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Americas Conference on Information Systems AMCIS2009 San Francisco IT Capability: A Moderator Model of Competitive Advantage

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ABSTRACT

Although, the resource based theory mentions both resources and capabilities to be sources of competitive advantage, not much distinction between the two has been made in research on competitive advantage. Therefore, this proposal presents a literature review of the research on information technology (IT) and organizational capability, and then puts forth a model of IT capability as a moderator in the relationship between IT resources (as indicated by the IT investment announcements) and competitive advantage (as indicated by the firm's stock performance).

Keywords

IT capability, IT resources, managing change, competitive advantage, resource-based view (RBV), strategy, IT-business alignment, event study.

INTRODUCTION

The resource-based view of the firm links the financial performance of firms to their resources and capabilities (Bharadwaj, 2000). Grant (1991) differentiates between resources and capabilities (Bharadwaj, 2000). According to Grant (1991), while resources are the basic units of analyses, capabilities refer to an "organization's ability to assemble, integrate, and deploy valued resources, usually, in combination or copresence" (Bharadwaj, 2000, p.171). Grant (1995) further describes organizational capabilities as a hierarchy where in "specialized capabilities are integrated into broader functional capabilities such as marketing, manufacturing and IT (information technology) capabilities" (Bharadwaj, 2000, p.171). According to Bharadwaj (2000), these functional capabilities further integrate to form cross-functional capabilities. A firm's IT capability is defined as "its ability to mobilize and deploy IT-based resources in combination or copresent with other resources and capabilities" (Bharadwaj, 2000, p.171). Sambamurthy (2000) defines IT capabilities as "the ability of IS managers, business managers, and senior executives to mobilize appropriate behaviors for IT innovation" (p.255). Furthermore, according to Sambamurthy (2000), some of the examples of valued IT capabilities include: seamless global IT infrastructure (Weill and Broadbent, 1998; Ross et al., 1996; Sambamurthy and Zmud, 1997), technical skills (Ross et al., 1996), partnership networks among the business and IS managers (Ross et al., 1996; Brown and Sambamurthy, 1999), business systems thinking (Feeny and Wilcocks, 1998), and change-readiness (Clark et al., 1997).

Segars and Dean (2000) believe that organizations are not "equal in terms of effectively leveraging IT" (p.243). Those organizations, which realize that they do not effectively leverage IT, seek to build key capabilities necessary for change (Segars and Dean, 2000). And an integral part of managing any kind of radical organizational change is to determine whether the organization has the necessary capability for the change effort (Segars and Dean, 2000). This indicates that there is a linkage between resources, capabilities and managing change. Therefore, in this paper, a literature review of research encompassing these three aspects with major emphasis on IT and organizational capability will be discussed. Although, competitive advantage has been studied from the resource based view (e.g., Barney, 1991; Mata, Fuerst and Barney, 1995; and Ray, Barney and Muhanna, 2004), there seems to be a lack of research on competitive advantage from only the IT capability perspective. Therefore, in this paper, a model of competitive advantage from an IT capability perspective will be presented, followed by a statement of hypotheses and a brief discussion on a possible methodology for data analysis. But, first a literature review of research on IT and organizational capability will be presented.

IMPACT OF IT ON CORPORATE STRATEGY

Impact of IT at Three Levels of Corporate Strategy

Bakos and Treacy (1986) believe that there is a lack of understanding of what determines the influence of IT and what facilitates the coordination of IT and corporate strategy. IT can impact corporate strategy at three levels, namely, internal, competitive, and business portfolio (Bakos and Treacy, 1986). Internal strategy is concerned with the development of efficient and effective organizational structures and processes for achieving goals and objectives (Bakos and Treacy, 1986). Competitive strategy focuses on competitive moves within the industry in which the organization does business (Bakos and Treacy, 1986). Business portfolio strategy concerns the choice of which industries to compete in and how to position the organization in those industries (Bakos and Treacy, 1986). According to Bakos and Treacy (1986), IT affects the efficiency and effectiveness of the organization primarily by reducing the effects of bounded rationality (i.e., the neurophysiological limitations to the information processing capacities of an individual) of individual and group decision making.

