The role of theory adaptation in the making of a reference discipline

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ABSTRACT

Information Systems (IS) scholars repeatedly debate the nature of the IS discipline. A series of articles have debated whether the IS field has become a reference discipline. While many scholars have argued this question from a perceptual point of view, we address it by examining the role of theory adaptation in the making of a reference discipline. Based on a review of how the sensemaking theory from organization studies is adapted and used in IS research, we show that papers that adapt and use sensemaking theory as a central construct in the theoretical framework – in other words – engaging in theory adaptation, have a higher probability of being referenced by other disciplines. Finally, we discuss the implications of the manner in which IS scholars borrow theory regarding the IS discipline's prospects of becoming a reference discipline.

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1. Introduction

Over the past for almost thirty years, IS scholars have debated the status of the IS discipline. Many leading IS scholars have contributed to the debate, and while they do not necessarily agree on the current status of the IS discipline, the dominant position is that it has matured significantly since the 1980s (see, for example, Baskerville & Myers, 2002). The debate covers a number of sub-debates ranging from problems of legitimacy and recognition from other research fields (Benbasat & Zmud, 2003; Lyytinen & King, 2004), to the lack of a clear definition of the IS field (Avgerou, Siemer, & Bjørn-Andersen, 1999) and to the problems related to the absence of a theoretical core of the field (Benbasat & Weber, 1996; King & Lyytinen, 2004; Weber, 2006). While some have historically questioned the legitimacy of the discipline as a field on its own (DeSanctis,

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2003; Hirschheim & Klein, 2003), others have been less conclusive, inquiring about initiatives and measures for developing and improving the discipline and the criteria for doing this (Baskerville & Myers, 2002; Lucas, 1999; Wade, Biehl, & Kim, 2006).

A central sub-debate is the IS reference discipline debate. From around 1980 until 2002, it focused on what disciplines should serve as reference disciplines for IS. Articles with this focus include Keen (1980), Hamilton and Ives (1982), Culnan and Swanson (1986), Culnan (1987) and Lee (1991). In 2002 the debate took an important turn as two articles, Baskerville and Myers (2002) and Vessey, Ramash, and Glass (2002), initiated a debate about IS as a reference discipline on its own merits, and thus, from 2002, the reference discipline debate began to focus on the IS field's external influence and how referencing to IS research by other disciplines could be measured and strengthened.

Three studies have set a direction for this controversy. Initiating this debate, Baskerville and Myers (2002) reviewed the citations of two pieces of IS research (Davenport & Short, 1990; Markus, 1983) proven valuable to scholars from other disciplines. They concluded that the IS discipline was ready to serve as a reference discipline because it had developed its own research tradition and perspective, thereby becoming of interest and value to scholars from other disciplines. Further, Vessey et al. (2002) looked at what reference disciplines IS scholars rely on in their publications and the diversity across journals, suggesting that IS had already become a reference discipline. Finally, Wade et al. (2006) investigated what they call the IS field's proclaimed status as a reference discipline, and concluded that IS had yet to attain the status of a reference discipline based on the understanding that other disciplines must reference a discipline for it to be a reference discipline.[1] Together, these three articles provide valuable insights into what to expect from a reference discipline, and they maintain that its importance to other fields is central to sustain the legitimacy of the IS field.

The authors subscribe to the idea put forward by Hambrick and Chen (2008) that, in part at least, the success and legitimacy of a young academic field depends on its ability to convince more established fields that it has a contribution to make. The reference discipline debate addresses the issue of legitimacy building by a young field, as it examines whether other fields have been convinced that the knowledge it produces is worth referencing.

To further the visibility and the legitimacy of the IS discipline, different IS scholars have formulated varying proposals for initiatives to be taken in order to increase the likelihood that scholars from other disciplines will reference IS research in their own research. Lee (1991) and Baskerville and Myers (2002) suggest publishing IS research in journals from other academic fields or focusing on co-publication with scholars from other research fields, for example, in joint special issues. Lucas (1999) suggests pursuing a constant strive for quality, while Wade et al. (2006) propose increasing the quantity of articles in leading IS journals. Galliers (2003) advocates for the IS discipline to accept and embrace pluralism, while Hirschheim and Klein (2003) promote the development of a discipline-wide body of knowledge. For Baskerville and Myers (2002), it is important to ensure that IS research is readily accessible to scholars in other fields, whereas Benbasat and Zmud (2003) encourage; a) IS scholars to attend other areas' conferences and b) scholars from other fields to attend IS conferences (for a list of these proposals see Appendix A).

