

SEEKING THE “VALUE” IN IS BUSINESS VALUE RESEARCH - AN AGENDA FOR INVESTIGATING SYNERGIES BETWEEN SOCIO-ORGANIZATIONAL CHANGE, IS CAPABILITIES CHANGE, AND IS INNOVATION

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Abstract

The business value of investments in Information Systems (IS) has been, and is predicted to remain, one of the major research topics for IS researchers. However, the fundamental question of the causal relationship between IS investments and firm performance still remains unexplained. We argue that this lack of causal explanations is one of the main reasons why the IS community still lacks a theory on IS business value. We further argue that deficiencies in research on synergies between socio-organizational change, IS capabilities change, and IS innovation take a responsible part in this regard. In order to re-activate researchers' interest and activities in the central field of IS business value, this article provides a fresh, techno- and socio-organizational perspective on the question of how IS create business value. In particular, the contribution of this paper is the provision of a condensed literature review, the identification of research gaps, and the suggestion of a research agenda, including research thrusts and related research paths.

Keywords: IS business value, Research agenda, Intangibles, Literature review, Socio-organizational capabilities, IS capabilities

1 Introduction

The business value of investments in Information Systems (IS) has been, and is predicted to remain, one of the major research topics for IS researchers (Dehning et al., 2004). Particularly challenging for the IS community is the fact that researchers have provided rather sobering arguments against the economic relevance of IS. For example, Hitt and Brynjolffson (1996) doubt the strategic power of IS and argue that IS are commodities and that any IS-based advantages will soon be eroded. Another discourse is rooted in empirical studies that do not find evidence of IS positively affecting specific performance measures, such as productivity (Ko & Osei-Bryson, 2004; Stiroh & Botsch, 2007), stock market reactions (Dos Santos et al., 1993; Im et al., 2001), or “Return on Assets” (Rai et al., 1997). Baker et al. (2008) argue that the fundamental question of the causal relationship between IS investments and firm performance still remains unexplained. We hypothesize that the lack of causal explanations is one of the main reasons why the IS community still lacks a theory on IS business value (among the many theories listed on the AIS website (Schneberger & Wade, 2010) no theory on IS business value is provided). In particular, we argue that deficiencies in research on synergies between socio-organizational change, IS capabilities change, and IS innovation take a responsible part in this regard.

Despite this epistemological deficiency in IS business value research, the numbers of IS business value papers published in pertinent academic outlets declined after a publication peak in 2000. In particular, the journals *MISQ*, *ISR*, *JMIS*, and *EJIS* have published overall only five articles on IS business value after 2005. We hypothesize that this decreasing attention of IS business value is not rooted in any decreasing interest of editors and reviewers of these journals, but is based on declining activities of researchers in this field. In order to re-activate researchers’ interest and activities in the central field of IS business value, this article provides a new, techno- and socio-organizational perspective on the question of how IS investments create business value. In particular, the contribution of this paper is the provision of a condensed literature review, the identification of research gaps, and the suggestion of a research agenda, including research thrusts and related research paths.

The remainder of this paper is structured as follows: The next section synthesizes key research findings, before Section 3 identifies research gaps. Section 4 suggests a detailed agenda for future IS business value research. We conclude our paper in Section 5 with a discussion of our results and the limitations of our paper.

2 Related Work

Reviewing the body of literature on IS business value research (for a more detailed discussion, see Subsection 3.1) reveals that this field is dominated by empirical studies (Chan, 2000; Chen & Hwang, 1991; Pare et al., 2008) and econometric approaches, the “ex post” perspective, the adoption of variance theories in contrast to process theories (Markus & Robey, 1988; Pare et al., 2008; Sircar et al., 1998; Soh & Markus, 1995), a firm-level perspective (Chau et al., 2007; Pare et al., 2008; Wan et al., 2007), the analysis of firm performance in terms of productivity, market performance, and financial performance, and the consideration of the complementary influence of contextual factors and lag effects. Several IS business value models based on various theories are proposed; for example, Dedrick (2003) suggests a measurement-based model, Dehning and Richardson (2002) suggest a production-oriented model, Melville et al. (2004) proposes a model based on the resource-based view, and Soh and Markus (1995) suggest a process-oriented model.