Based on Rockart and Morton's three types of opportunities that can create competitive advantage, Porter's framework for competitive forces, Parsons six generic categories of opportunities for competitive advantage, and other such categorizations of competitive advantage created by technology, Bakos and Treacy (1986) have distilled four areas of opportunity for IT to support competitive strategy, which are: (1) improvement of operational efficiency and functional effectiveness, (2) exploitation of interorganizational synergies, (3) product innovation with IT, and (4) acquisition of bargaining advantage over one's customers and suppliers. Bakos and Treacy (1986) conclude that though this can provide a useful framework to an insider in a competitive game, its value is limited by the lack of a general underlying theory. They believe that 'bargaining power' and 'comparative efficiency' can be seen as the two major sources of competitive advantage. The three primary determinants of bargaining power are the cost of the search process, unique product features, and switching costs (Bakos and Treacy, 1986). The two major aspects of comparative efficiency are internal (intraorganizational) efficiency, and external (boundary spanning, interorganizational) efficiency (Bakos and Treacy, 1986). According to Bakos and Treacy (1986), industry-level impacts of information technology have important strategic implications for the portfolio of industries in which a firm is competing. Bakos and Treacy (1986) see organizational theories, industrial economic theories, and game theory as the three likely sources of specific theories and models for the creation and exploitation of technology advantage in the context of business portfolio strategy.

Business-IT Alignment

Wheeler (2002) believes that choosing IT precedes rather than aligns with corporate strategy. Although, it is hard to say if that is necessarily always the case or not, it can however, be said that there certainly seems to be a linkage between IT and business/corporate strategy as indicated by some research that will now be discussed.

The social dimension of alignment refers to the state in which business and IT executives understand and are committed to the business and IT mission, objectives, and plans (Reich and Benbasat, 2000). According to Reich and Benbasat (2000), four factors that would potentially influence alignment are: (1) shared domain knowledge between business and IT executives, (2) IT implementation success, (3) communication between business and IT executives, and (4) connections between business and IT planning processes. The outcome, alignment, was operationalized in two ways: the degree of mutual understanding of current objectives (short-term alignment) and the congruence of IT vision (long-term alignment) between business and IT executives (Reich and Benbasat, 2000). Reich and Benbasat (2000) found that all the four factors (i.e., shared domain knowledge, IT implementation success, communication between business and IT executives, and connections between business and IT planning) were found to influence short-term alignment. Only shared domain knowledge was found to influence long-term alignment and a new factor, strategic business plans, was found to influence both short and long-term alignment (Reich and Benbasat, 2000). Roepke, Agarwal and Ferratt (2000) believe that investment in a leadership capability can help align IT with the business vision and provide value to IT customers

According to Venkatraman (1994), successful businesses will neither treat IT as the driver nor the magic bullet that provides distinctive strategic advantage. Successful companies will be differentiated by their ability to visualize the logic of the new business world and leverage IT to create an appropriate organizational arrangement (both internal and external) to support the business logic (Venkatraman, 1994). Business transformation should be considered to be a moving target, shaped by the fundamental changes in the competitive business world (Venkatraman, 1994). The management should continually adapt the organizational and technological capabilities so that they are in a dynamic alignment with the chosen business vision (Venkatraman, 1994).

Therefore, it can be said that there is a definite linkage between IT and corporate strategy and that in fact as Venkatraman (1994) states “IT is not simply a utility like power or telephone but a fundamental source of business scope reconfiguration to redefine the “rules of the game”” (p.84).

IMPACT OF IT-BASED COMPETITION ON INDUSTRY STRUCTURE

In the foregoing paragraphs, the impact of IT on corporate strategy was discussed and it was seen that IT can be a source of business reconfiguration. Therefore, it leads one to wonder whether IT-based competition has any influence on the industry structure. This question was examined by Segars and Grover (1995), who based on their research findings conclude that competitive-based IT can lead to changes in an industry’s structural characteristics. Segars and Grover (1995) found evidence that early adopters formed their own unique bases of competition.