While these proposals might increase the external referencing to IS research, we find that foremost they focus on promotion of IS research, building on the assumption that there is an audience to it. Hence, it seems that none of the proponents mentioned above has considered whether the manner in which a piece of IS research is conducted influences the number of citations it receives from outside the IS discipline; thus, the above-mentioned proponents have not looked for factors that could influence the number of citations articles get from outside their discipline of origin. We suggest that further investigation into factors that can potentially influence the becoming of a reference discipline is an important step for the advancement of the reference discipline debate.

In our search for factors that might influence how often research publications get cited, we consulted Judge, Cable, Colbert, and Rynes (2007), who found that articles reporting empirical studies which clearly extend the theoretical base of existing literature increase the number of citations by other scholars as well

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[1] A fourth paper (Katerattanakul et al., 2006) claims that IS has become a reference discipline. However, the results are not compatible, because the paper solely categorizes Communications of the ACM as an IS journal, and thereby, it concludes that IS is a major reference discipline for computer science.

as the likelihood for a discipline to become a reference discipline for others. Therefore, the research question we pursue is:

What is the consequence of the manner of theory borrowing in IS for the ability of the field to serve as a reference discipline to other disciplines?

Regarding Wade et al.'s (2006, p. 248) statement that "for a field to be considered a reference discipline, it must first be referenced by other disciplines," we take this a step further, suggesting that for someone to reference a discipline, there must be something of interest to reference.

For the purpose of answering our research question, we examine how sensemaking theory from organization studies (Weick, 1995) published in nine leading IS journals is used in IS research. We have chosen a theory from organization studies because of the long tradition for exchange between the two disciplines (DeSanctis, 2003; Orlikowski & Barley, 2001), in particular, with regard to understanding how users appropriate, frame, construct meaning and make sense of information systems (Markus & Robey, 2004).

The rest of the paper is structured as follows. First, we present Truex, Holmström, and Keil's (2006) argument for informed theory adaptation, after which we describe the sensemaking theory in order to outline its theoretical foundation and use in organization studies. Next, we present our methodology before analyzing how sensemaking theory is borrowed in IS research, as well as whether theory adaptation influences external referencing to IS research. Finally, based on our findings, we discuss the prospects of IS as a reference discipline and put forward suggestions for future research. We thereby contribute to the reference discipline debate by examining the role of theory adaptation in the making of a reference discipline.

2. Theory adaptation: a marker for external referencing?

IS scholars have continuously addressed the importance of a theoretical base for empirical studies. For example, at the first International Conference on Information Systems in 1980, Peter Keen argued that IS is an applied discipline that draws upon mature disciplines' theories and methods. More recently, Truex et al. (2006) have discussed the adaption of theory in IS research, highlighting that poorly informed adaptation of theory may generate three mistakes; a) repetition of mistakes made and debated within the original discipline's discourse, b) misinterpretation of underlying assumptions about the nature of reality and how knowledge is acquired which are implicit in the theory and the methodological implications of those assumptions, and c) waste of time and effort by not adding value to the cumulative tradition in the IS field. Further, Truex et al. (2006, p. 798) suggest that it is "the manner in which theories are borrowed by IS scholars more than the borrowing itself that creates problems for, and weakens, the IS discipline."

Using this point of view as our steppingstone, we investigate whether the manner in which theories are borrowed by IS scholars has consequences for the frequency by which pieces of IS research are cited by scholars from other disciplines. Our assumption is that the manner of theory borrowing in the IS field has consequences for the ability of IS scholars to produce research that scholars from other disciplines regard as being valuable and worth referencing in their own research. Hence, we investigate whether theory adaptation is important when a research field aspires to become a reference discipline.

3. Sensemaking theory: a theory used in is research

We selected sensemaking theory (Weick, 1995) as the example for our review of theory borrowing in IS research. We use a theory from organization studies because exchanges between organization studies and IS are already established; some scholars, for example Stephen Barley, the late Claudio Ciborra, and Wanda Orlikowski, have published in both IS and organization studies journals. Moreover, a number of the theories originating from organization studies have been used in IS research, including new institutional theory (Currie, 2009), structuration theory (Jones & Karsten, 2008) and organizational learning theory (Reardon & Davidson, 2007). Finally, some organization studies journals, for example, Organization Science, have published special issues on information systems (see Special Issue: Information Technology and Organizational Form and Function, Organization Science, 2007, vol. 18, issue 5).

