MARKET AND BUREAUCRACY COSTS: THE MODERATING EFFECT OF INFORMATION TECHNOLOGY

Jennifer C. Leonard, Ph.D. & Timothy J. Wilkinson, Ph.D.
Montana State University Billings

INTRODUCTION

Gathering information has long been a function of managers because, as suggested by Porter (1979), the information about the environment that is available to an organization affects the efficiency of the strategy it chooses to employ. For this reason, one structural variable that is receiving a great deal of attention is information technology(IT) (Fiedler, Grover, & Teng, 1996; Radhakrishnan, Zu, & Grover, 2008), especially as IT has become affordable for even the smallest of firms (Unknown, 2003).

Despite differences in IT perspectives of the theorists, there does appear to be a common theme in much of the IT literature: efficiency. Efficiency is either directly discussed or implied in much of the IT material, regardless of the theoretical approach taken. Considering that transaction cost economics has efficiency as its underlying foundation (Williamson, 1975), it would make sense that TCE could be used to explain and predict the relationship between information technology and strategic choice.

THEORETICAL OVERVIEW

Transaction cost economics posits there are costs associated with any transaction that takes place. Costs are created through the interaction of bounded rationality or opportunistic behavior and uncertainty/complexity or small numbers exchange (Williamson, Markets and Hierarchies: Analysis and Antitrust Implications, 1975). The resulting monitoring, contracting, compliance and enforcement, negotiating, coordinating, and search costs may be exacerbated by the presence of information impactedness, transaction frequency, and asset specificity (Jones & Hill, 1988) .

Information technology can mitigate the factors that cause transaction costs by providing strategic support (Leonard & Dooley, 2007), communication (Chan & Davis, 2000; Dennis & Tyran, 1997), and decision support and knowledge management (Chen, 1995; Hackbarth & Grover, 1999). These three broad areas encompass the major uses of IT systems, although each has sub-levels. For example, strategic support includes such matters as environmental monitoring (Leonard & Dooley, 2007) and business-to-business integration (Iacovou & Benbasat, 1995); communication encompasses group communication (Dennis, Pootheri, & Natarajan, 1998; Nunamaker & Briggs, 1996), person-to-person or person-to-group communication (Barua, Ravindran, & Whinston, 1997), or business-to-business communication (Townsend, DeMarie, & Hendrickson, 1998), while knowledge management and decision support incorporates the sphere of expert systems (Jenks & Wilson, 1999), artificial intelligence (Quereshi, Shim, & Siegel, 1998), executive information systems (Lam & Ching, 1998), and group decision support systems (Townsend, DeMarie, & Hendrickson, 1998).

While organizations may use an IT system to decrease transaction costs in general (through communication, thereby reducing information impactedness or business-to-business integration to reduce complexity and the risk of opportunistic behavior), transaction costs may be separated into two distinct types: market costs (i.e., costs associated with doing business with trading partners outside the firm) or bureaucracy costs (i.e., costs associated with the use of a hierarchical form of governance – transacting within the firm) (D'Aveni & Ravenscraft, 1994; Hill & Hoskisson, 1987; Jones & Hill, 1988). Information systems, like transaction costs, focus on either the internal aspects of the firm or the external market forces (Dennis, Pootheri, & Natarajan, 1998; Fiedler, Grover, & Teng, 1996; Keen, 1991). Thus, it becomes advantageous to examine the relationships at the internal (bureaucracy) or external (market) efficiency level.

Market Costs

Transaction cost economics assumes that information impactedness exists: that information is not equally available to both parties in a transaction because it is not shared (or sharable) or that the costs of obtaining needed information is prohibitively costly (Williamson, 1975). Thus, in situations where

information impactedness is combined with complexity or opportunistic behavior, transaction costs increase as the need for monitoring and contracting escalate. As complexity or opportunistic behavior intensifies and the disparity between partners' information increases, the need for the deficient partner to monitor the behavior of the partner with more complete information in order to protect its own interests also increases (Williamson, 1991). Additionally, contracts must be more complex in order to counteract the effects of the information asymmetry in such situations (Williamson, 1975). Sherry and Teece (2004), in their case study of a petroleum industry contract, supported the relationship between decreased information impactedness and reduced transaction costs.