IT AND SUSTAINABLE COMPETITIVE ADVANTAGE

Internally and Externally Focused Systems

Although, a lot of attention is paid to the strategic potential of information systems, little attempt has been made to determine the factors that determine strategic success factors (Clemons, 1986). It is argued by Clemons (1986) that “not all innovative uses of IT are equally successful in producing real, sustainable benefits for their developers” (p.132). It is important to characterize and distinguish those uses of IT that have offered, or will prove to offer, sustainable advantage (Clemons, 1986). Clemons (1986) distinguishes between internally and externally focused applications. The former are generally used within a firm, for cost reductions or quality improvements; they do not have interfaces with suppliers, customers, or the outside world (Clemons, 1986). The latter are used principally by customers, clients, or suppliers, and should add value (Clemons, 1986).

Johnston and Vitale (1988) studied the role of interorganizational systems (IOS) on creating competitive advantage. IOS are competitively advantageous information systems that link a company to its suppliers, distributors, or customers (Johnston and Vitale, 1988). IOS are further categorized based on the business purpose of the system, on the relationship between the sponsoring organization and the other participants, and on the information function in the system (Johnston and Vitale, 1988). Bakos and Treacy (1986) argue that competitive advantage stems fundamentally from two factors: comparative efficiency, which allows an organization to produce its goods or services more cheaply than its competitors; and bargaining power, which allows a firm to resolve bargaining situations with its customers and suppliers to its own advantage. Johnston and Vitale (1988), however, argue that the strength of these factors is determined by even more fundamental issues. The strength of comparative efficiency is determined by both internal efficiency and interorganizational efficiency, and the strength of bargaining power is determined by unique product features, switching costs, and search-related costs (Johnston and Vitale, 1988).

According to Johnston and Vitale (1988), the search for IOS opportunities can utilize the categorization scheme and the framework for competitive advantage together as guides for the search process. An effective structure for the search process helps to achieve clarity about the fundamental objectives of the IOS and the prospective costs and benefits to all participants (Johnston and Vitale, 1988). The most significant outcome of an effective search and planning process should be the recognition that the electronic link between separate organizations is a part of a major change in the relationship between the parties (Johnston and Vitale, 1988). Contrary to the conclusions of Johnson and Vitale (1988), Venkatraman (1994) believes that there is no evidence to prove that proprietary interorganizational systems by themselves lead to competitive advantage. This leads one to question as to what are the factors that might be considered to assess the sustainability of IT-based competitive advantage.

Assessing Sustainability of IT-Based Competitive Advantage

Feeny and Ives (1990) propose the pillared framework as a means to assess the sustainability of IT-based competitive advantage. The first pillar involves analysis of the project development cycle to understand the “generic lead time” (i.e., the time it would take for a competitor to duplicate the application approximately) faced by a follower company (Feeny and Ives, 1990). The second pillar identifies the extent to which the project is protected through “competitive asymmetry” (Feeny and Ives, 1990). According to Feeny and Ives (1990), competitive asymmetry tells whether the competitors will be able to copy the application. Finally Feeny and Ives (1990) turn to supply chain analysis and the ideas of McMillan to consider the “preemption potential” (i.e., the potential of the prime mover to seriously preempt retaliation by the follower) of the proposed application. Feeny and Ives (1990) believe that these pillars suggest the following three questions: (1) How long before a competitor can respond to our idea? (2) Which competitors can respond? (3) Will a response be effective? The framework

proposed and illustrated by Feeny and Ives (1990) allows management to consider the probability that an application, if successful, will provide advantage for long enough to justify the investment required.

Kettinger, Grover, Guha and Segars (1994) believe that “technological wizardry” and “innovating first” may not necessary be the only components to competitive success. Established technological base and availability of substantial capital are considered to be prerequisites for effective technology-led competition (Kettinger et al., 1994). Firm’s resources and that of the competitors must be considered (Kettinger et al., 1994). According to Kettinger et al. (1994), achieving sustained competitive advantage is not about being the innovator or the first mover, but it is more of a process of building organizational infrastructure that would lead to innovative strategies. According to Roepke, Agarwal and Ferratt (2000), leadership capability in all IT professionals is a potential source of sustainable competitive advantage, but such a resource capability cannot be easily duplicated. In order to generate competitive advantage, Christiaanse and Venkatraman (2002) advocate the concept of ‘expertise exploitation’, which is defined as “the ability of a firm to combine external data with internal procedures to generate a distinctive capability that is difficult to imitate and could potentially drive differential advantage in the market place”(p.18). This discussion leads to the inference that resources and capabilities are the determinants of a firm’s competitive advantage.