Furthermore, sensemaking theory is an ideal example of a theory with appeal to scholars from outside its field of origin as a) scholars from other disciplines, such as psychology, education, sociology and information systems, have applied the theory when investigating a variety of different empirical phenomena; thereby, it has proven its applicability in many research contexts (Maitlis & Christianson, 2014), b) it is continuously being developed and applied, thus making it a vibrant theory (Sandberg & Tsoukas, 2014) and finally c) within its field of origin, organization studies, sensemaking theory has a solid history for being applied in studies of technology, as seen, for example, in Griffith (1999) and Weick (1988,1990).

Sensemaking theory first appeared in Weick (1969). Since then it has continuously been developed by Karl Weick and his collaborators, for example, Weick, Sutcliffe, and Obstfeld (2005) and by other scholars of organizations, such as Fiol and O'Connor (2003), Maitlis and Lawrence (2007) and Rerup (2009). The theory focuses on the relationship between cognition and action (Weick, 1995), and it explains cognitive and social mechanisms for dealing with ambiguity and uncertainty in organizations. Summarized by Maitlis and Christianson (2014), sensemaking is "the process through which people work to understand issues or events that are novel, ambiguous, confusing, or in some other way violate expectations. As an activity central to organizing, sensemaking has been the subject of considerable research which has intensified over the last decade" (Maitlis and Christianson, 2014, p. 57).

According to Weick (1993), sensemaking is an on-going accomplishment through which people attempt to create order and make retrospective sense of the situations in which they find themselves. Sensemaking is both an individual and a social activity, and the two are not easily separated, as the cognitive process happens within the individual, but the individual always reflects his or her 'self' in other individuals (as well as what he or she believes others perceive about him- or herself). Sensemaking is the creation of reality as well as comprehension of reality, and it is therefore strongly linked to constructivism. Although sensemaking is a cognitive process, it is also closely linked to action, which precedes the construction of meaning, thus making sensemaking a retrospective activity. The core concepts employed in the analysis of sensemaking are: a frame, a cue and a connection, which together create meaning: "Meaning = cue + relation + frame" (Weick, 1995, p. 110). All three elements must be present for sensemaking to occur, with the starting element not being important.

The substance of sensemaking is a frame (an overall paradigm or shared understanding) that summarizes past experiences, such as traditions, ideologies, theories of actions or stories (Allard-Poesi, 2005), and a cue (for example, a new experience, a new technology or a failed project) that includes a connection between the two. The frame and the cue alone do not make sense, whereas the cue in the frame does make sense. According to Weick (1995, p. 111), "frames tend to be past moments of socialization and cues tend to be present moments of experience. If a person can construct a relation between these two moments, meaning is created."

In organization studies, sensemaking theory has been used to understand the construction of meaning of organizational phenomena or processes. It has been applied in a number of studies, including studies of strategic change (Gioia & Thomas, 1996), organizational learning (Thomas, Sussman, & Henderson, 2001), creativity (Drazin, Glynn, & Kazaniian, 1999), post-acquisition integration (Vaara, 2003), trust (Adobor, 2005) and product innovation (Dougherty & Borrelli, 2000). Although they rely on different theoretical backgrounds, scholars converge to see sensemaking as created and situated in the micro-practices of interactions, conversations and coordinated actions between people (Allard-Poesi, 2005).

In IS research, we see an interest in studying how users perceive and use technology in organizations. Sensemaking has been used to study interaction between cognition and action in studies of, for example, technological innovation (Swan & Newell, 1998), IT-adaptation (Henfriedsson, 1999), post-adoptive behaviors associated with IT-enabled work systems (Jasperson, Carter, & Zmud, 2005) and electronic communication (Bansler & Havn, 2004).

In the next section, we present the method we used for the sampling and categorization of IS research which use sensemaking theory. The purpose is to identify IS research that adapts theory in a manner that creates potential for producing contributions of interest to scholars from other disciplines.

4. Research methodology

Over the years, IS scholars have used different approaches in assessing referencing between IS and other disciplines. Citation analysis has been used to study the extent in which other disciplines reference articles

published in IS journals (Baskerville & Myers, 2002; Wade et al., 2006). Classification studies have been used to study topics that are referenced by other disciplines (Vessey et al., 2002). Finally, some in-depth studies of other disciplines' use of a specific IS theory have contributed to IS reference discipline research (Truex et al., 2006). In the reference discipline debate, it is common to use citation analysis when assessing the interest in IS research by other disciplines, and as our aim is to contribute to this debate, we analyze how often scholars from other disciplines have cited specific pieces of IS research. Similar to Tsoukas (2008), we acknowledge that citations "…do not exhaustively define quality" (Tsoukas, 2008, p. 1095), but we nevertheless find that when we want to measure the external impact of a scholarly field, this is best done in a citation analysis, and thus, we concur with Anderson (2006), who states that citations reflect "[t]he realized contribution of a work which is only determined as subsequent authors actually use that work" (Anderson, 2006, p. 1676).

