Overview of The Business Value of IT Literature

Scholars in many fields have sought to rationalize and explain how investments in IT resources and capabilities by the firm, can affect performance, and potentially serve as sources of competitive advantage. Studies exist in the fields of MIS, Accounting, Economics, Management, Sociology, Psychology, Engineering, and Science to explore the roles and relationships between IT and the organization. However, in this study we will focus on what we can learn from prior research in the Strategy and MIS domains. Work in the MIS area on this topic is quite prevalent, with more than 200 studies documented in recent review articles (Kohli and Devaraj, 2003; Melville, Kraemer, and Gurbaxani, 2004; Piccoli and Ives, 2005). This body of work has employed micro economic, industrial organization, sociological, and more recently RBV perspectives in which to ground its research (Melville et al., 2004). However, scholars have recently also has suggested the need for consideration of transaction cost economics (TCE) (Williamson, 1975), and dynamic capabilities (DC) (Teece et al., 1997) perspectives (Melville et al., 2004). This suggests a strong fit with related work in Strategic Management and calls to address the roles of resources and capabilities in the firm and its performance (i.e. Hoopes et al., 2003). However, research on this topic in an IT context in the Strategic Management literature has been extremely limited. Here, such work tends to view IT investments as merely a means of improving the firm's competitive position (Powell and Dent-Micallef, 1997; Miller, 2003; Zott, 2003), or avoiding a competitive disadvantage (Mata, Fuerst, and Barney, 1995). Therefore, in this paper, we seek first to understand what MIS scholars studying the "business value of IT" have been accomplished and what they still seek to discover, and then look to the Strategic Management literature to see how theory developed there can further inform work on this topic and context.

The definition of the "business value of IT," in MIS research, is "the organizational performance impacts of IT at both the intermediate process level and the organization-wide level, and comprising of both efficiency impacts and competitive impacts" (Melville et al., 2004, p. 287). Collectively, this body of research continues to struggle with the issue of an "IT value paradox" in regards to the relationship between IT investments and firm performance (Kohli and Devaraj, 2003; Melville et al., 2004; Piccoli and Ives, 2005). Some studies find mixed results for the IT investment – performance relationship (Barua et al., 1995; Francalanci and Galal, 1998), while others find negative relationships (Loveman, 1994; Lee and Barua, 1999). Yet other studies find that IT gains might be largely subject to implementation issues (Brynjolfsson and Hitt, 1998; Mooney, Gurbaxani, and Kraemer, 1996). Further, other work also suggests that many prior studies may also be subject to measurement issues of the IT artifact as well as level of analysis problems (Bharadwaj, 2000).

Numerous recent review and meta-analysis type studies have appeared which attempt to discern some of the potential reasons for the observations across this body of work (e.g., Kohli and Devaraj, 2003; Melville et al., 2004; Piccoli and Ives, 2005). While these types of studies correctly identify many of the weaknesses and limitations of prior work on the business value of IT, we are still lacking a clear and effective explanation as to where, when, and how IT can support the firm and its performance. For example, most studies (e.g., Melville et al., 2004; Piccoli and Ives, 2005), simply assume IT is a source of sustainable competitive advantage (based on vague support in the RBV), without clearly establishing theoretically, or articulating how to support empirically, why and how IT affects firm performance in a persistent manner. Collectively, this body of research has made some substantial contributions to research on the relationship is between IT and firm performance. For example, these contributions include: 1) Clarifying the IT construct; 2) Defining the proper levels of analysis; 3) Identifying important performance mechanisms and mediating and moderating factors in the firm and its environment; 4) Suggesting the useful theoretical lenses for analysis; 5) Defining the performance constructs and potential measures; and 6) Developing the basis for conceptually modeling the business value of IT. These "central tenets" for studying the performance implications of IT for the firm are in the table below and discussed in further detail in the remainder of this section.

Table 1. Central Tenets for Studying the Performance Implications of IT

1) Correctly identify, define, and measure the IT construct:
- Construct should be limited to tool, proxy, ensemble, and/or nominal conceptualizations (Orlikowski and Iacono, 2001).
- Ensemble view is likely the most appropriate conceptualization for examining the roles of IT resources and capabilities in performance (Melville et al., 2004).

2) Distinguish between the process and firm levels:
- IT affects firm performance through intermediate business processes (Barua et al., 1995; Mukhopadhyay et al., 1995; Melville et al., 2004).

