The Organizational Effects of Software as a Service

Research-in-Progress

ABSTRACT

Organizational subunits such as marketing, sales, and customer service, invest in software-as-a-service (SaaS) as a means to reduce information technology costs, speed time to market, gain access to new technologies, and improve application support and maintenance. For these reasons, SaaS has been characterized as a form of outsourcing, but one in which IT is losing relevancy because contracts are being executed between external application service providers and the affected subunits directly without absolute oversight from IT. Here, we argue that SaaS is not outsourcing as has been traditionally envisioned and that it will instead result in increased IT relevancy through a strategic transformation of its mission by way of the theory of organizational slack to include innovative activities that directly affect the value chain.

Keywords

Information technology, IT, software as a service, SaaS, organizational slack, innovation, strategy, competitive advantage.

INTRODUCTION

Cloud computing, the much-heralded shift of information technology (IT) resources from internal to external environments using service-oriented architectures, consists of three primary pathways: 1) infrastructure as a service (IaaS), 2) platform as a service (PaaS), and 3) software as a service (SaaS) (Armbrust, Fox, Griffith, Joseph, Katz, Konswinski, Lee, Patterson, Rabkin, Stoica, and Zaharia, 2010). While the economic justification for IaaS and PaaS is dependent on structural contingencies such as application development resources, organizational cost of money, and real property and utility costs, the fiscal argument for SaaS is much clearer and well defined against the existing options of custom application development and packaged software (Garrison, Kim, and Wakefield, 2012). Enacting SaaS is the externalization of business process infrastructure, and because of the distributed nature of SOA with more optimal economies of scale reuse (Candan, Li, Phan, and Zhou, 2011), it is reported to lower IT costs, speed time to market, provide access to new technology, offer improved management of applications, and increase revenue growth rate among other anticipated outcomes (Garrison et al. 2012; Susarla, Barua, and Whinston, 2009). These lower expenses come in the form of hardware elimination, physical space reuse, and human resource reductions in application maintenance, testing, integration, server maintenance, systems administration, and technical support (Benlian and Hess, 2011). On top of these cost reductions, SaaS converts capital expenditures in depreciable assets on the balance sheet to operational expenditures on the income statement, which can benefit the financial structure of the organization (Golden 2009).

Concomitant with the SaaS-led reductions in internal IT budgets is the belief that information technology is taking another step toward commoditization and utilitarianism as promoted by Nicholas Carr in his provocative article "IT Doesn't Matter" (2003). It is widely believed that SaaS further reduces the relevancy of IT as a differentiator, consistent with published research that demonstrates an inability of IT to deliver sustainable competitive advantage (D'Aveni, Dagnino, and Smith, 2010).

Many researchers consider SaaS to be a form of outsourcing (Armbrust et al. 2010; Candan et al. 2011; Susarla et al. 2009), but we contend that it is something very different, an approach with profound implications for altering the role of IT within the organizational structure of firms facing moderate to turbulent environmental uncertainty. Rather than diminish the relevancy of IT, we believe that SaaS will enhance its importance and elevate IT's position from a support function to a value chain innovator through

the creation and allocation of organizational slack. We believe that SaaS may contribute to a fundamental redesign of Porter's value chain (Porter 1998) through the theory of organizational slack.

Organizational slack, essentially an unused resource capacity, along with the ability of the organization to absorb slack into the value chain sets the stage for the transformation of IT from a maintenance and support subunit to a center for value-chain innovation. Slack, by its nature to buffer the organization from environmental turbulence (Cyert and March, 1992; Pfeffer and Salancik, 1978; Thompson 2003), is the means by which IT could achieve newfound intra-organizational relevancy and power (Hickson, Hinings, Lee, Schneck, and Pennings, 1971).

This research paper will present prior research into organizational slack from multi-faceted viewpoints, examine the technological and process implications of software-as-a-service, and predict the outcomes that may emerge at the intersection of organizational slack and SaaS. From this work, we seek to answer the following research questions:

1) Will the adoption of SaaS result in the creation of organizational slack?
2) If so, will the slack be concentrated within IT and serve to restructure the IT function within the firm?