Key findings of the literature (Schryen, 2010) include the following results¹:

¹ A complete list of the following references is provided on the website of the author (http://www-users.rwth-aachen.de/guido.schryen/publications/References_ECIS2011.pdf) and can also be retrieved on request (schryen@gmx.net).

- Performance Measures: Many researchers empirically investigated economic measures, including productivity, consumer welfare, various profit ratios and market-oriented measures (Brynjolfsson and Hitt 1996, Barua et al. 1995, Thatcher and Oliver 2001, Thatcher and Pingry 2004, Barua et al. 1995, Bharadwaj et al. 1999). Widely adopted classifications are (1) the model of DeLone and McLean (DeLone and McLean 1992, Seddon 1997, DeLone and McLean 2003) and (2) the classification that distinguishes between process performance and firm performance (Barua et al. 1995, Dehning and Richardson 2002, Melville et al. 2004). The impact of IS investments on firm performance is intermediated by process performance (Barua et al. 1995, Dehning and Richardson 2002, Kim et al. 2006, Lee et al. 2004, Melville et al. 2004, Mooney et al. 1995, Shin 1997, Soh and Markus 1995).
- Productivity: Early studies did not find a positive correlation between IS and productivity at firm level, industry level or economy level (Brynjolfsson and Yang 1996, Baily 1986, Jorgenson and Stiroh 1995, Roach 1987, Berndt and Morrison 1995, Roach 1991, Loveman 1994). More recent studies draw a more positive picture on the impact on productivity: the productivity paradox has been resolved at the firm level, and major impact of IS investments on national productivity and economic growth have been identified (Aral et al. 2007, Brynjolfsson and Hitt 1996, Kelley 1994, Lin and Shao 2006a, Neirotti and Paolucci 2007, Menon et al. 2000, Shin 1997, Stiroh 2002, and Swierczek and Shrestha 2003, Devaraj and Kohli 2000, Dedrick et al. 2003, Jorgensen 2001, Jorgenson and Stiroh 2000, Oliner and Sichel 2000).
- Market performance: No positive correlation between IS investments and Total Shareholder Return (TSR) has been identified (Tam 1998, Brynjolfsson and Hitt 1996). The impact of IS investments on stock market reactions is largely determined by the particular type of IS (Dos Santos et al. 1993, Im et al. 2001, Richardson and Zmud 2002). Positive correlation between IS investments and Tobin's q have been observed (Bharadwaj et al. 1999, Brynjolfsson and Yang 1999, Brynjolfsson et al. 2002).
- Financial performance: IS investments positively affect Return on Sales (Bharadwaj 2000, Kim et al. 2009, Santhanam and Hartono 2003, Zhang 2005) and Operating Income to employees (Bharadwaj 2000, Santhanam and Hartono 2003). Positive impacts on Return on Assets (Bharadwaj 2000, Hitt and Brynjolfsson 1996, Kim et al. 2009, Peslak 2003, Rai et al. 1997, Santhanam and Hartono 2003, Stratopoulos and Dehning 2000, Tam 1998) and Return on Investment (Hayes et al. 2001, Mahmood and Mann 2005, Peslak 2003, Stratopoulos and Dehning 2000) could be observed. Return on Equity seems to depend largely on lag effects, contextual factors and the level of IS investments compared to total assets (Alpar and Kim 1990, Beccalli 2007, Peslak 2003, Rai et al. 1997, Shin 2006, Stratopoulos and Dehning 2000).
- Contextual factors: Contextual factors can be divided into firm, industry, and economic factors (Barua et al. 1996, Bharadwaj 2000, Davern and Kauffman 2000, Dehning and Richardson 2002, Ko and Osei-Bryson 2004, Melville et al. 2004, Zhu et al. 2004). The alignment of IS with a firm's core competencies and business planning, and close ties between IS investments and upper management are crucial for enhanced firm performance (Chari et al. 2008, Dos Santos et al. 1996, Floyd and Wooldridge 1990, Li and Ye 1999, Ravichandran and Lertwongsatien 2005). Industry factors (Lin and Shao 2006a, Sircar et al. 2000, Lim et al. 2004, Melville et al. 2007) and macro-economic factors (Kim et al. 2009, Swierczek and Shrestha 2003 and Zhu et al. 2004) are addressed only rarely.
- Lag effects: The mismeasurement of IS investment impact may be rooted in the ignorance of effects delayed by years (Kauffman and Weill 1989, Stiroh 2002, Weill and Olson 1989, Brynjolfsson and Hitt 1998, Jain 2005, Mahmood and Mann 2005, Santhanam and Hartono 2003).