STRATEGIC DECISION MAKING AND CHANGE MANAGEMENT

Decision Making Speed

Eisenhardt (1989) conducted an inductive study to determine how executive teams make rapid decisions in the high-velocity microcomputer industry. According to Eisenhardt (1989), “fast decision makers use more, not less, information than do slow decision makers” (p.543). The fast decision makers also develop more, not fewer, alternatives, and use a two-tiered advice process (Eisenhardt, 1989). According to Eisenhardt (1989) conflict resolution and integration among strategic decisions and tactical plans are also critical to the pace of decision making. Moreover, fast decisions based on this pattern of behaviors lead to superior performance (Eisenhardt, 1989).

Framework for IT-Enabled Change Management

IT-enabled change processes are different from more general processes as they create unique issues for managers (Benjamin and Levinson, 1993). Managers must know how to integrate the technology, business processes, and organization in order to achieve the goals they expect with the technology (Benjamin and Levinson, 1993). Based on change management literature, Benjamin and Levinson (1993) have identified eight principles that managers need to consider as they make complex IT-enabled changes. The eight principles are: (1) develop a systematic process for change; (2) manage equilibrium and mutual adaptation of organization, technology, and business process; (3) determine whether there is enough energy for change; (4) analyze the size of the change effort; (5) analyze and manage stakeholder commitment; (6) major change requires a champion-know what one does; (7) prototype organizational response; and (8) build change reviews into management process (Benjamin and Levinson, 1993).

Change Agents

When business leaders do not do their part in IT change management, or are not as effective as they should be, information systems (IS) specialists who are effective change managers can often direct projects toward success (Markus and Benjamin, 1996). Markus and Benjamin (1996) believe that there is a strong mutual relationship between IS specialist credibility and change management skills. According to Markus and Benjamin (1996), effective change management not only requires credibility, but it also builds credibility. Moreover, different change agent roles grow out of, and are maintained by, various structural conditions (Markus and Benjamin, 1996). Structural conditions are defined by Markus and Benjamin (1996) as social and economic arrangements, e.g., reporting relationships and policies, that influence the processes of IS work (e.g., which activities are done by in-house specialists and which by vendors and/or clients) and the outcomes of IS work (e.g., how successful IT projects are and how clients view specialists’ credibility and effectiveness).

Markus and Benjamin (1996) present three different models of change agency: traditional IS model, facilitator model, and the advocate model. Markus and Benjamin (1996) believe that these three models should be understood as “ideal types”, rather than as empirical categories. In all three models, IS change agency is understood as a basic orientation towards the goals and means of IS work that shapes what a practitioner does and how she or he does it (Markus and Benjamin, 1996). It is believed that change agency is not something a specialist might do instead of doing IS work (Markus and Benjamin, 1996). It is in fact considered to be a part and parcel of IS work, and is performed by specialists who are employees of the organizations for which the work is done (Markus and Benjamin, 1996). According to Markus and Benjamin (1996), in the

traditional IS model, technology causes change, while in the facilitator model, clients make change using technology; technology alone does not make the change. The advocate model indicates that people, including the change advocate, make change (Markus and Benjamin, 1996).

Markus and Benjamin (1996) found that many IS specialists do not see any need to change, because they already view themselves as effective change agents. There are several structural barriers to change in the IS change-agentry role, such as overreliance on technical expertise, control authority, and an inappropriate reward system (Markus and Benjamin, 1996). Increased behavioral flexibility of IS specialists (i.e., their ability to switch roles in different circumstances) would improve organizational effectiveness and also ensure IS specialist credibility.