SAAS DEFINITION AND DESCRIPTION

Software-as-a-service, a variant of cloud computing, is the internet-enabled form of Application Service Provider (ASP) delivered software. Over the past several years, application service providers have offered software on mainframe computers in multi-tenant data centers for customers to access remotely (Farber 2008). What makes SaaS different is elastic technology in the form of service oriented architectures (SOA) and Web Services Design Language (WSDL) that conform to instantaneous changes in demand, the access method of using a standard browser whether desktop or mobile over broadband internet links, and the lower cost of operating a data center using virtualized servers in a locale of cheap electric utilities and real estate, and co-located with fiber optic trunk line facilities. All of these SaaS elements combine to rewrite the economics of provisioning and using software on demand.

The computational power offered by SaaS is akin to electricity; a seemingly unlimited amount is available on demand, and the customer only pays for what is consumed. And like electricity, cloud computing and SaaS have transformed the use, maintenance, and support of software applications to that of a utility function (Armbrust et al. 2010). Consistent with the notion of SaaS as a utility, cost savings is the largest factor in selection over packaged or custom software. It is the conversion of this cost savings into organizational slack that is envisioned as the funding for transforming IT from a focus on maintenance and support to innovation.

Even so, there have been a number of issues related to SaaS that have limited its acceptance in the business community. Armbrust et al. (2010) inventoried these obstacles to SaaS adoption: Availability / Business Continuity, Data Lock-In, Data Confidentiality and Auditability, Data Transfer Bottlenecks, Performance Unpredictability, Scalable Storage, Large-Scale Distributed System Errors, Rapid Scalability, Reputation Fate Sharing, and Software Licensing.

Perhaps due to these hurdles, early adopters of SaaS have been highly dissatisfied (Mears 2004). In addition to this list, there is the potential for application-firm environment misfit over custom developed software (Strong and Volkoff, 2010), but there are categories of applications in which SaaS has achieved 'best of breed' status, thus minimizing the organizational-enterprise software misfit artifact. As to the aforementioned obstacles, each is being addressed in the private and public sectors, and SaaS is now being used in some form by 425 of the InformationWeek 500 (InformationWeek 2012). The Internet Software and Services market, of which SaaS is a still-minor part, now comprises 40.9% of the $2.5 trillion global software and services (MarketLine 2012).

SAAS AND OUTSOURCING

After analyzing 12 organizations involved in outsourcing, Kern and Willcocks (2000) defined outsourcing as "the decision taken by an organization to contract or sell the organizational assets, people, processes and/or activities to a third party supplier, who in exchange provides and manages assets and services for monetary returns over an agreed period of time." An even more extensive survey comprised of 544 responses revealed outsourcing to be nothing less than the wholesale restructuring of the corporation around core competencies and outside relationships (Elmuti, Kathawala, and Monippallil, 1998).

Outsourcing began with IT functions such as application development and maintenance, bug fixes, data entry, call centers, and systems maintenance in the 1960s and 1970s (also known as information technology outsourcing or ITO) (Duggal and Simkonis, 2007; Hirschheim, Heizl, and Dibbern, 2002). As more corporations experienced cost savings as the result of divesting internal, non-strategic tasks, the focus on outsourcing shifted to include whole business processes (business process outsourcing or BPO) (Elmuti et al. 1998). While ITO represents 40% of the outsourcing market, real estate and physical plant (15%), logistics (15%) and administration, human resources, customer service, finance, marketing, sales and transportation (30%) are substantial components. It's important to note that BPO as it relates to IT is the externalization of entire business processes – personnel, hardware, software, and tasks. Primarily, BPO may be viewed as a payroll reduction effort by relocating labor-intensive tasks to a low-cost locale (offshoring) or diverting them to a provider with much higher efficiency and economies of scale.

Outsourcing, while offering a panacea of offloading non-strategic tasks and gaining reduced budgets, has been problematic. Researching 61 ITO projects, Lacity and Willcocks (1998) found that only 56% achieved the expected success. Seven years later, Craig and Wilmott (2005) and Aron and Singh (2005) confirmed the notion that only half of all outsourcing projects realize the expected cost savings and performance outcomes.