3 IS business value creation process as black box

Despite the large body of literature on IS business value, including many empirical studies on the economic impact of IS investments, dissenting voices on IS value (Hitt & Brynjolfsson, 1996; West & Courtney, 1993) show that IS researchers have not fully managed to identify and to explain the

economic relevance of IS. In fact, the literature reveals inconclusive and conflicting results in many areas, including correlations between IS investments and productivity, market performance, and financial performance. Overall, after many years of research it seems that the contribution and importance of IS regarding the creation of various forms of business value still remains a black box.

We hypothesize that the existence of the black box is largely rooted in the fact that past research on IS business value has underemphasized increasingly important research areas and questions, more specifically (1) how to get a consistent and comprehensive understanding of the complex “IS business value construct”, and (2) how, why, and when IS assets create capabilities with which they jointly create and preserve business value.

3.1 Ambiguity and fuzziness of the “IS business value” construct

Having analyzed a substantial body of literature on IS business value, it seems that the discussion of IS business value frays into many lines of thought in various directions by contemporaneously losing track of the “IS value construct”. What makes it extremely challenging to catch IS business value comprehensively are the facts that “*IS-based value manifests itself in many ways*” (Kohli & Grover, 2008, p. 26) and that it also manifests in ways that are hard to measure with quantitative indicators. For example, Avgerou (2001) argues that the value of (interorganizational) IS should also be seen regarding its contribution to secure the competitive position of a firm by protecting resources. Also, the importance of product and service innovations induced through IS is highlighted in the literature (Aral & Weill, 2007; Zammuto et al., 2007). While resource protection and product and service provision are market-oriented capabilities that are assumed to have a direct impact on the strategic position of a firm, internal capabilities (sometimes referred to as “intangibles”) created through IS are deemed important parts of IS business value as well (Bannister & Remenyi, 2000; Oz, 2005; Irani & Love, 2001; Devaraj & Kohli, 2000). For example, implications of IS use at the individual level and capabilities and knowledge at the organizational level (Kohli & Grover, 2008), such as redesigned business processes, better decision-making, and improved coordination flexibility (Soh & Markus, 1995), may have either an intermediate, a delayed, or a hidden impact on performance that is measured by traditional economic indicators. However, only few researchers (Tambe & Hitt, 2010; Barua et al., 1995) have empirically addressed intangible benefits in their empirical studies. Apparently, it has either not been widely acknowledged or at least underestimated in the IS business value community that intangibles must not be overseen when IS business value is addressed. The neglect of intangible benefits leads to the underestimation of the overall economic benefit of IS investments, as Davern and Wilkin (2010) note. Consequently, we argue that a systemization of intangibles should be included when we theorize on the IS business value construct.

To sum up deficiencies in research on the ambiguity and fuzziness of the “IS business value” construct, we argue that our future efforts to develop a consistent and comprehensive understanding of the complex “IS business value construct” should account for a) linkages between different types of performance, b) market-oriented capabilities that go beyond hard indicators, and c) various types of internal capabilities (intangibles).

