

Contribution 5: Identification of research gaps Research gaps inform on missing domain knowledge and are thus conceptualized as domain metaknowledge. By explicating research gaps, literature reviews convert tacit into explicit domain metaknowledge; this corresponds to the “externalization” mode of knowledge conversion. For example, by viewing the phenomenon of software piracy from a perspective of cognitive moral development, Siponen and Vartiainen (2004) find that existing approaches tend to focus on the lower stages, which are associated with punishment, for example. By identifying a lack of solutions that pay attention to higher stages – which are oriented towards universal ethical principles - the authors externalize a research gap, i.e., domain metaknowledge.

Contribution 6: Provision of a research agenda By providing a research agenda, literature reviews make explicit domain metaknowledge (identified research gaps) transparent in terms of how they might be closed in future research, without contributing to domain knowledge themselves. As Bandara et al. (2011) puts it, the provision of a research agenda is an opportunity to compliment research gaps with an analysis at the level of domain metaknowledge. This corresponds to the “combination” mode of knowledge conversion. An exemplary research agenda is developed by Lacity et al. (2010), who draw on research gaps identified by several articles (e.g., the previous review by Dibbern et al. 2004). By combining domain metaknowledge from several sources, the authors do an excellent job in providing a more transparent view of how research paths in IT outsourcing can be followed in future studies.

Empirical Study

We conducted an empirical study of the proposed model in IS. This study serves two purposes: First, we validate the epistemological model in an exemplary research discipline and demonstrate its applicability. Second, we answer research questions 2 (How have IS literature reviews contributed to knowledge creation and how can we foster it in future IS literature reviews?) and 3 (How can the empirical analysis of knowledge creation through IS literature reviews be used to develop an epistemological taxonomy?).

Methodology

Literature Search

With regard to the identification of literature reviews, we consider publications in “pertinent academic IS journals”. We argue that this requirement is met by the recent study of Lowry et al. (2013), which attempts to identify and rank “the best IS journals”. Although each journal ranking has its limitations, we believe that the study of Lowry et al. (2013) has the potential to get widely accepted in the IS community for three reasons: First, it considers prior studies on the quality of journals. Second, the authors account for both scholars’ preferences and bibliometric measures and provide empirical evidence that expert-based methods provide very similar results to bibliometric measures. Third, it includes the widely acknowledged AIS senior scholars’ basket of journals. We refer to this set of 39 journals which appear in English as ISJOUR (IS journals).

To identify literature review candidates that were published between 2000 and 2014, we checked the tables of contents and abstracts of the ISJOUR. This manual procedure was necessary because it is quite common in major information systems journals that authors do not clearly indicate that their article is a literature review (Paré et al. 2015). In order to reduce the risk of missing literature reviews, three senior IS scholars kindly reviewed our list and provided us with two missing literature reviews. We acknowledge that a broader search using literature databases and conference proceedings would have led to a more comprehensive landscape of literature reviews. However, only scanning the table of contents and abstracts of 39 journals over 15 years required scanning more than 15,000 articles and finally reading more than 407 articles in order to classify them as reviews (or not) and to code them. This extensive manual work did not allow us to extend our literature search. However, we argue that covering 39 pertinent IS journals provides a comprehensive overview of literature reviews published in IS journals.

Inclusion Criteria and Procedure

Each literature review candidate was analyzed with regard to whether it conforms to the definition of a literature review presented above (Definition 1). After a training phase and the development of a coding guideline (Neuendorf 2002, p. 160), two of the authors assessed the set of 407 candidates. From this set, we excluded 65 candidates as they do not provide a synthesis or go beyond it (Property 1), 97 because they do not focus on domain knowledge (Property 2) and 25 as they violate principles of comprehensiveness (Property 3). As some literature reviews appear under a different genre, we did not exclude editorials, research commentaries and research notes in advance unless they are very short (16) or violate other inclusion criteria. Finally, we excluded articles which collect primary data (23) or which do not review academic literature primarily (8). In total, we identified 173 literature reviews, which we cannot list here due to space limitation; a list can be obtained from the authors on request.

The reliability of the inclusion decisions was measured based on a random subsample of 69 candidates, which was coded by both of the two authors. Cohen's kappa (Cohen 1960), which quantifies inter-coder reliability while controlling for agreement by chance, was 0.94 – indicating almost perfect agreement (Landis and Koch 1977). Remaining disagreements were reconciled by the third author.

Coding Scheme and Procedure

Beyond the basic information (e.g., year of publication, journal), we coded the domain, epistemological contributions and the technique, which affects how reviews contribute to knowledge development.