3) Consider the role of mediating and moderating endogenous and exogenous factors:
- IT will interact with, and be mediated through or moderated by, other resources and capabilities existing within the firm (Devaraj and Kohli, 2003; Melville et al., 2004; Piccoli and Ives, 2005).
- Relationships among IT, existing resources and capabilities, and a firm's business processes, with performance, will be affected by the external environment (Melville et al., 2004; Piccoli and Ives, 2005).

4) Establish theoretical mechanisms for the relationships among the elements of IT business value:
- Most assume the value of IT to be based upon the resource-based view (RBV) (Mata et al., 1995; Hitt and Brynjolfsson, 1996; Dewan et al., 1998; Melville et al., 2004; Piccoli and Ives; 2005; Ray et al., 2005).
- Need for consideration of TCE, and dynamic capabilities perspectives, in addition to RBV to better inform our understanding of the IT - performance relationship (Melville et al., 2004; Drnevich et al., 2005; 2006).

5) Differentiate measures of performance between efficiency and effectiveness:
- IT can influence firm efficiency and effectiveness (Melville et al., 2004).
- Creating operational efficiencies for the firm is an important role of IT, but IT can also be a source of flexibility, structure, and scope, which hold implications for effectiveness (Drnevich et al., 2005; 2006).

6) Choose a model and research design that will accurately depict, measure, and test the role of IT in the firm and its performance:
- Include the means for IT contributions to accrue to the level of the firm (Drnevich et al., 2005; 2006), such as two stage models, which take into account first and second order effects of IT (Barua et al., 1995; Melville et al., 2004).
- Take into consideration the exogenous effects of the external environment on the process-level performance to firm-level performance relationship (Melville et al., 2004; Piccoli and Ives, 2005; Drnevich et al., 2005; 2006).

2.1 Clarifying the IT Construct

The construct of "IT" may be operationalized in many ways. Fortunately, there appears to be some consensus (Melville et al., 2004), that the construct should be limited to tool, proxy, ensemble, and/or nominal conceptualizations (see Orlikowski and Iacono, 2001) for IT business value research. Thus, most prior studies operationalize IT as a "tool" leading to a specific intended outcome, as a "proxy" through aggregate variables (i.e. IT $), as a factor which may mediate or moderate value as part of an "ensemble" of other organizational factors, or simply as a "nominal" abstract concept (Melville et al., 2004). Of these conceptualizations, it appears that while the tool view may lend itself most applicably to empirical

research, and the nominal view may work best for modeling purposes, the ensemble view is likely the most appropriate conceptualization for examining the role of IT acting through a firm's resources and capabilities to affect performance. Thus, to be consistent with this usage, and with prior theory (Dosi, Nelson, and Winter, 2000; Winter, 2003), as alluded to earlier we view the IT artifact in this study as two distinct constructs based upon its usage in the firm. These uses correspond to "zero-order" "resource" uses of IT and "first-order" "capability" uses of IT.

2.2 Defining the Levels of Analysis

Levels of analysis for IT business value research appear equally of concern in both the Strategy and MIS fields (Barua et al., 1995; Ray et al., 2004; Drnevich and Shanley, 2005). Given the size and distance differentials between IT and performance measures at the firm level of analysis, most recent research indicates the study of IT value should focus on the IT – business process relationship (Barua et al., 1995; Mukhopadhyay, Kekre, and Kalathur, 1995; Melville et al., 2004). Therefore the literature offers some consensus that IT is a process-level construct that affects firm performance through intermediate business processes (Barua et al., 1995; Mukhopadhyay et al., 1995; Melville et al., 2004). For example, while firm-level IT investments do exist (i.e. ERP systems, Enterprise software suites, etc.) most IT investments are made with the intention of supporting and/or improving many of a firm's functional business processes (i.e. accounting, HR, manufacturing, supply chain, etc.). Further, IT will interact with other resources and capabilities existing within the firm, and these relationships among IT, a firm's existing resources and capabilities, and a firm's business processes and performance, are affected by the firm's internal and external environment (Devaraj and Kohli, 2003; Melville et al., 2004; Piccoli and Ives, 2005).

2.3 Identifying Mediating and Moderating Relationships

With respect to studying the role and value of IT investments in the firm, both process-level and firm-level measures have been used in the literature to measure the performance implications of IT (Barua et al., 1995; Melville et al., 2004; Piccoli and Ives, 2005). This is potentially problematic if research designs do not include the means for IT contributions (which are largely at the process level and act through an ensemble of other resources and capabilities) to accrue to the level of the firm. For these reasons, two stage models, which take into account first and second order effects of IT, are likely required (Barua et al., 1995). Further, research on this topic and context should also take into consideration the exogenous effects of the external environment on this process-level performance to firm-level performance relationship (Melville et al., 2004; Piccoli and Ives, 2005).