3.2 IS capabilities and socio-organizational capabilities as complementarities

Our analysis of the literature shows that the majority of both theoretical and empirical research papers on IS business value is concerned with quantifying the impact of IS investments on various forms of performance. This perspective is output-oriented, allows to identify correlations between IS inputs and economic performance, and is capable of answering the question *what* IS has induced. As the results of this research stream are partially conflicting, researchers are interested to explore the reasons of the divergent results. However, the output-oriented perspective does not provide explanations for the divergence in economic performance as it does not allow analyzing how, why, and when IS investments create business value. As Sircar (1998) notes, the analysis of the impact of IS on selected

outputs suffers the problem that firm performance is also simultaneously affected by a host of other external and internal factors, making it exceedingly difficult to isolate the influence of IT alone and to develop causal relationships.

Researchers have started addressing the “how” and “why” questions in multiple ways. One stream of research conceptualizes and investigates (the mediating role of) intangible benefits (Bannister & Remenyi, 2000; Oz, 2005; Irani & Love, 2001; Devaraj & Kohli, 2000). A second stream acknowledges the importance of complementarities, in particular IS capabilities (Aral & Weill, 2007) and socio-organizational capabilities (Aral & Weill, 2007; Avgerou, 2001; DeSanctis & Poole, 1994; Leonardi, 2007; Mutch, 2010; Orlikowski, 1996; Pinsonneault & Kraemer, 2002; Rowe, 1994; Whittington et al., 1999; Zammuto et al., 2007). It acknowledges the existence of time-variant relationships between complementarities and IS. This perspective is mirrored in the conceptualization of IS innovation processes and socio-organizational changes. However, the discussion of the complementarities of IS assets, IS capabilities, and socio-organizational capabilities is fragmented and produces conflicting results. For example, the existence of interdependencies between IS innovation and socio-organizational capabilities is stressed in many of the above mentioned works, which state a symbiotic relationship (Zammuto et al., 2007), while others, such as Avgerou (2000), adopt an institutionalization perspective and argue that “*IT innovation proceeds in a self-fulfilling manner, relying mainly on its own institutional forces.*” (p. 242) Also, the relationship between IS capabilities and socio-organizational capabilities has been addressed only rarely; see, for example (Rai & Tang, 2010). While the literature widely agrees that IS assets and complementary capabilities affect each other and should thus not be investigated separately, the particular relationships and their roles in the value generation process remain unclear.

Acknowledging the importance to consider relationships between IS assets and firms’ capabilities, the question arises how the complementarities co-create business value in terms of various competitive goals, such as the protection of resources (Avgerou, 2001), innovations, and market performance. We see some fragmented discussion of this important issue in the literature. For example, Dedrick et al. (2003) find that IS is an enabler of organizational changes that can lead to additional productivity gains, which can in turn lead to lower product prices and an increased market share. Aral and Weill (2007) argue that investments in specific IS assets explain performance differences only along dimensions consistent with their strategic purpose. Bhatt and Grover (2005) state that the quality of IS business expertise can form capabilities that have a significant effect on competitive advantage.

Overall, the value creation process in terms of how and why IS assets and organizational capabilities are transformed into competitive strength remains unclear. It also remains unclear when competitive value can be created. For example, Rowe (1994) argues that competitive value can be created in specific periods only, but the literature does not provide many contributions on this issue. Gaining insights into this subfield is of particular importance for practitioners and also for scholars, who discuss the competitive advantage of IS highly controversially (Piccoli & Ives, 2005; West & Courtney, 1993; Hitt & Brynjolfsson, 1996; Bhatt & Grover, 2005).

To sum up, while the literature provides some streams of research on how, why and when IS co-create business value jointly with IS and socio-organizational capabilities, the business value creation process is still a black box (epistemological issue). We hypothesize that the lack of causal explanations is one of the main reasons why the IS community still lacks a theory on IS business value. Our argument is based on the understanding that a theory includes an explanatory component (Dubin 1978, Whetten 1989). For a classification of IS theories, see (Gregor 2006).