We now describe the methodology used when establishing the sample of articles to be included in our analysis of external referencing. We first present the criteria that we applied when creating the sample of articles to be reviewed with regard to their adaptation and use of sensemaking theory, and thereafter introduce the classification scheme methods used to examine the articles.

4.1. Defining the scope of the review

Our review includes articles published in nine leading IS journals, including European Journal of Information Systems (EJIS), Information Systems Journal (ISJ), Information Systems Research (ISR), Journal of the Association of Information Systems (JAIS), Journal of Information Technology (JIT), Journal of Management in Information Systems (JMIS), Journal of Strategic Information Systems (JSIS), MIS Quarterly (MISQ) and Information & Organization (I&O). The eight first-mentioned journals make up the Association of Information Systems' (AIS) 'basket of eight'.

4.2. Searching the Journals

In order to identify all articles that applied sensemaking theory, we searched the nine leading journals using three search terms: sensemaking, enactment and Weick. 'Sensemaking' was chosen as the key concept of our review, and 'Weick' is the main contributor to the theory. Finally, we included 'enactment' because it refers to a central process in sensemaking, thereby ensuring that we did not overlook articles that dealt with the process of making sense without directly using the word 'sensemaking.'

For the purpose of identifying the articles, we used a number of databases with scholarly journals; J-Stor for MISQ (1977–2001), Business Source Complete for ISJ (1998–2006), ISR (1990–2006), JIT (1991–2006) and MISQ (1977–2006), Science Direct for Information & Organization (1991–2006), Palgrave Journals for EJIS (1997–2006), jais.aisnet.org for JAIS (2000–2006), and Blackwell Synergy for ISJ (1996–1997). Volumes 1–5 of EJIS and ISJ were not included in the databases, and therefore, we obtained paper copies of these and searched them manually. For each journal, we performed a full text search, using each of the three search words individually, and we obtained either pdf-files or paper copies of all the identified articles.

Both authors performed all searches in order to ensure that no articles that matched our search words were missed. Following each search, we compared our findings and solved any inconsistencies.

4.3. Sorting the results

Our searches produced a sample of 323 articles that matched one or more of our search terms. These 323 articles constitute our sample A. Acknowledging that most likely not all articles in sample A applied sensemaking theory, we went through all the articles in the sample to identify whether they used sensemaking as a central construct in their analytical framework in: a) theoretical discussions, b) creation of a theoretical framework or c) construction of theoretical concepts. Hence, we excluded articles that, for example, solely mentioned sensemaking in the introduction but did not involve the construct further in the body of the article. We also excluded articles that used nominally identical concepts to those used in sensemaking theory, but did not refer to the theory. Both scholars sorted the articles in sample A according to the criteria above and then we compared our findings, resolving

Table 1

Sample sizes and distribution of articles in journals.

	EJIS	I&O	ISJ	ISR	JAIS	JMIS	JSIS	MISQ	JIT	Total
Sample A	36	69	4	26	9	42	29	80	28	323
Sample B	2	11	0	5	3	6	5	14	5	52
Sample C	1	6	0	2	1	0	2	7	0	19

differences and disagreements. The result from the sorting was a reduced sample B of 52 articles, which we took to the next step of analysis.

4.4. Analysis of the selected articles

For the purpose of examining the application of sensemaking in the sample B articles, we adopted Gregor's (2006) five interrelated types of theory: a) theory for analyzing, b) theory for explaining, c) theory for predicting, d) theory for explaining and predicting and e) theory for design and action. Subsequently, for the purpose of examining the application domain in each of the articles, we adopted the five categories of bodies of knowledge developed by Baskerville and Myers (2002) based on Davis (2000). These are: a) IS management processes, b) IS development processes, c) IS development concepts, d) representations in IS and e) application systems.

The articles from the sample were then read carefully and discussed with the aim of examining each article's application domain. In this process, we focused on the details of the use of the theory in the selected articles. In the next section, we present the findings from our review, and thereafter we examine the external referencing to the articles.