A potentially more deleterious outcome than failing to achieve the expected cost savings is the potential loss of organizational skills and knowledge (Fine 1998; Kakabadse and Kakabadse 2005), and therein lay the chief difference between outsourcing and SaaS; the externalization of process and knowledge versus the externalization of tools alone. Outsourcing, particularly BPO, is a reduction in payroll and a concomitant loss of organizational knowledge through personnel depletion whereas SaaS is retention of organizational knowledge by keeping the business processes and personnel internal to the organization. Certainly, there is a payroll reduction inherent in SaaS, but that is confined to IT maintenance and support activities. The remainder of the cost savings associated with SaaS is centered on real estate, hardware, software licensing, utilities, and other operational expenses tied to running the application software. It is this cost savings that we propose will be converted to organizational slack, which will then be applied toward a transformation of the IT subunit.

THE THEORY OF ORGANIZATIONAL SLACK

Organizational slack made its conceptual debut in The Behavioral Theory of the Firm (Cyert et al. 1992) as a hypothetical construct to explain an organizational phenomenon. It was originally defined as an unintended disparity between resource availability and payment necessity to maintain the coalition of the firm that was the result of satisficing behaviors. Since that time, slack has received numerous definitions (Child 1972; Cohen, March, and Olsen, 1972; Dimick and Murray, 1978; Litschert and Bonham, 1978; March 1979; March and Olsen, 1976), but because James March and his work dominate definitions of organizational slack, Bourgeois condensed and paraphrased what will be considered to be the exemplar definition: "Organizational slack is that cushion of actual or potential resources which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for change in policy, as well as to initiate changes in strategy with respect to the external environment" (Bourgeois 1981). Under the aegis of organizational theory, slack is seen as benefiting the firm rather than the individual.

Slack has also appeared in agency theory, specifically with incentive contract design for maximum agent gains while taking into account information asymmetry between agent and principal, the agent's pursuit of

self-interest, and environmental uncertainty that alter the agent's outcomes (Choudhury 1985). The slack that arises under the guise of agency theory involves deceptive behaviors with regard to communications, decision-making, and the presentation of self (Schein 1979). The duplicitous actions of these agents are dependent upon the level of competition facing the firm. In highly competitive environments, agents are forced to accommodate a low-slack environment because of the necessity for efficient resource allocation, thus limiting their ability to generate slack for the purpose of personal enrichment. Similarly, in stable environments where the organization may rely on standard operating procedures to guide decision-making, the agent is able to transfer greater volumes of slack for personal gain (Schein 1977). In either case, the maximization of personal reward is the guiding managerial mantra within the boundaries of agency theory cynicism. While this makes for interesting theory, empirical evidence clearly supports organizational theory over agency theory with regard to organizational and budgetary slack (Tan and Peng, 2003).

Another slack model involving non-strategic managerial discretion is income smoothing, the manipulation of the level of earnings to neutralize environmental uncertainty (Kamin and Ronen, 1978). Income smoothing may be accounting-derived numerical manipulations or real in the sense that management controls the timing of revenue or cost events. A large number of firms are engaged in this behavior, particularly among management-controlled firms with high entry barriers (Belkaoui and Picur, 1984)

In certain organizations, the implementation of Software-as-a-Service may result in budgetary slack or income smoothing as a result of deceptive managerial behaviors, but this is unlikely given the transparent SaaS contracting process that involves multiple organizational subunits and layers of management. As such, this research will confine its focus to the creation of organizational slack that may arise through cost savings along with a SaaS-induced externalization and redistribution of IT tasks and roles. For these reasons, we propose the following hypotheses:

H1: The adoption of SaaS will positively mediate the creation of organizational slack.
H2: The adoption of SaaS will positively mediate the decentralization of certain IT tasks and roles.