4 Research Agenda

Based on the identified deficiencies in IS business value research, we suggest a research agenda that accounts for the deficiencies and suggests research paths for overcoming these deficiencies. Figure 1 shows a graphical representation of the research agenda, which is being detailed into research thrusts and related research paths.

4.1 Ambiguity and fuzziness of the “IS business value” construct

The identification of research deficiencies reveals that the object of investigation, the “IS business value construct”, has been defined neither precisely nor comprehensively, which resulted in ambiguity and fuzziness of IS business value. Accounting for our observation that the discussion frays into too many lines of thought by contemporaneously losing track of the “IS business value construct”, we define

Research thrust 1: How can we yield a comprehensive, consistent, and precise understanding of the multi-faceted construct “IS business value”?

To study this question, we need to disaggregate and operationalize the multi-faceted construct “IS business value”. Important steps toward a profound understanding of IS business value are (1) the identification and precise definition of value items (phenomena in which value manifests), and (2) taxonomies that help structuring the many various value items and their linkages. For each value item, we need suggestions on how to measure it, be it at ordinal or cardinal scale level. We suggest two different starting points for these tasks: First, we can identify many value items when we analyze the literature regarding methodologies applied to investigate IS business value. For example, the work of Bannister and Remenyi (2000) categorizes an abundance of methodologies, which are related to value items. A second stream is to inspect the literature regarding internal capabilities (intangibles, such as redesigned business processes and improved coordination flexibility) (Bannister & Remenyi, 2000; Soh & Markus, 1995; Irani & Love, 2001; Devaraj & Kohli, 2000), categorized in to IS capabilities and socio-organizational capabilities, and regarding market-oriented capabilities, including the protection of resources, innovations, market performance and accounting performance.

4.2 IS capabilities and socio-organizational capabilities as complementarities

Our review of the literature reveals that researchers, particularly those drawing on (socio-) organizational theories, identified IS capabilities and socio-organizational capabilities as complementarities, which mediate the impact of (investments in) IS assets in supporting the competitive goals of a firm (Aral & Weill, 2007; Rowe, 1994; DeSanctis & Poole, 1994; Avgerou, 2001; Mutch, 2010; Orlikowski, 1996; Rai & Tang, 2010). We thus distinguish intangible value (complementarities) from competitive value, which is directly market-oriented (e.g., protection of resources, innovations, market share). Analyzing the former, we find that the process of generating intangible value, based on the relationships between IS assets and various complementarities, has not been explored sufficiently. Being consistent with Zammuto et al. (2007) and Orlikowski and Iacono (2001), we argue that these relationships are not static and can thus be explained more appropriately when accounting for time-variant changes. Consequently, we suggest a perspective that accounts for both static and dynamic aspects.

Research thrust 2: How, why, and when do IS assets, IS capabilities and socio-organizational capabilities affect each other and jointly create intangible value?

To study this research question, we need to conceptualize how capabilities can manifest as intangible values and to explain interdependencies between IS assets, IS capabilities, and socio-organizational capabilities in terms of their mutually reinforcing character. Regarding the conceptualization of IS capabilities, we find the approach of Aral and Well (2007) useful, who draw on the work of Nelson and Winter (1982) and distinguish IS competencies (IS skills and IS management quality) and IS practices (culture of IS use) as “interlocking systems” that complement IS, based on the RBV and evolutionary economics. Future research would need to investigate how competencies and practices influence each other and how these IS capabilities develop over time (IS capabilities change).