5. The borrowing of sensemaking theory in is research

From our initial sample A (323 articles), we selected our sample B (52 articles) for a closer examination, as described in the methodology. Each of the 52 articles in sample B was examined according to theory use and application domain. During the examination, another 33 articles were excluded from the sample, as our closer examination showed that their use of sensemaking did not fulfill one of the three criteria for being a central theoretical construct in the analytical framework (see 3.3). The major reason for excluding these articles was that their main theoretical focus was not sensemaking theory. For example, Daft, Lengel, and Trevino (1987) use media richness theory, and Jones (1995) focuses on organizational learning theories. This left us with 19 articles (sample C) from six different journals (EJIS, I&O, ISR, JAIS, JSIS and MISQ), as shown in Table 1.

We then categorized the articles in sample C based on Gregor's (2006) taxonomy of theories in IS. Eight of the articles in the sample use sensemaking theory to *analyze* the phenomena of interest in the article, and eight other articles use it for *explaining*, whereas three use it for *design and action*. Finally, none of the articles use the theory for *predicting* or for *explaining and predicting*. The results are shown in Table 2.

The articles that use sensemaking theory for analysis focus on describing relationships between constructs and the boundaries within which relations and observations were held. Articles using sensemaking theory for explanation focus on how, why and when things happened with the aim of providing a greater understanding of the phenomena of interest. Finally, articles using sensemaking theory for design and action provide recipes for prescriptive action. A brief description of the use of the theory in each article is provided in Table 3.

We also examined the application domain for the theory in the articles and categorized them according to Baskerville and Myers (2002) categories of bodies of knowledge within IS. The results are presented in Table 4.

As it appears from Table 4, the examination of application domains showed that when sensemaking theory is central to the theoretical framework of the article, it is primarily to explain or analyze either IS development processes or IS management processes.

Based on our examination of the articles in sample C, we concluded that all had potential as contributors of theoretical insights to research performed in disciplines other than IS. In order to examine the external impact of the 19 articles, we performed a citation analysis for each article. For this purpose, we used the Thomson

Table 2
Distribution of sample B articles on Gregor's (2006) types of theory in IS.

Type of theory	Authors
Theory for analyzing	Lim and Benbasat (2000)
	Ramiller (2001)
	Davidson (2002)
	Tan and Hunter (2002)
	Swanson and Ramiller (2004)
	Majchrzak et al. (2005)
	Scott and Barrett (2005)
	Vaast and Walsham (2005)
Theory for explaining	Hirschheim and Newman (1991)
	Boland and Greenberg (1992)
	Kirsch and Beath (1996)
	Ciborra (1999)
	Boersma and Kingma (2005)
	Jasperson et al. (2005)
	Bondarouk (2006)
	Butler and Gray (2006)
Theory for predicting	None
Theory for explaining and predicting	None
Theory for design and action	Kydd (1989)
	Ciborra and Lanzara (1994)
	Gosain (2004)

Reuters Web of Knowledge and the Web of Science Cited Reference Search in the queries. We identified 842 citations of the 19 articles. However, 52 of these were self-citations, which we decided to exclude from the citation analysis, and thus, as shown in Table 5, the total number of citations of the 19 articles is 790, of which 210 appear in non-IS journals. In sum, the citations from outside the IS discipline amount to 26.6%.[2]

For the purpose of examining the robustness of our findings, we defined two different criteria for identification of outliers in our sample, namely: a) percentage of citations from outside the IS discipline, and b) total number of citations. Thereafter, we removed top and bottom outliers and analyzed the citation numbers for the two resulting samples. First, we removed the three articles with the highest percentages of citations from outside the IS discipline (Boland & Greenberg, 1992; Majchrzak, Malhotra, & John, 2005; Vaast & Walsham, 2005) and the three articles with the lowest percentages of citations from outside the IS discipline (Gosain, 2004; Kirsch & Beath, 2006; Scott & Barrett, 2005). When analyzing the citation numbers for the remaining 13 articles, we found that 26.6% of the citations of these came from outside the IS discipline. Second, we removed the three articles with the highest (Hirschheim & Newman, 1991; Jasperson et al., 2005; Swanson & Ramiller, 2004) and lowest (Bondarouk, 2006; Ramiller, 2001; Scott & Barrett, 2005) total number of citations. When analyzing the citation numbers for the remaining 13 articles, we found that 29.7% of the citations of these came from outside the IS discipline.