2.4 Theoretically Grounding the Role of IT in Firm Performance

Most recent business value of IT research studies (e.g., Dewan, Michael, and Min, 1998; Hitt and Brynjolfsson, 1996; Melville et al., 2004; Piccoli and Ives, 2005), generally assume the value of IT to be based upon the resource-based view (RBV) (Wernerfelt, 1984; Barney, 1991). However, while reviews of the literature on this topic generally assume that IT plays some role in performance at either the process or firm level (Kohli and Devaraj, 2003; Melville et al., 2004; Piccoli and Ives, 2005), as we mentioned earlier, such a relationship between IT resources and capabilities has yet to be clearly and effectively established theoretically, or conclusively supported empirically. This is likely due in part to study designs which over rely on limited and often incomplete operationalizations of single theory explanations (i.e. RBV), and/or fail to consider the process, firm, and industry level mechanisms, which can mediate or moderate the IT - performance relationship.

This is important as it appears likely that it is the capability to manage IT (Mata, Fuerst, and Barney, 1995), not the ability to "pick" the correct (IT) resources (e.g. Makadok, 2001), that may lead to sustainable competitive advantage (Carr, 2004). This would indicate that grounding "*Business Value of IT"* research in RBV assumptions alone, to the exclusion of alternative theories and their considerations, as has generally been the case, is potentially problematic. Such incomplete and/or incorrect theoretical grounding of topic may explain in part, the paradoxical relationship between IT and firm performance observed in much of the research on this topic (Berndt and Morrison, 1995; Carr, 2004; Melville et al., 2004; Orlikowski and Barley, 2001; Tippins and Sohi, 2003). We therefore agree with the conclusions of Melville et al. (2004), that suggest the need for consideration of transaction cost economics (Williamson, 1975, 1985, 1991), and dynamic capabilities (Teece et al., 1997; Eisenhardt and Martin, 2000) perspectives, in addition to RBV to better inform our understanding of the IT - performance relationship.

2.5 Effectively Measuring the Performance Implications of IT

The business value of IT literature commonly uses two conceptual formulations for measuring the performance implications of IT (Melville et al., 2004). These conceptualizations are analogous to the classic *efficiency* (doing things right) vs. *effectiveness* (doing the right things) debate from the strategic management literature (Barnard, 1938; Knight, 1941; Hayek, 1945; Williamson, 1991). These potential performance implications also are theoretically consistent with distinctions in a firm's strategic objectives between "economizing" and "strategizing" (Williamson, 1991).

However, while we accept that IT can improve efficiency, most prior studies do not appear to clearly establish or model the relationship between efficiency and effectiveness. Further, prior research does not appear to account for the theoretical mechanisms through which efficiency improvements at the process-level should translate to effectiveness improvements at the firm-level. Specifically, while reviews of the body of work on the business value of IT (Kohli and Devaraj, 2003; Melville et al., 2004; Piccoli and Ives, 2005) correctly observes the need to: 1) distinguish between the process and firm levels; 2) differentiate measures of performance between efficiency and effectiveness; and 3) consider the role of mediating and moderating endogenous and exogenous factors; the theoretical mechanisms for the relationships among these elements of IT business value are left largely unaccounted for. For example, a central research question arising from this body of work is "How does the IT resource generate operational efficiencies and competitive advantage," (Melville et al., 2004, p. 298). For a variety of reasons, the views of the IT - performance relationship expressed through this type of question are somewhat assumptive and theoretically incomplete.

First, while creating operational efficiencies and reducing costs for the firm is an important role of IT, this is an incomplete conceptualization of IT as it is not the only role IT can play in the firm. For example, IT can also be a source of flexibility, structure, and scope, all of which hold implication for effectiveness. These effectiveness factors can hold substantial implications for firm competitive priorities such as quality, speed, and innovation - all of which can affect a firm's performance and competitive advantage. Second, this type of efficiency focused question is assumptive of the process-level to firm-level performance relationship, and further, does not offer or establish any conceptualization of this relationship (Melville et al., 2004; Piccoli and Ives, 2005). Specifically, while operational efficiency at the process-level can be an important source of competitive advantage, the mechanism(s) through which operational efficiency benefits at this level accrue to competitive advantage benefits at the firm-level do not appear to be effectively established theoretically in the literature. For example, while research may establish that IT can offer operational efficiency improvements at the process-level which are valuable and even inimitable, if that process is not a part of the mechanisms through which the firm creates and captures value, it cannot be a source of competitive heterogeneity for the firm (Hoopes et al., 2003).