The domain (Boell and Cecez-Kecmanovic 2014b; Cooper 1988; Rowe 2014), on which the literature review focuses, was coded without a predefined scheme. After the phase of open coding was completed, the domain descriptions were refined in a discussion between two of the authors. The technique describes how a review can be characterized on the qualitative – quantitative continuum of research methods, which covers narrative reviews, descriptive reviews, vote counting, and meta-analysis (Guzzo et al. 1987; King and He 2005). A narrative review presents verbal descriptions of studies focusing on theories and frameworks, elementary factors and their roles and research outcomes regarding a hypothesized relationship. A descriptive review analyzes to what extent the literature supports a particular proposition or reveals an interpretable pattern. We subsumed both the narrative and the descriptive technique under “qualitative” as in our empirical analysis a clear distinction between both types turned out to be difficult. Vote counting is commonly used for drawing qualitative inferences about a focal relationship based on the outcomes of tests of hypothesis reported in individual studies. When vote counting is complemented by the consideration of effect sizes and construct reliabilities, it is regarded as meta-analysis. The epistemological contributions comprise synthesis, the adoption of a new perspective, theory building, theory testing, the identification of research gaps and the provision of a research agenda (cf. section 2). For reviews which contribute to theory building, the type of theory was coded as analyzing, explaining, explaining and predicting, predicting or design and action (Gregor 2006). None of the categories are mutually exclusive, i.e., reviews can use multiple techniques and make multiple contributions.

Inter-rater reliability was measured based on a random subsample of 28 reviews. The agreement was almost perfect with kappa-values above 0.9. The third author reconciled remaining disagreements.

Results

We first provide descriptive statistics of the body of literature reviews before we analyze it with regard to the epistemological contributions; finally, we suggest an epistemological taxonomy of literature reviews.

Descriptive Statistics

We identified 173 literature reviews which were published between 2000 and 2014 in one of 36 journals; 3 journals did not publish any literature review. The leading outlets, which have published more than one third of the literature reviews, are MISQ (24 reviews published), CAIS (17 reviews), JAIS and DSS (both 11 reviews). These journals seem to be more receptive to literature reviews than most of the other journals, which have published only a few literature reviews over the last 15 years. Major domains covered by IS literature reviews include systems development (25 reviews), e-commerce (14), value of IS (12), technology acceptance and use (12), outsourcing (10), security (9), and virtual teams (6).

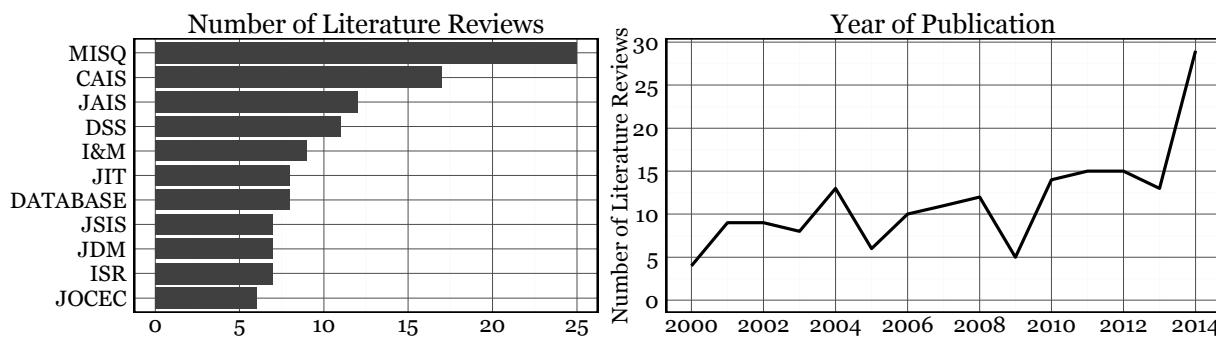


Figure 3. Descriptive statistics: journals and years

With regard to their methodological characteristics, most reviews adopt purely qualitative techniques (74%), while 20% quantitative techniques (20%) and combinations of qualitative and quantitative techniques (24%) are applied more rarely. Concerning the contributions, each review conducted a synthesis (as required by our definition), and more than two thirds of all reviews (68%) identified research gaps. Contributions to theory building were observed in 42% of the literature reviews, with theory for explaining being the most frequent type (68%), followed by theory for analysis (26%), theory for explaining and predicting (8%) and theory for design and action (6%) – theory for predicting was not identified (0%). A few reviews adopted a new perspective (22%) or tested a theory (19%). The provision of a research agenda was identified in 29% of the reviews.