Radical Change

In order to compete in a dynamic global environment, coalitions of business networks (suppliers, manufacturers, distributors, and customers) must coordinate their activities on a global scale (Segars and Dean, 2000). According to Segars and Dean (2000), this requires most firms to comprehensively review the assumptions that underlie their processes, lines of authority, knowledge sharing, technologies, and mechanisms of economic exchange. In many instances, a nexus of innovative organizational design and IT enables these new models of business (Segars and Dean, 2000). Segars and Dean (2000) believe that such transformations need radical change, and not incremental change. One of the crucial aspects of managing radical change is to determine whether the organization has the energy or capability for the change effort (Segars and Dean, 2000). It was found that organizations are not equal in terms of effectively leveraging IT and those that do leverage IT effectively have built key capabilities for navigating change and have also embarked on aggressive programs of reconfiguring their network of suppliers and customers (Segars and Dean, 2000). Bharadwaj (2000) found that firms with high IT capability tend to outperform a control sample of firms on a variety of profit and cost-based performance measures.

MODEL DEVELOPMENT

As stated earlier, a firm's IT capability is defined as "its ability to mobilize and deploy IT-based resources in combination or copresent with other resources and capabilities" (Bharadwaj, 2000, p.171). But in definite terms, what would be a firm's IT capability? What would it include?

Roepke, Agarwal and Ferratt (2000) believe that investment in a leadership capability can help align IT with the business vision and provide value to IT customers. According to Roepke et al. (2000), leadership capability in all IT professionals is a potential source of sustainable competitive advantage, and such a resource capability cannot be easily duplicated. Therefore, IT leadership capability appears to be one of the chief factors in a firm's IT capability. Since the Chief Information Officer (CIO) is in the highest level of IT leadership role in an organization, it can be said that the CIO is a major component of a firm's IT capability.

IT-enabled change processes are different from more general processes as they create unique issues for managers (Benjamin and Levinson, 1993). Managers must know how to integrate the technology, business processes, and organization in order to achieve the goals they expect with the technology (Benjamin and Levinson, 1993). This implies that the background and expertise of managers also plays an important role in a firm's IT capability.

According to Reich and Benbasat (2000), four factors that would potentially influence alignment are: (1) shared domain knowledge between business and IT executives, (2) IT implementation success, (3) communication between business and IT executives, and (4) connections between business and IT planning processes. Based on this, it can be inferred that an equal mix of IT and business experts on the board of directors and in executive composition is a good indicator of capabilities that would ensure IT-business alignment and therefore, could lead to competitive advantage.

Therefore, based on the foregoing discussion, it can be concluded that a firm's IT capability could include CIO competence, managers' competence, and board of directors and executives composition. It should be remembered that IT capability includes these factors, but is not limited to them. CIO competence could be gauged by her/his education, industry experience, and performance track record. The competence of managers could also be assessed in a similar manner. The composition of the board of directors and the executives could be assessed based on their backgrounds, by checking if there is an equal representation of both the business and IT professionals.

According to Mata, Fuerst and Barney(1995), research focused on understanding the sources of sustained competitive advantages for firms has identified various factors such as relative cost position of a firm (Porter,1980), a firm's ability to differentiate its products (Caves and Williamson, 1985; Porter, 1980), the ability of firms to cooperate in strategic alliances (Kogut, 1988), and information technology (Barney, 1991; Clemons and Kimbrough, 1986; Clemons and Row 1987, 1991a; Feeny, 1988; Feeny and Ives, 1990) as having a significant impact on a firm's ability to obtain sustained competitive

advantage. As can be seen, information technology is a resource that could have a significant impact on a firm's ability to obtain sustained competitive advantage. But how do we know how much of IT resources a firm possesses? Previous research has used IT investments as indicators of stock performance (e.g., Im, Dow and Grover, 2001). Therefore, stock performance will be considered as a proxy or indicator for competitive advantage in this paper.

Santhanam and Hartono (2003) investigated the IT capability and firm performance linkage and found that firms with superior IT capability exhibited "superior current and sustained firm performance when compared to average industry performance, even after adjusting for effects of prior firm performance" (p.125). Sambamurthy, Bharadwaj, and Grover (2003) argue that IT investments and capabilities influence firm performance through significant organizational capabilities and strategic processes.