In sum, our major finding is that 26.6% of the citations of the articles that adapt and use sensemaking as a central theoretical construct in the analytical framework, come from outside the IS discipline, which is rather robust. The results of our examination of the robustness are shown below in Table 6.

6. Conclusion and discussion of results

In this section we first summarize our findings regarding: a) external referencing to articles in which the authors adapt and use sensemaking theory as a central construct in the theoretical framework, and b) the

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[2] A potential source of error is citations appearing in articles published by IS scholars in non-IS journals, as it can be argued that such citations are not truly external to the IS discipline. We identified 21 citations of this kind. If we correct our citation numbers for these, the total number of citations is then 769, with 189 of these appearing in non-IS journals, meaning that 24.6% appear in non-IS journals. However, we decided to follow the procedure of Wade et al. (2006), who did not correct their sample for citations of this kind.

Table 3
Summaries of theory use in the articles in sample C.

Authors	Use of theory
Boersma and Kingma (2005)	The theory is used to explain the mutual shaping of technology and organizational culture during the restructuring of an Enterprise Resource Planning (ERP) system within a manufacturing company.
Boland and Greenberg (1992)	The theory is used to analyze if information systems analysts interpret the same situation differently and operate on it differently. The study explores their language use to reveal how the schema used in the analysis shaped the formulation of problems and the choice of action.
Bondarouk (2006)	The theory is used to build a framework in order to conceptualize the role of user interaction in IT implementation processes. The framework is then used to explain group learning in three case studies.
Butler and Gray (2006)	The theory is used to explain the efforts to achieve individual and organizational reliability in complex and surprising environments by drawing from the theoretical concept of mindfulness.
Ciborra (1999)	The theory is used to explain improvisation as an alternative approach to cope with time in business and to increase the chance of making sense of complex situations.
Ciborra and Lanzara (1994)	The theory is used to propose an interpretive vocabulary for helping systems' designers and organizational actors to deal with ambiguous and interactive setting. A framework for "designing-in-action" is developed.
Davidson (2002)	The theory is used to build a socio-cognitive process model which is used to analyze how participants in requirement determination processes make sense of contextual information and what implication this has for possible requirements.
Gosain (2004)	The theory is used for developing a theoretical model of enterprise information systems as objects of institutionalizing forces. The model is used to explain how enterprise information systems constrain organizational activities and the cognitive frames of organizational members.
Hirschheim and Newman (1991)	The theory is used to explain why IS development is not a normative process reflecting conventional economic rationality. Symbolism is presented as important in the development of IS to describe and explain the behavior of developers and users in ISD processes.
Jasperson et al. (2005)	The theory is used to build a conceptual model of post-adoptive behavior, which explains the relation between cognition and action in post-adoptive IT behavior focusing on technology management.
Kirsch and Beath (1996)	The theory is used to examine how user participation is enacted in practice and to explain why those enactments result in particular project outcomes. Three patterns of user participation are presented.
Kydd (1989)	The theory is used to analyze why failure to address uncertainty and equivocality during development and implementation of new management information systems may lead to failing projects. Management tools to reduce uncertainty and avoid equivocality are presented and evaluated.
Lim and Benbasat (2000)	The theory is used to construct hypotheses and to analyze how to capture and present information using a variety of representation formats so that members of an organization can make better sense out of the information available.
Majchrzak et al. (2005)	The theory is used to analyze how IT can support an individual's communication of context in order to develop collaboration know-how to work effectively with other members of a team.
Ramiller (2001)	The theory is used to analyze five images of information systems practitioners' use of language and how they promote rationality in identifying emerging opportunities for organizational innovation through information technology.
Scott and Barrett (2005)	The theory is applied in the analysis of a period of strategic crises at the London International Financial Future and options Exchange, and subsequently to develop an empirically grounded form of sensemaking called strategic risk positioning.
Swanson and Ramiller (2004)	The theory is used to analyze organizational innovation with information technology through the use of the concepts of mindfulness and mindlessness.
Tan and Hunter (2002)	The theory is used to explain a cognitive mapping technique. This technique is discussed in relation to IS, considering its strengths and weaknesses and its underlying theory.
Vaast and Walsham (2005)	The theory is used to analyze what makes agents transform how they work with IT and how these transformations may be shared among members of the same work group. The study presents a conceptual framework to relate actions and representations to practice change.

adaptation and use in IS research of a theory borrowed from another discipline. Finally, we discuss what the findings indicate about the IS discipline's prospects in becoming a reference discipline.