A few of the numerous ways that information technology may assist in reducing search, compliance/enforcement, monitoring, and contracting costs are communication and data sharing (Clemens, Reddi, & Row, 1993), providing information that was otherwise unavailable (Hackbarth & Grover, 1999), making available advanced analysis tools (Chen, 1995), and offering new possible trading partners (Mithas, Jones, & Mitchell, 2008).

An IT system may increase information flows between contracting parties, through communication, data, and application sharing (Clemens, Reddi, & Row, 1993; Fiedler, Grover, & Teng, 1996). The use of such technology as decision rooms, distribution lists, bulletin boards, chat sites, computer-conferencing, project rooms, video conferencing, email, and voice mail (Barua, Ravindran, & Whinston, 1997; Raisinghani, Ramarupa, & Simkin, 1998) makes communications between and among group members nearly as simple and cost effective as communicating with only one person or in face-to-face settings (Raisinghani, Ramarupa, & Simkin, 1998). Faster processing speeds and communication links reduce the amount of time between the event and the time information is available (Keen, 1991). The resulting increase in communication and information sharing decreases uncertainty and information impactedness between the organization and its trading partners.

Interfirm communication may be used to increase the transaction frequency between the contracting parties, thereby reducing market costs. Transaction frequency, in conjunction with uncertainty, bounded rationality or information impactedness, can increase the amount of monitoring that may be required (D'Aveni & Ravenscraft, 1994; Williamson, 1975; Williamson & Ouchi, 1981) as infrequent transactions keep a firm from acquiring information about subsequent transaction performance (Jones, 1987). Keen (1991) has suggested that the biggest gains to be made from IT are through managing documents electronically, along with fast, clear, and natural communications.

Executive decision support systems, which include communication, organization, access, and analysis tool components (Chen, 1995), offer timely and convenient access to data from all levels of the organization as well as information from trading partners and other external sources (van den Hoven, 1995). However, because information is readily and cheaply available, managers may quickly suffer from information overload, therefore access to information is not enough; analysis tools play a large part in efficient IT information systems (Chen, 1995; Lam & Ching, 1998). Access to and ability to process external information quickly through a user-friendly interface allow managers to reduce uncertainty in a volatile environment (Bakos & Treacy, 1986; Chen, 1995).

The use of IT has allowed for the employment of new and specialized interorganizational group support systems (Dennis, Pootheri, & Natarajan, 1998) that boast sophisticated decision support applications (Turrof & Hiltz, 1993). Group support systems allow for a larger number of participants than do traditional face-to-face meetings (Raisinghani, Ramarupa, & Simkin, 1998), resulting in a wider range of expertise and knowledge bases (Hambrick & Mason, 1984; Nunamaker & Briggs, 1996) and interorganizational information sharing (Gurbaxani & Whang, 1991). Anonymity is often built into group support systems, thus permitting participants to provide information that might not otherwise be made available to the group due to politics, position, or personality (Dennis & Tyran, 1997; Nunamaker & Briggs, 1996). Increases in participants and participation also allows for wider diversity in the expertise upon which the group has to draw (Hambrick & Mason, 1984; Nunamaker & Briggs, 1996). The use of a group support system, then, reduces bounded rationality and information impactedness.

Another advantage provided by the use of information technology is that decisions and communications are maintained in computer memory, thus aiding in future decisions or continued

deliberation of current decisions (Raisinghani, Ramarupa, & Simkin, 1998). Additionally, as managers are traditionally very busy, this memory allows a manager to continue a task after interruption with a minimum of restart time (Dennis & Tyran, 1997). Together these features provide for reduced uncertainty and information impactedness.