ORGANIZATIONAL SLACK AND INNOVATION

Proponents of agency theory view slack as a manifestation of managerial corruption (Fama et al. 1983), thus incapable of advancing organizational goals whereas organizational theorists (structural contingency and behavioral) envision slack as an uncertainty buffer that can also fulfill the role of innovative behavior through funding experimentation (Bourgeois 1981; Cyert et al. 1992; Hambrick and Snow, 1977). Nohria and Gulati (1996) responded to this paradox with empirical research designed to uncover a slack-innovation relationship, if any. They begin the process by defining innovation as most inclusive - any policy, structure, method or process, product or market opportunity that the manager of the innovating unit perceived to be new – so that they might capture all possible variants. This is an important factor particularly as it relates to IT because of its ability to deliver exploration and exploitation (i.e., differentiation and efficiency) outcomes (Xue, Ray, and Sambamurthy, 2012). Collecting data covering 264 functional departments across two multinational firms, they found supporting evidence that slack is beneficial toward motivating and funding innovation, but on an inverted U-shaped curvilinear relationship. Too little slack does not provide the necessary impetus to answer the environmental demands for innovation and too much slack has a negative effect on investment discipline.

Extending the examination into slack-innovation pathways, Geiger and Cashen (2002) introduced multidimensionality into the discussion by separating the slack construct into available, recoverable, and potential elements. Available slack is measured as the firm's current ratio (current assets/current liabilities), a quantification substantiated by prior research (Bourgeois and Singh 1983; Bromiley 1991; Cheng and Kesner, 1997). Recoverable slack is defined financially as the ratio of general and administrative expenses to sales revenue, which normalizes the measurement for size and industry (Bourgeois 1981; Bourgeois et al. 1983; Bromiley 1991; Lant 1986). Potential slack is operationalized as a firm's debt to equity ratio (Bourgeois et al. 1983; Bromiley 1991; Palmer and Wiseman, 1999).

Available and recoverable slack are hypothesized to exhibit a curvilinear effect because of the need to strike an economic balance between slack buffer, industry and market dynamism (innovation requirements), and firm performance, whereas potential slack is viewed as having a purely linear impact on innovation as a result of its zero percent debt limitation. Data from 228 companies was analyzed and controlled for risk, size, product diversification, time, and administrative structure, and from their findings, Geiger et al. (2002) asserted that there is an optimum level of available and recoverable slack that conforms to an environmental fit; too little denies innovation of the 'fuel' it needs and too much promotes wastefulness.

Addressing limitations regarding the robustness and generalizability of Nohria et al.'s findings, Herold, Jayaraman, and Narayanaswamy (2006) researched the available slack-innovation relationship with a focus on patents as evidence of innovative activity at the organizational instead the departmental level. The use of patents is chosen to reduce perceptual and increase objective data, and at the same time it must be normalized for industry and patent importance. Researching 350 companies, the authors demonstrated the available slack-innovation function as curvilinear in two dimensions: 1) the relationship between organizational slack resources and the importance of patent-based inventions is positive, but diminishes in strength beyond some intermediate point, and 2) the industry patenting intensity moderates the relationship between slack resources and the impact or importance of firms' patents. Specifically, diminishing returns will be more evident in low-patent intensity industries.

Organizations are facing increasing requirements for innovation in IT as these are now being directly integrated into business strategy. Kleis, Chwelos, Ramirez, and Cockburn (2012) demonstrated in their 10-year longitudinal study of large corporations the significant relationship between IT input and innovation output while holding innovation spending constant. This relationship was notably strong during the rapid-growth adoption of Internet technologies that occurred during the late 1990s. A recent InformationWeek survey of 500 firms (2012) found the following:

- 58% developed a revenue-generating product or service from within the IT function;
- 51% embedded IT intellectual property into a new product or service;
- 60% are reducing IT overhead costs to fund new business technology initiatives;
- 33% of CIOs are responsible for all business innovation, up from 16% in 2009.

Another recent InformationWeek survey of 382 business technology professionals (Lundquist 2012) collected the following perceptions:

- 74% see IT as very important and extremely important to business innovation;
- 75% of the organizations that have a chief innovation officer have positioned that role within the IT function.