Our examination of the referencing to the 19 articles that adapt and use sensemaking theory as a central construct in their theoretical framework shows that 26.6% of the citations come from articles published in non-IS journals. When compared with Wade et al.'s (2006) finding that on average 15% of the citations of articles published in IS journals come from articles published in non-IS-journals, it appears that these 19 articles are remarkably more successful in attracting citations from outside the IS discipline, and therefore conclude that theory adaptation matters for external referencing. This conclusion is in line with Judge et al. (2007) conclusion, indicating that authors who conduct empirical studies that extend the theoretical base of existing literature will increase the number of times their work is used by others.

Table 4
Application domains for the articles in sample C.

Application domain	Authors
Information systems management processes	Ciborra (1999)
	Ramiller (2001)
	Tan and Hunter (2002)
	Boersma and Kingma (2005)
	Majchrzak et al. (2005)
	Scott and Barrett (2005)
	Butler and Gray (2006)
Information systems development processes	Kydd (1989)
	Hirschheim and Newman (1991)
	Ciborra and Lanzara (1994)
	Kirsch and Beath (1996)
	Davidson (2002)
	Swanson and Ramiller (2004)
	Jasperson et al. (2005)
	Vaast and Walsham (2005)
	Bondarouk (2006)
Information systems development concepts	Boland and Greenberg (1992)
Representations in information systems	Lim and Benbasat (2000)
Application systems	Gosain (2004)

If a borrowed theory is adapted and used as a central construct in the theoretical framework, there is, on average, a larger audience to IS research outside the IS discipline; we thus assess that the IS discipline's prospects in becoming a reference discipline look rather promising and that the possibility of bringing the IS discipline closer to the status of being a reference discipline is closely related to a stronger commitment to theory adaptation among IS scholars — in other words, to what has been described as "better use of theory" (King & Lyytinen, 2004; Truex et al., 2006).

Unfortunately, our review of the borrowing of sensemaking theory by IS scholars shows that only 19 out of the 323 articles in our sample A adapt and use sensemaking theory as a central construct in the theoretical framework; it thus appears that theory adaptation in the form proposed by Truex et al. (2006) does not occur regularly in the IS discipline. While many IS scholars seem to find that sensemaking theory can inform their research, only few clarify its theoretical or methodological implications or explanatory power.[3] Apparently, many IS scholars write about sensemaking without further explanation of the theory, and thus, in IS research the use of the theoretical construct of sensemaking is often uninformed by substantial theoretical consideration. This can be regarded as a confirmation of Baskerville and Myers (2002) observation that foremost IS research focuses on empirical phenomena, whereas theory development is of less interest; thus, it is quite likely that in IS research the theory is not adapted with the aim of theory construction, which is what generates more citations (Judge et al., 2007).

From above, it follows that there is room for improvement with regards to theory adaptation in IS research. Yet, when looking at the history of the IS discipline, such a change in behavior might not come about easily, as extensive borrowing of theories from other disciplines has been encouraged since the early days of the IS discipline when Keen (1980) suggested that IS scholars should borrow theories from more mature disciplines. While this might have been a viable research strategy in the formative years of the IS discipline,[4] it can be counterproductive for the IS discipline's prospects in becoming a reference discipline, particularly because exploration of new theories typically happens at the expense of exploitation of specific theories. When scholars operate in an explorative mode and constantly pick up new theories, there is a risk that they will "produce more junk than jewels" (Augier, March, & Sullivan, 2005, p. 93). In sum, we find that there is reason to agree with Truex et al. (2006), who express "concern over the negative impact that

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[3] It is worth noting that other disciplines struggle with similar issues. Tsui (2009), for example, mentions that Chinese management scholars "tend to apply theories without a 'native understanding of the borrowed theory' — including its 'historical roots' and 'contemporary treatments' (Whetten, 2009, p. 46)".

[4] As another example, Hambrick and Chen (2008) show that the field of strategy management successfully borrowed from economics in its formative years.

Table 5
Web of science citations of the articles in sample C[a].