Based on earlier research, IT investments are considered as indicators of stock performance and thereby, competitive advantage. But as has been discussed earlier, it is not just the resources, but the ability to mobilize the resources, which is the capability, that can play a crucial role. Therefore, if IT resources, as indicated by the IT investments can lead to competitive advantage, as represented by the stock performance, then IT capability moderates this relationship and influences the extent to which the investments affect the stock performance as shown in Figure 1.

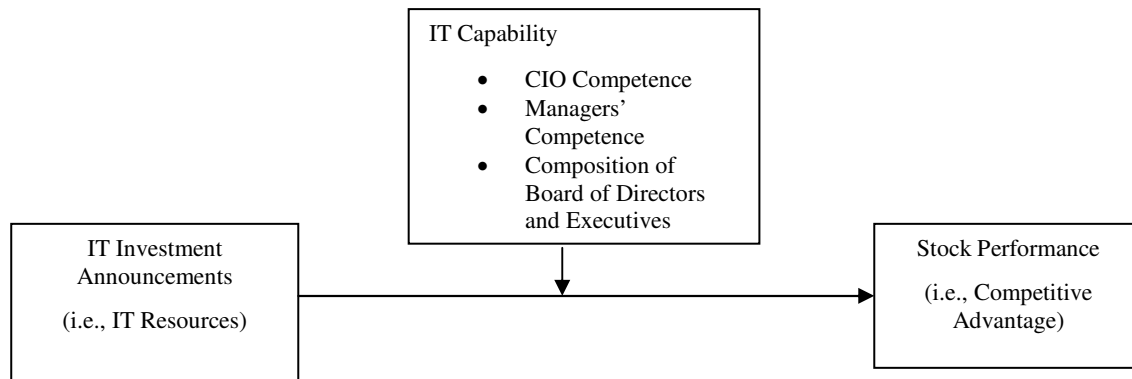


Figure 1. IT Capability: The Moderator Model of the Impact of IT Investment Announcements on Stock Performance

Based on this model, the following hypotheses are presented.

- Hypothesis 1: IT investment announcements have a significant relationship with the firm's stock performance.
- Hypothesis 2 (a): IT capability has a moderating effect on the relationship between IT investment announcements and stock performance.
- Hypothesis 2(b): CIO competence will moderate the relationship between IT investment announcements and stock performance.
- Hypothesis 2(c): Managers' competence will moderate the relationship between IT investment announcements and stock performance.
- Hypothesis 2(d): Composition of board of directors and executives will moderate the relationship between IT investment announcements and stock performance.

DATA COLLECTION AND METHODOLOGY

The IT investment announcements will be collected from news reports through the Lexus-Nexus database. The stock prices will be obtained from the Center for Research for Security Prices (CRSP) daily stock returns file. The prospectus (form S-1/A) and proxy statements (form DEF-14 A) obtained from the U.S. Securities and Exchange Commission's (SEC) EDGAR database would be used to collect the data for the IT capability components. Since the current economic downturn has impacted the stock market as a whole, care will be taken to ensure that the IT investment announcements will be collected from an earlier time period which was not marked by extreme volatile economic/market fluctuations. In order to test the hypotheses, an event study analysis and moderated regression would be conducted.

CONCLUSION

The literature review on IT and organizational capability presented in this paper has been synthesized from research on a wide range of topics that include the following: impact of IT on corporate strategy, impact of IT-based competition on industry structure, IT and sustainable competitive advantage, strategic decision making and change management. The literature review presented in this paper covers some of the seminal research conducted in this subject area between the years 1986 to 2002. During this period, and through all the different sub streams of research covered, one common thread has been seen. And this common thread is the importance of resources and capabilities. This leads to the conclusion that two key factors that will drive a firm's competitive advantage are its resources and capabilities. Although a lot of earlier research based on the resource based theory, has focused on the resources, there seems to be a lack of research that makes a distinction between resources and capabilities and their impact on a firm's competitive advantage. This research proposal seeks to fill in the gap in research by proposing that the IT capability could play a moderator role in the relationship between IT resources (as indicated by IT investment announcements) and competitive advantage (as indicated by a firm's stock performance). It could also offer guidelines to the practitioners in terms of the IT capabilities that could lead to a possible impact on a firm's competitive advantage.

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