In addition to IS-related organizational capabilities, other socio-organizational capabilities have been intensively discussed in the context of IS and organizational research

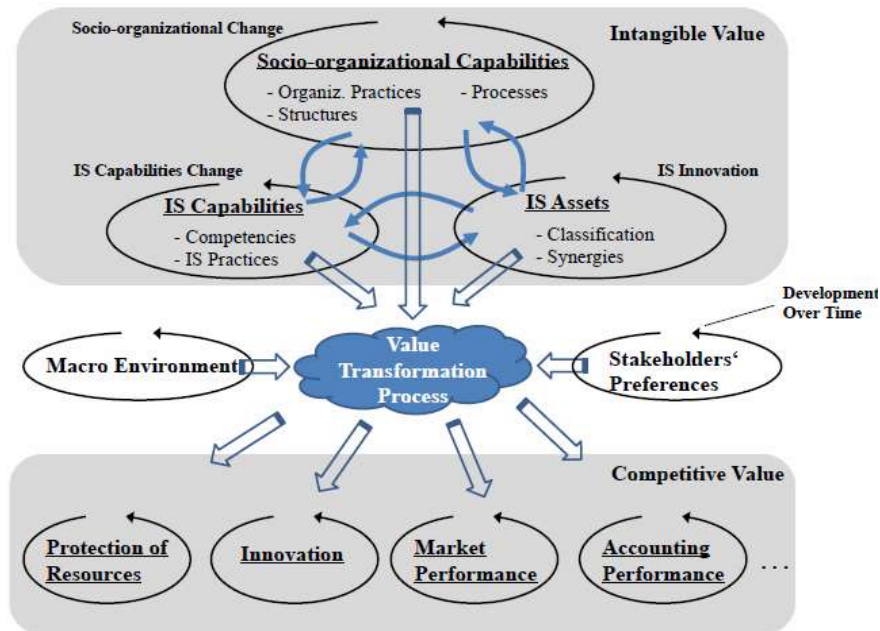


Figure 1. IS Business Value Research Agenda

(Bannister & Remenyi, 2000; Oz, 2005; Irani & Love, 2001; Devaraj & Kohli, 2000; Aral & Weill, 2007; Avgerou, 2001; DeSanctis & Poole, 1994; Leonardi, 2007; Mutch, 2010; Orlikowski, 1996; Pinsonneault & Kraemer, 2002; Rowe, 1994; Whittington et al., 1999; Zammuto et al., 2007). Important parts are deemed (intra- and interorganizational) processes, practices, and structures, all of which develop over time, thereby creating socio-organizational change. However, research has been remarkably silent on the questions how and when socio-organizational change induces changes in IS capabilities and vice versa (we found only the work of Rai and Tang (2010) in this regard).

In contrast, a substantial body of contributions addresses the relationship between socio-organizational capabilities and IS innovation. If we regard the latter as a construct that models time-variant dynamics of IS assets in order to account for the fact that different assets are subject to different speeds of IS innovation (Whyte, 2010), we can conceptually merge the static perspective on IS assets with the dynamic perspective on how their development (IS innovation) interact with socio-organizational capabilities (see Figure 1). This interaction has been studied intensively, but it needs further attention due to conflicting results: A substantial body of research attests a symbiotic relationship between IS innovation and socio-organizational change (Zammuto et al., 2007; Whittington et al., 1999; Rowe, 1994; Leonardi, 2007; Aral & Weill, 2007; Orlikowski, 1996; Avgerou, 2001; Orlikowski & Walsham, 1996), which is consistent with results from various streams and concepts of socio-technical research, including the duality of technology (DeSanctis & Poole, 1994; Daft, 1978; Orlikowski, 1992), actor networks (Callon, 1991), and social constructionism (Bijker & Law, 1992). Avgerou (2001) provides a good overview of this research and stresses that value creation is a social construction. In contrast, another stream of research questions the symbiotic relationship. For example, Avgerou (2000) adopt an institutionalization perspective and find empirical evidence that “[i]t is misleading to consider IT an enabler to or a result from the efforts of organizational change. [...] IT innovation proceeds in a self-fulfilling manner, relying mainly on its own institutional forces.” (p. 242) Based on a case study, the author argues that IS has become a “rational myth”. Another issue that questions the symbiotic relationship between IS innovation and socio-organizational change is related to organizational structures. While some studies find that IS innovation has been associated with the emergence of new organizational forms replacing the hierarchical bureaucratic structure (Bjorn-Andersen & Turner, 1994), Applegate (1994) reports that her continuing research on IS and organizational forms suggests the persistence of the hierarchical structure, rather than its replacement.