#	Articles in sample C	Total number of citations	Citations in IS	Citations in organization studies	Citations in management	Citations in engineering	Citations in library & information science	Citations in other disciplines[b]
1	Boersma and Kingma (2005)	9	6	0	0	0	0	3
2	Boland and Greenberg (1992)	9	5	1	1	0	0	2
3	Bondarouk (2006)	6	5	0	0	0	0	1
4	Butler and Gray (2006)	25	18	2	3	0	0	2
5	Ciborra (1999)	43	29	4	4	2	1	3
6	Ciborra and Lanzara (1994)	54	38	4	4	2	0	6
7	Davidson (2002)	53	43	2	2	2	0	4
8	Gosain (2004)	30	28	1	0	0	1	0
9	Hirschheim and Newman (1991)	83	67	2	0	2	2	10
10	Jasperson et al. (2005)	152	114	2	16	7	5	8
11	Kirsch and Beath (1996)	20	18	0	1	0	1	0
12	Kydd (1989)	17	11	1	1	0	1	3
13	Lim and Benbasat (2000)	50	33	1	3	2	5	6
14	Majchrzak et al. (2005)	40	24	5	5	1	2 (1)	3
15	Ramiller (2001)	8	7	0	1	0	0	0
16	Scott and Barrett (2005)	7	7	0	0	0	0	0
17	Swanson and Ramiller (2004)	106	79	4	10	2	1	10
18	Tan and Hunter (2002)	48	40	1	2	0	5	10
19	Vaast and Walsham (2005)	30	18	7	0	0	1	4
	Total	790	580	37	53	20	25 (1)	75

[a] The search was performed using Web of Science's Cited Reference Search function on November 19, 2012.
[b] Other disciplines include: Accounting, Communication Studies, Economics, Educational Studies, Ethics, Marketing, Psychology, etc.

uninformed borrowing of external theories has on our field." We therefore note that unless IS scholars change their theory adaptation behavior, the prospects for the IS discipline to become a reference discipline do not look very promising.

7. Limitations and directions for future research

We do acknowledge that the present study has limitations that should be addressed. As we have not compared theory adaptation from any other disciplines besides IS, there is no data as to whether theory adaptation in other disciplines is similar to that in IS or not. We also acknowledge that by solely examining the adaption and use of one theory in IS research, we cannot verify that similar findings would have been obtained if a different theory had been chosen.

Table 6
Robustness of our findings regarding citations from outside the IS discipline.

Description	Number of citations	Number of citations from outside the IS discipline	Percentage of citations from outside the IS discipline
Sample without articles with the three highest and lowest percentage of citations from outside the IS discipline	654	174	26.6%
Sample without articles with the three highest and lowest total number of citations	428	127	29.7%

In line of this reasoning we are not suggesting that theory adaptation is the only or the best way to obtain higher citation counts in other fields and we are not suggesting that IS scholar are incapable of inventing new theories with the potential of being well cited by scholars from other disciplines. Thus, future research should examine whether similar consequences of theory adaptation can be observed for other major theories borrowed by IS scholars and whether theory adaptation is the same in other disciplines as our results show for IS.

In spite of these limitation, we do believe that our findings show that theory adaptation matters for external referencing to the IS discipline, and IS scholars participating in the reference discipline debate should therefore pay attention to theory adaptation as a factor that influences the likelihood that IS scholars will produce research that scholars from other disciplines regard as valuable and worth referencing in their own research. With regard to future research, we therefore hope that the insights generated in this paper will inspire IS scholars to continue the investigation of the role of theory adaptation in the making of reference disciplines, possibly by formulating and testing hypotheses concerning this issue. Such research will be important because it is likely to lead to more detailed insights about the relevance of informed use of theory as well as the status of the IS discipline. Finally, it is worth noting that by looking at one factor, theory adaptation, which influences the number of citations that articles receive from outside their discipline of origin, the present study has only opened the black box of scholars' citation behavior. In order to acquire more knowledge about this phenomenon and attempting to get closer to an understanding of the emergence of reference disciplines, future research must investigate, potentially in qualitative surveys, why authors from other disciplines decide to reference specific articles.

Acknowledgments

Appendix A. Eight proposals on how to stimulate external referencing of IS research

Proposed Initiatives	References
Publish IS research in journals from other academic fields or focus on co-publication with scholars from other research fields in, for example, joint special issues	Lee, 1991; Baskerville & Myers, 2002
Make sure that IS research is readily accessible to scholars in other fields	Baskerville & Myers, 2002
Attend other areas' conferences and encourage scholars from other fields to attend IS conferences	Benbasat & Zmud, 2003
Improve the IS discipline external relevance by establishing a core body of knowledge in the discipline	Hirschheim & Klein, 2003
Increase the quantity of articles in leading IS journals	Wade et al., 2006
Promote systems thinking	Wade et al., 2006
Constantly strive for quality	Lucas, 1999
Accept and embrace pluralism	Galliers, 2003

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