Yet another recent InformationWeek survey of 1,391 business technology professionals (Murphy 2012) found that second to information security, applications development is a leading category for IT hiring. In light of the extensive use of SaaS, we may conjecture that these application developers will be devoted to innovative activities, regardless of exploration or exploitation outcomes. For these reasons, we propose the following hypotheses:

H3: The decentralization of IT tasks and roles will positively mediate the transformation of the IT subunit toward a greater emphasis on innovative activities.

H4: The slack created by SaaS adoption will be concentrated within the IT function and it will consist of available and recoverable variations.

H5: SaaS-induced slack will positively mediate the transformation of IT toward a greater emphasis on innovative activities.

ORGANIZATIONAL SLACK AND FIRM PERFORMANCE

Because of ambiguity in the slack-performance relationship across a large number of studies, Daniel, Lohrke, Fornaciari, and Turner (2004) undertook a meta-analysis to determine why results have been

inconclusive and further, to ascertain if there is a positive relationship between slack and firm performance. Extracting 80 samples from 66 studies, the authors offered evidence of a significantly positive slack-firm performance relationship among all three types of slack (available, recoverable, and potential). This relationship was stronger when controlling for industry, which by its nature includes controls of the external environment. While not a direct confirmation of Sharfman, Wolf, Chase, and Tansik (1988), this emboldens the notion that the slack-firm performance link is subject to a moderating influence of environmental dynamism.

Several researchers have hypothesized that slack's contribution to firm performance is not linear but parabolic, an inverse-U shaped function that is the result of economic efficiency (Bourgeois 1981; Bromiley 1991; Sharfman et al. 1988). The idea is that the amount of slack must be matched to industry and environmental requirements such that sufficient slack exists to accommodate uncertainty and complexity but not so much as to provoke strategic complacency or deceptive practices in pursuit of managerial remuneration. In addition to the amount, the type of slack may have an impact on managerial practices as they relate to firm performance, as shown by Tan et al. (2003) who advocated the notion that available slack is more closely tied to organizational theory whereas recoverable slack is more closely aligned with agency theory.

Wefald, Katz, Downey, and Rust (2010) continued the investigation into the role of industry as it pertains to the slack-firm performance relationship. Examining 359 company records and following the methods of Nohria et al. (1996), Palmer et al. (1999), and Daniel et al. (2004), available and recoverable slack were studied. Using the measurements specified by Bourgeois (1981) and Lant (1986), they discovered a partial confirmation of the curvilinear relationship between available and recoverable slack and firm performance. Additionally, Wefald, et al. demonstrated a partial confirmation of the notion that when industry is added as a control variable to recoverable slack, a significant increase in the predictability of firm performance was partially supported.

Delving into the industry sectors that segmented the research, if the firm is sensitive to labor productivity in their competitive stance, then recoverable slack is an important predictor in the firm performance model. In short, when labor is essential for competitive advantage, then excess labor reduces risk and contributes to financial performance. When profitability is the criterion and available slack the predictor, then the function between slack and firm performance is curvilinear. This available slack curvilinear effect is more pronounced for those firms operating in industrial sectors with relatively short production cycles, such as apparel, shoes, and other consumer products, firms that need liquidity to introduce rapid changes dictated by their markets (Wefald et al. 2010).

Firm performance specific to IT management has been operationalized as simply business process improvement, regardless of whether efficiency or innovation is the goal (Melville, Kraemer, and Gurbaxani, 2004). Building on that idea is the notion that IT resources influence firm performance through improvements in customer management, performance management, and process management capabilities (Mithas, Ramasubbu, and Sambamurthy, 2011). For those reasons, we propose the following hypothesis:

H6: SaaS-induced slack will positively mediate firm performance.

ORGANIZATIONAL SLACK AND ENVIRONMENTAL DYNAMISM

Because slack buffers the organization from environmental turbulence (Cyert et al. 1992; Pfeffer et al. 1978; Thompson 2003), some understanding of environmental dynamism is in order.