Future work needs to resolve the aforementioned contradictions and to clarify the relationship between IS innovation and socio-organizational change. We argue that such research would need to differentiate the relationships between the various types of IS assets and socio-organizational capabilities (practices, intra-organizational processes, inter-organizational processes, and structures), and to consider the development of these relationships over time. The classification of different types of impact may follow the differentiation of Pinsonneault & Kraemer (2002), who distinguish the “facilitate effect” and the “cause effect”.

Finally, the relationship between IS innovation and IS capabilities change has not received much attention in the literature although both are considered key components in accomplishing organizational tasks (Aral & Weill, 2007). The importance of analyzing the relationship becomes evident when we draw on the RBV and argue that the actual benefit of IS assets is not their pure availability in a firm as IS assets can become commodities rapidly, but their much more difficult to imitate interplay with capability development and learning opportunities tied to firms’ specific asset positions (Dierickx & Cool, 1989). We suggest focussing this relationship in future research.

Beyond the explanation of how internal capabilities and intangible value are created, IS business value research must account for how competitive value is co-created through IS and intangible values. As the discussion of IS value generation in the previous section reveals, the literature acknowledges that this effect is substantial and can result in competitive value that manifests in many ways, including the protection of resources, innovations (e.g., protected through patents), market performance and accounting performance. However, research still lacks an explanatory component of this phenomenon.

Research thrust 3: How, why, and when do IS assets, IS capabilities, and socio-organizational capabilities jointly create competitive value, thus performing a value transformation process?

This research thrust will require explaining how specific types of competitive value are supported or even caused by various IS assets and intangible value items. One interesting research path is to validate the hypothesis of Aral und Weill (2007), who state that “*[f]irms’ total IT investment is not associated with performance, but investments in specific IT assets explain performance differences along dimensions consistent with their strategic purpose*”. (p. 763) While the authors regard strategies at a high level, we argue that this phenomenon should also be studied at a more concrete level. For example, if acquiring and protecting access to information resources, such as media content, real-time stock data, or technical information on suppliers’ products, is a key success factor for sustaining a firm’s competitiveness, then investments in inter-organizational information systems and the development of capabilities to integrate them in business processes seem reasonable. To address this research subfield, future research may draw on the “Resource Dependence Theory” (Pfeffer & Salancik, 1978), which has not drawn much attention in IS business value research. We suggest that this strategic-oriented perspective on IS be complemented with research efforts in the field of IS governance, which deals with the strategic alignment of business and IS and which has recently started getting attention by scholars (Ali & Green, 2009).

A more general perspective on the research thrust offers the “Resource-based View” (Barney, 1991; Wernerfelt, 1984), which argues that durable competitive advantage emerges from unique combinations of resources (Grant, 1996) that are economically valuable, scarce, and difficult to imitate (Barney, 1991). Being consistent with Aral and Weill (2007), we argue that the impact of IS and complementing capabilities on a firm’s competitive position can be captured only if we investigate how both firms IS allocations and capabilities (Powell & Dent-Micallef, 1997) jointly contribute to building and sustaining resources. This (more comprehensive) perspective might resolve the alleged contradictory results on the strategic relevance of IS. As a consequence, even when IS assets are identified as imitable resources that are perfectly mobile across organizational boundaries, the bundle consisting of these assets and complementary capabilities may form a difficult-to-imitate resource.

We also need to acknowledge concerns regarding the durability of competitive advantages that are induced through such bundles. As in the case of intangible value, we argue that the perspective on competitive value, too, needs to account for time-variance and that such value is eroded over time,

depending on competitors' ability and speed with which IS assets and capabilities are imitated by competitors. Rowe (1994, p. 29) argues that "[...]competitive advantage can only be achieved during periods when there is uncertainty concerning technology and when organizational innovation is being introduced." We thereby question Grant's (1996) hypothesis of "durable competitive advantage" in the context of IS business value, and we argue that future research needs to investigate the time dimension of competitive value.