Knowledge management systems permit cost-effect access and analysis of internal and external information thereby reducing market costs related to contracting, since they reduce uncertainty and information impactedness through data and application sharing and mutual monitoring (Gurbaxani & Whang, 1991). Archived information, maintained by knowledge management systems, is readily accessible, and may provide insight into prior decisions, thereby making contract negotiations more efficient (Hackbarth & Grover, 1999) than they may otherwise have been.

Additionally, knowledge management systems that are interorganizational in nature allow for the firms involved to take advantage of synergies between organizations and may allow a firm to either gain bargaining power over trading partners, or at a minimum, reduce the threat that trading partners may gain power over the firm (Bakos & Treacy, 1986). Knowledge management, through data mining, allows managers' access to information that may have been hitherto unwanted, unneeded, or unavailable. This data access, in turn, gives managers the ability to draw on data stores for unique opportunities that previously went undetected (Lam & Ching, 1998).

The ability to leverage current resources and capabilities externally (Venkatraman, 1997) and to support current strategies (Broadbent & Weill, 1997) while reducing market costs is of prime importance to an efficient IT system (Malone, Yates, & Benjamin, 1987). The above line of reasoning leads to the following supposition:

> *Proposition 1: Firms using IT systems that emphasize external communication, coordination, and decision-making will have lower market costs than those that do not.*

Bureaucracy Costs

In order to reduce market costs, a firm may choose to change to a hierarchy (Williamson, 1985). However, the move from market governance does not indicate that all transaction costs are eliminated; hierarchical governance incurs its own transaction costs. As Jones and Hill (1988) state: "transaction costs do not simply disappear when firms choose hierarchy over the market" (p. 163). Chandler (1988) defined transaction costs as "the cost of transfer of goods or services from one operating unit to another" (p. 475). This definition implies that such costs may be incurred with either market governance or hierarchical governance.

As the previous argument shows, the firm itself (as far as transactions between divisions are concerned) may be treated as an internal market with all the costs and benefits associated with market governance.

Knowing what information is available, who needs it, and how it can be accessed and used is an essential determinant in the effective use of IT systems (Hackbarth & Grover, 1999). IT reduces the costs of coordination, monitoring, negotiation, and enforcement costs (Brynjolfsson, Malone, Gurbaxani, & Kambil, 1994; D'Aveni & Ravenscraft, 1994) by lowering the cost of information sharing and communication, and provides faster processing speeds, less expensive information gathering, and improved tools for analysis and management decision-making (Fiedler, Grover, & Teng, 1996; Gurbaxani & Whang, 1991). Electronic communication, the handling of complex information systems, the use of sophisticated production scheduling techniques, and increased and complex resource sharing (Fiedler, Grover, & Teng, 1996; Gurbaxani & Whang, 1991; Jones & Hill, 1988) also reduce transaction costs. The ability to view information at individual levels as well as departmental or divisional levels, data and application sharing, and the use of other tools such as hand-held computers, optical scanners, and electronic communication reduces monitoring costs (Fiedler, Grover, & Teng, 1996; Gurbaxani & Whang, 1991). The use of Internet technologies such as blogs and job sites reduce negotiation costs, as do knowledge management systems (Hoffman, 2008).

IT systems reduce internal costs by providing information to management regarding the various operations of the organization and providing standardized reports at the transaction level as well as the

department level (Radhakrishnan, Zu, & Grover, 2008; Gurbaxani & Whang, 1991; D'Aveni & Ravenscraft, 1994) that may have been too costly to compile otherwise (Munter & Kren, 1995). As Gurbaxani and Whang (1991) point out, the accessibility of inexpensive monitoring is critical to reducing bureaucracy costs: "Information systems contribute to this end by providing an effective tool to monitor agents' actions directly and by keeping track of the performance records of an agent or a functional unit in a firm" (p. 67).