An emergent Taxonomy

From our epistemological perspective, we observe that literature reviews have contributed to the development of knowledge in multiple ways by combining different contribution, such as theory building and theory testing. Apparently, the overall epistemological contribution of a literature review depends on its combination of single epistemological contributions. Thus, we analyze the occurrence of such combinations, identify their predominant type of knowledge conversion as conceptualized in the epistemological model of literature reviews (cf. Figure 2) and use the combinations to suggest an epistemological taxonomy of literature reviews, including the crystallization of archetypal review types.

Table 2 depicts the resulting epistemological taxonomy of literature reviews and indicates how frequently each of the five types occurs in our set of 173 literature reviews. The classification identifies the predominant knowledge conversion of each type and aligns it with the *dominant* contribution (additional contributions might be *included* by the review type); it also provides for subtypes of archetypal epistemological literature review types. To focus on the most important types, we do not present rarely occurring subtypes; as a consequence, the number of subtypes presented in Table 2 does not add up to 173. Specifically, our taxonomy does not contain reviews which combine the adoption of a new perspective and theory building (rare combination) and reviews which combine theory testing and the provision of a research agenda (not found). We continue by describing the five archetypal IS review types.

Archetypal Epistemological Review Type	Predominant knowledge conversion	Sub-type	Synthesis	Adoption of a new Perspective	Theory Building	Theory Testing	Identification of Research Gaps	Contributions	
								No. of reviews	Provision of a Research Agenda
I. Gap Spotting Review	Externalization of domain metaknowledge	a)	included					dominant	
		b)	included					dominant	included
II. Perspectival Review	Externalization of domain knowledge	a)	included	dominant					
		b)	included	dominant				included	
		c)	included	dominant				included	included
III. Theory Building Review	Combination of domain metaknowledge	a)	included		dominant				
		b)	included		dominant			included	
		c)	included		dominant			included	included
IV. Theory Testing Review	Externalization of domain knowledge	a)	included				dominant		
		b)	included				dominant	included	
V. Theory Building and Testing Review	Externalization of domain knowledge and combination of domain metaknowledge	a)	included		dominant	dominant			
		b)	included		dominant	dominant		included	
		c)	included		dominant	dominant		included	included

Table 2. An epistemological taxonomy of literature reviews

In IS research, the most frequent epistemological review type is the gap-spotting review; by identifying research gaps, it predominantly externalizes domain metaknowledge. Both, the original gap-spotting reviews (subtype a) and gap-spotting reviews which develop a research agenda (subtype b) almost exclusively draw on qualitative techniques. An example for gap-spotting reviews can be found in Elgarah et al. (2005), who spot gaps in research on data exchange in inter-organizational relationships and derive corresponding propositions. The review Zhao and Zhu (2014) is an example for a gap-spotting review which includes a research agenda (subtype b); the authors provide directions for future research, including theoretical approaches, under-researched factors and methodological approaches.

The perspectival review adopts a new perspective, which is sometimes complemented by corresponding research gaps or a research agenda. Thereby, its predominant knowledge conversion is the externalization of tacit domain knowledge. Perspectival reviews are based on qualitative techniques exclusively. For example, Brown and Grant (2005) develop the *Conceptual Framework for IT Governance Research*, which they use as an instrument to frame existing research (subtype a). Beyond adopting a new perspective, there are reviews which additionally identify research gaps (e.g., Dibbern et al. 2004; subtype b) or even develop a research agenda (e.g., Alavi and Leidner 2001; subtype c).

Several IS literature reviews contribute to theory building. By drawing on domain metaknowledge, theory building reviews predominantly combine explicit domain metaknowledge and thereby contribute to domain knowledge. All subtypes draw on qualitative techniques. Pure theory building reviews (subtype a) synthesize existing research and derive theoretical propositions (e.g., Carte and Chidambaram 2004). Melville et al. (2004) complement their integrative model of IT business value with several research questions (subtype b); Wade and Hulland (2004) provide an additional research agenda (subtype c).

Pure theory testing reviews correspond to the externalization of domain knowledge as the predominant knowledge conversion and exclusively use quantitative, meta-analytic techniques. Exemplary testing reviews (subtype a) are Petter and McLean (2009) and Schepers and Wetzels (2007), who aggregate empirical evidence on the IS Success Model and the Technology Acceptance Model. Notably, there are very few theory testing reviews which identify specific research gaps (e.g., Gerow et al. 2014; subtype b).

We observe that several reviews combine the dominant contributions to theory building and testing. Based on a combination of qualitative and quantitative techniques, these reviews convert explicit domain metaknowledge to domain knowledge and explicate domain knowledge. For example, Sharma and Yetton (2003) theorize that management support has a moderating effect on implementation success. Beyond this contribution to theory building, the authors use meta-analytic techniques to assess to which extent their hypothesis is supported by existing literature (subtype a). In addition to theory building and testing, Brown (2004) and Petter et al. (2013) identify research gaps (subtype b). An additional research agenda is developed by Lacity et al. (2010; 2011), who use vote-counting as opposed to meta-analytic techniques, which allow them to include qualitative studies.