Environmental dynamism, ranging from stable to turbulent, describes unpredictable conditions that arise from changes in customer needs, new technologies, or strategic moves by aggressive competitors (D'Aveni et al. 1994) as well as dramatic regulatory changes (DiMaggio and Powell, 1983). The environment may be external (e.g., markets, competitive rivalry, disruptive technologies) or internal (e.g., crises and conflicts) to the firm (Mendelson 2000). Dynamic environments have been characterized as relatively predictable within the anticipated wave patterns, and "high velocity markets" as nonlinear and arbitrary (Eisenhardt and

Martin, 2000). These definitions have been supported by Kendall, Holsapple, and Jin (2007) who report environmental dynamism as occurring in "waves," which by their cyclical peak-and-trough nature, are somewhat predictable, and "storms," which are unexpected and capricious.

Sharfman et al. (1988) designed a predictive model of two dimensions of slack – high discretion (available) and low discretion (recoverable) - as they relate to the environment. With an external environment defined with the constructs of emergent and declining industries, environmental dynamism in terms of speed and size, market munificence, and service industries, and an unstable internal environment, the authors demonstrate that high discretion slack is necessary and in greater quantities in dynamic environments than in stable environments to manage risk and performance.

Exploring the relationship between environment and slack further, Palmer et al. (1999) showed that environmental complexity and uncertainty affect managerially perceived risk, which is the driving factor in determining slack requirements. Applying these findings to available and recoverable slack, it may be surmised that in dynamic industrial and market sectors high levels of available slack would mitigate risks due to the availability of immediate liquidity whereas in stable environments high levels of recoverable slack would allow greater production and consequently higher levels of performance. Under these scenarios, industry is not so much a moderating factor than a constraint in how firms choose to compete (Latham and Braun, 2008).

Hickson et al. (1971) postulated a positive relationship between an ability to process environmental uncertainty and increased intra-organizational power. The ability to cope with uncertainty establishes a "shock absorber," which may be enacted through prevention, forecasting, or absorption after the fact. It is this post facto absorption with which slack may enable an uncertainty coping mechanism within the subunit, and consequently empower that subunit relative to the internal environment of the organization. Combined with its ability to reduce conflict between subunits through decentralization (Pondy 1967), slack may serve to quell uncertainty in both the internal and external environments. For these reasons, we propose the following hypotheses:

H7: The amount of slack created by the adoption of SaaS will be positively moderated by environmental dynamism.

H8: SaaS-induced IT innovation will be positively moderated by environmental dynamism.

H9: The concentrated slack produced by SaaS adoption will positively affect intra-organizational IT power.

However, regardless of the prior research linking slack production with a necessarily dynamic environment, with SaaS-induced slack the case may not hold. Information technology is a catalyst for organizational learning affecting both exploration and exploitation cycles (Zollo and Winter, 2002). This would imply that independent of a firm's strategic position – differentiation or cost – IT would advance its mission in a competitive environment, an idea demonstrated through empirical data (Xue et al. 2012). For these reasons, we propose the following hypothesis:

H10: Environmental dynamism will not affect the creation or use of SaaS-induced organizational slack.

RESEARCH DESIGN AND METHODOLOGY

Because very little research has been conducted into the organizational impact of Software as a Service (SaaS), this study will focus on explanatory issues, such as examining the forces generated by the implementation of SaaS and studying the causal network as proposed in the research model. We seek to uncover the beliefs, attitudes, and administrative policies that shape the adoption of SaaS and any resultant outcomes that affect the organization and its structure, strategy, competitive advantage, and performance relative to the adoption ratio of SaaS. To do so we propose a multi-site case study as the means to gather an illuminating portrait of SaaS across a range of industry environments and, along with information to determine the research model validity, perhaps uncover unanticipated consequences of its adoption. While

this tactic may not promote generalizability, it should aid in the refinement of the research model and allow better tuning of future research.