An IT system also reduces bureaucracy costs through information and resource sharing (Broadbent & Weill, 1997; Goodhue, Quillard, & Rockart, 1988). Information at the transaction level may be analyzed and quantified, thus reducing information impactedness, asset specificity, and performance ambiguity. Costs associated with functional specialization and task complexity can thereby be reduced (D'Aveni & Ravenscraft, 1994; Welbourne, Balkin, & Gomez-Mejia, 1995). Goodhue, Wybo, and Kirsch (1992) suggest that uncertainty caused by task specialization may be reduced through firm-wide integration because "mandatory data integration might reduce the flexibility of an individual subunit to redesign its information systems to address its unique needs." (p. 298).

Data integration allows for all levels of the organization to have a common information base (Bhatt, 2001) thereby reducing ambiguity and confusion. The result is lowered information impactedness and bounded rationality because information is shared across the organization (Goodhue, Wybo, & Kirsch, 1992) and personnel with different backgrounds bring varied knowledge and experience bases to the decision-making process (Hambrick & Mason, 1984). Information impactedness and bounded rationality create monitoring costs because the manager's ability to assemble, organize, and understand information about divisional performance is limited (Baysinger & Hoskisson, 1989). As the interaction between task uncertainty and information impactedness becomes more pronounced coordination costs increase (D'Aveni & Ravenscraft, 1994). As the need for information increases, the interaction of performance ambiguity and task uncertainty requires more complex internal governance structures (Jones, 1987). Thus, the combination of uncertainty, information impactedness, and coordination create costs associated with strategic decision-making and planning; if the manager does not have the information to make decisions, or the ability to coordinate internal divisions, planning and decision-making become difficult.

An IT system uses superior information processing abilities to create "informational economies of scale" (Gurbaxani & Whang, 1991), and perpetuates the reduction in bureaucracy costs by reducing both bounded rationality (Bakos & Treacy, 1986) and information impactedness (D'Aveni & Ravenscraft, 1994).

Information may be gathered and evaluated at all levels of the organization allowing for reductions in bounded rationality associated with decision-making (Radhakrishnan, Zu, & Grover, 2008; Williamson, 1991). "Information technology can directly affect the computational and communication abilities of a decision-maker, thus shifting the limits of rationality" (Bakos & Treacy, Information Technology and Corporate Strategy: A Research Perspective, 1986, p. 109), which occurs because additional information is available to the decision-maker, thus allowing him or her to increase the knowledge base upon which decisions are made (Williamson, 1991). Therefore, knowledge management that allows the free flow of information and data increases efficiency and effectiveness of decision-making (Hackbarth & Grover, 1999).

Information technology reduces information asymmetries and bounded rationality of group decision-making as well (Bakos & Treacy, 1986). Members of a group can provide more information and differing perspectives than are available to a single individual (Hambrick & Mason, 1984). In support, Turrof and Hiltz (1993), in their five case studies, found that the use of distributed group support systems improved the quality of the decisions, sped the processes, and increased the amount of information available to the decision-makers. The effect is greatly enhanced when data warehousing components are added to the DSS system (Park, 2006). In addition to using monitoring systems, the use of such technologies as the World Wide Web can reduce the asset specificity associated with negotiation costs..

Thus, the following proposal is offered:

> *Proposition 2: Firms using IT systems that emphasize internal communication, coordination, and decision-making will have lower bureaucracy costs than those that do not.*

CONCLUSION

Information technology has become an important structural variable over the last decade. Unfortunately, no predominant theoretical platform has emerged in the IT or strategic management fields to explain the overall impact information technology has on strategic choice. However, as efficiency appears to be common theme in most IT literature, an argument can be made that transaction cost economics would serve as an appropriate approach.

Additionally, most research in the strategy–information technology field consists of single IT construct or component investigations. The use of transaction cost economics allows for the examination of IT systems as a whole in the strategy – structure – performance relationship. By distinguishing between internal (i.e., bureaucracy) and external (i.e., market) transaction costs, specific proposals can be made about how IT can be used to reduce the underlying causes of each.

Future Research

The next logical phase would be to test empirically the propositions proposed. However, no framework, taxonomy, or typology currently exists that easily allows for a measurable IT construct. Thus, future work in this area must first consist of creating such a classification scheme.

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