Discussion

In this paper, we asked the research questions of (1) how the theory of knowledge can be used to develop an epistemological model of knowledge creation through literature reviews, (2) how IS literature reviews have contributed to knowledge creation and how it can be fostered in future IS literature reviews, (3) how the empirical analysis of knowledge creation through IS literature reviews can be used to develop an epistemological taxonomy of literature reviews.

With regard to question 1, we drew on the theory of knowledge in order to suggest a framework of knowledge types and an epistemological model of literature reviews. In this model, we conceptualized the different types of contributions of literature reviews and aligned them to Nonaka's (1994) modes of knowledge conversion. The conceptualization is driven by our review of the literature on literature reviews, by the theory of knowledge, and by the review of more than 170 literature reviews. However, it remains subjective to a certain extent how literature contributions are aligned with (modes of) knowledge conversion, and other researchers might end up with a different alignment. Yet, to our best knowledge, we have suggested the first epistemological model on literature reviews, which is applicable not only to IS.

With regard to research question 2, we analyzed more than 170 IS literature reviews which have been published in 39 renowned IS journals over the past 15 years. Thereby, we empirically validated the

appropriateness of the proposed model. Our results show that (1) there has been an increasing interest in literature reviews, with a considerable peak in 2014, and (2) a few journals (MISQ, CAIS, JAIS, DSS) have published more than one third of all literature reviews. This development demonstrates the relevance of literature reviews in the IS community. However, it also shows that this interest concentrates on a few journals. We suggest that other journals become more receptive to literature reviews. The results show further that (3) IS literature reviews have been quite attentive to the identification of research gaps and to the suggestion of new (elements of) theories but also neglected theories for explaining and predicting, theories for predicting and theories for design and action (Gregor 2006) and other contributions, including the adoption of a new perspective and theory testing. These empirical results show avenues for authors of future literature reviews with regard to providing missing types of contributions.

With regard to research question 3, we inductively developed an empirical taxonomy of literature reviews, which complements deductive typologies suggested by Grant and Booth (2009), Paré et al. (2015) and Rowe (2014). Our taxonomy conceptualizes archetypal ways, in which IS literature reviews have contributed to knowledge development. Our empirical analysis also reveals how often the corresponding review types can be found in the IS literature over the past 15 years. Gap spotting reviews amount to almost one third of all IS literature reviews, thereby contributing to the externalization of domain metaknowledge. Perspectival reviews occur rarely; one reason might be that it requires knowledge in other, related disciplines, such as psychology or computer science, and that this combination of knowledge from multiple disciplines is rare. To foster the externalization of domain knowledge, we encourage authors to compile perspectival reviews. Although theory building reviews occur relatively often, particular types of theories have been suggested rarely, as discussed above. Consequently, the combination of domain metaknowledge in IS is limited to theories for analysis and theories for explaining, thereby neglecting theories for design and action, among others. Future literature reviews should address this epistemological gap. Both theory testing reviews and theory and building and testing reviews occur rarely in the IS literature review landscape. With regard to the former, the externalization of knowledge is neglected, as it is due to rarely occurring perspectival reviews. Regarding the latter, it should be acknowledged that this review type is one of the most challenging but also one of the most epistemologically valuable ones as it provides both the externalization of domain knowledge and the combination of domain metaknowledge.

Conclusion

In this article, we investigated the epistemological role of literature reviews. Our contribution is threefold. First, we developed an epistemological model of literature reviews. The model is based on established concepts of epistemology and the theory of knowledge creation. Second, we collected 173 IS literature reviews and validated the model. Third, we developed an epistemological taxonomy of IS literature reviews. Fourth, we provided unique insights into how effectively the IS discipline has exploited the potential of literature reviews to create knowledge in the past 15 years.

Our study has some limitations, which represent opportunities for further research. First, our analysis and recommendations are based on articles published in one of the 39 journals which can be considered the premier journals in IS. Second, our analysis of epistemological contributions is limited to direct epistemological progress. The overall epistemological impact of literature reviews also includes indirect epistemological progress, which arise when follow-up articles draw on literature reviews in order to provide epistemological contributions. For example, research gaps identified in a literature review may be closed by other papers. Conceptualizing and analyzing how different contributions of literature reviews stimulate subsequent research in epistemological regard would be useful not only for authors of literature reviews but also for authors of research articles who get advice on how to exploit literature reviews to strengthen the epistemological power of their own research.

Overall, we hope that our epistemological model and the taxonomy of literature reviews provide a fertile foundation for further epistemological research on literature reviews as an essential research method.

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