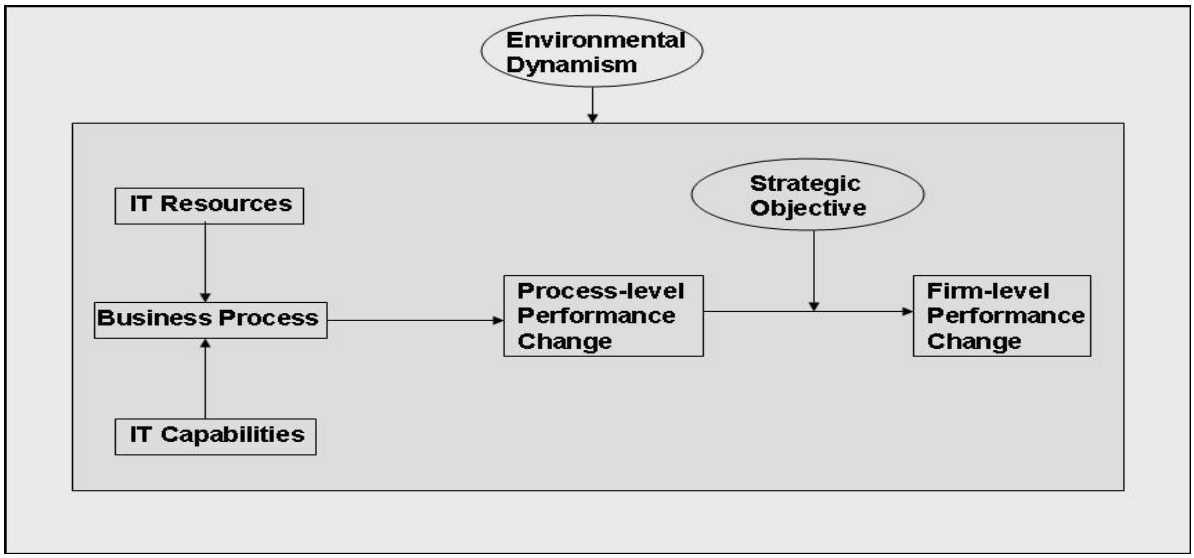
Further, this type of efficiency focused question offers an incomplete conceptualization of competitive advantage. For example, while operational efficiency is important, it is not the only means through which a firm may gain and sustain competitive advantage. Competitive advantage is attributable to a wide variety of factors and mechanisms including efficiency (Williamson, 1975, 1985, 1991), position and power (Porter, 1980), resource endowments (Wernerfelt, 1984; Barney, 1991), knowledge (Kogut and

Zander, 1992; Grant 1996; Spender 1996), and dynamic capabilities (Teece et al., 1997; Eisenhardt and Martin, 2000). Therefore, beyond efficiency factors and firm cost benefits, effectiveness factors such as quality, speed, and innovation can all potentially affect a firm's performance and the sustainability of any competitive advantages it enjoys. Thus, we need a more comprehensive conceptual model to understand and measure the role of IT in firm performance.

2.6 Establishing a Conceptual Model for the Roles of IT in Firm Performance

Based upon these collective lessons and observations from the business value of IT literature, we next develop a general conceptual model of the role of IT resources and capabilities in the firm and its performance. We begin by leveraging a basic conceptual model developed from a recent review of the literature (Melville et al., 2004), and add to it the lessons and observations raised in this section. Our model takes an ensemble view of the IT construct and begins with IT resource investments interacting with IT capabilities and a firm's business processes. The measurement of the effects of these IT investments are in terms of efficiency and/or effectiveness, and can affect the organization at the process-level, and the firm-level through process-level effects. The relationship between process-level and firm-level performance is moderated by the firm's strategy (i.e. the role the business process plays in the firm's profit mechanisms) and the external environment. This general conceptual model of the role of IT resources and capabilities in the firm and its performance is in the figure below. General Hypotheses for the model are in the section following the model.

Figure 1. General Conceptual Model of the Role of IT in the Firm



The overview of the business value of IT literature offered in this section demonstrates that collectively, this literature offers extensive contributions to the study of the roles IT can play in the firm and its performance. Further, this body of research can offer much to inform related research in other disciplines such as strategic management. Finally, as we have argued in this section, there is a need for more extensive theoretical grounding of the research on this topic, to effectively model the roles IT can play in the firm, and how these roles may affect process-level and firm-level performance, as well as interfirm performance variance in different contexts.

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