Finally, this research thrust will require analyzing which macro-economic factors (macro environment) need to be considered when we evaluate particular items value. For example, patents achieved through IS-induced innovation need to be assessed in the context of whether other competitors have been filed similar patents, what can be done with the granted patents with regard to competitive advantage, and whether national or supranational (e.g., European Union) laws or regulations have changed and thereby facilitated or impeded getting innovations patented. The research trust will also require distinguishing between performance and value: while indicators, such as productivity, ROA, and TSR, reflect states and objective outcomes, value is also what is perceived as advantage by a particular evaluator. In the context of IS business value, the evaluators are the various stakeholders, who have partially conflicting interest and thus divergent preferences (Tallon et al., 2000). From a theoretical perspective, researchers can draw on the concepts proposed in utility theory. It applies the concept of (subjective) preference functions, which map (objective) outcomes onto (subjective) utilities, which mirror evaluators' preferences.

5 Concluding Remarks

Accounting for enduring doubts about the value of IS investments, this paper aims at pushing forward research on IS business value by synthesizing existing knowledge, identifying research gaps, and proposing a research agenda. While the literature has generated substantial knowledge on performance measures, contextual factors, lag effects, and the impact of IS investments on productivity, financial performance, and productivity, results in these subfields have turned out to not sufficiently explain, how, why, and when IS investments create business value. In order to overcome these limitations, future research needs to resolve the ambiguity and fuzziness of the "IS business value" construct, and to open the black box of the IS business value creation process. Supporting researchers in this regard, we suggest a research agenda, including research thrusts and concrete research paths.

As one of the key challenges of future research we regard theory building and testing. To approach this goal, we regard it necessary to investigate causal relationships between capabilities, IS assets, and competitive value items. Such causal relationships are indicated through the arrows between item values in the graphical representation of our research agenda. We contemporaneously acknowledge that a theory on IS business value should help to explain dynamic phenomena. Thus, our research agenda also accounts for questions related to time-dependent relationships (indicated through the elliptic arrows in Figure 1). While the former research paths are aligned to variance theories, which incorporate independent variables that cause variation in dependent variables, the latter paths are linked to process theories, which target dynamic phenomena (Webster & Watson, 2002, p. xix). Our research agenda thereby accounts for the argument that "[...] many of the best theories are hybrids, combining the best qualities". (Newman & Sabherwal, 1991)

While we believe that the adoption of our research agenda supports researchers to address the identified lack of IS business value research, we also admit that our perspective has limitations. First, our research is intrinsically tied to the ex post, firm level perspective on IS business value. As a consequence, the derived research agenda is not adequate for combining research at different levels, as suggested in the literature (DeLone & McLean, 1992; Kohli & Grover, 2008; Pare et al., 2008). Second, the synthesis of literature findings (and the subsequent derivation of research deficiencies) is mainly based on journals (we searched the tables of contents of the journals MIS Quarterly, Communications of the ACM, Information Systems Research, Management Science, Journal of Management Information Systems, European Journal of Information Systems, Information Systems

Journal, Journal of AIS, Academy of Management Review, ACM Transactions on Information Systems, American Economic Review and Organization Science, considering the time period January 1995 until (04) December 2010) and databases (we performed a title search using the databases Business Source Premier, MLA International Bibliography, EconLit, ScienceDirect, IEEE Xplore, The ACM Digital Library and Web of Science, using the search string (“IT” OR “information technology” OR “IS” OR “information systems”) AND (“value” OR “investment” OR “productivity” OR “competitive” OR “performance” OR “measurement” OR “evaluation” OR “profit” OR “efficiency”) without any time constraints) that are related to the IS discipline and to organization science. We did not perform an in-depth investigation of the literature in other disciplines, such as sociology, psychology, and computer science.

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