Because hypotheses 7, 8, and 10 rely on both the presence and lack of environmental turbulence to determine if there is a relationship with IT-concentrated slack production, the sample population must reflect a range of environmental characteristics. Sørensen (2002) examined industry volatility using the Capital Asset Pricing Model and its notion of beta as a partial proxy for environmental characteristics. Using the Value Line database of 5,891 firms divided into 99 industry sectors, the beta for each sector was calculated and then unlevered by the market value debt-to-equity ratio. Plotting the distribution of the unlevered beta adjusted for cash reveals a normal distribution curve, thus allowing industry sector samples to be taken from the region one standard deviation above and below the mean to provide a basis from which to test for environmental turbulence and stability. A single industry sector representing the most and least volatile along with a sector at or near the mean will provide the foundation for a baseline sample population. Once a firm has agreed to engage as a research participant, up to four additional firms from that specific industry sector will be targeted. Limiting the samples to single industry sectors from each of volatile, moderate, and stable regions should minimize the effects of variables not represented by volatility measures developed by Sørenson.

Developing an understanding of SaaS adoption will necessitate before-and-after perceptual snapshots as well as top-down and bottom-up information gathering and analysis. In addition to pre-implementation snapshots of managerial perceptions and organizational structure, roles, and slack, in order to capture the potential effects of SaaS beyond simplistic cost reduction will require some period of time after a SaaS implementation has gone live such that organizational assimilation has taken place and that innovation and firm performance are potentially evident. We believe that two years should be sufficient to allow organizational changes and resultant performance improvements to take place.

Organizational structure, roles, and slack pre- and post-SaaS adoption will be determined using semi-structured interviews for top and line level management (top-down) and surveys for task level employees (bottom-up). Triangulating numerical data will be extracted from four secondary sources: 1) CI Technology Database from Harte-Hanks, 2) COMPUSTAT database, 3) National Bureau of Economic Research, and 4) Bureau of Economic Analysis.

DATA SOURCES

InformationWeek 500 and the CIO Executive Council is chosen as the target sample population for identifying primary case study candidates because this study seeks to determine the changing nature of IT with regard to SaaS adoption, and these companies, who represent 85% SaaS adoption (InformationWeek 2012), are considered to be at the leading edge of IT/business strategy.

Secondary case study candidates who represent companies in the same industries but that have not implemented SaaS will be identified and enrolled in the study as a control group and to assess/corroborate pre-SaaS adoption characteristics. Their identification will be undertaken through the Fortune 1000 membership list.

MEASURES

Following the research model, data measurements will pertain to constructs such as SaaS adoption, organizational slack, IT role decentralization, IT transformation, IT innovation, environmental dynamism, and firm performance. These constructs will be analyzed through interviews, surveys, and quantitative data in order to gain a better understanding of constituent factors and how they may pertain to resultant phenomena.

SaaS Measurement

Software-as-a-Service should be analyzed through a variety of prisms as determined through semi-structured interviews with top and line level managers. Using these instruments, we intend to ascertain the following information:

1) SaaS adoption timeline from pre-adoption to present
2) Number of task level employees using SaaS
3) Ratio of task level employees using SaaS to total firm employees
4) Perceived importance and value of SaaS functionality

Organizational Slack Measurement

Because SaaS is primarily implemented as an expense reduction mechanism, measuring IT investment before and after SaaS implementation will determine the level of concentrated slack that is produced, if any. If IT investments post-SaaS adoption remain constant or increase, after adjusted for control variables such as firm size and economic conditions, then clear indication of slack production is evident.

Perceptual measures of organizational slack will come from semi-structured interviews with top and line level managers; questions will be devised to uncover pre and post-SaaS adoption IT budgets and investment, personnel counts, and their roles.

Numerical data is collected by extending the organizational slack measures proposed by Bourgeois (1981), Bourgeois et al. (1983), and Lant (1986). This study will compute organizational slack as recoverable and the differential between pre and post-SaaS adoption IT asset investments/total sales.

After extracting data from the CI Technology Database, IT asset investments in hardware technology will be determined using the approach delineated by Chwelos, Ramirez, Kraemer, and Melville (2010). Additional investments in software, staff, and training will be approximated as three times the IT labor expense, which is consistent with IT productivity literature (Dewan, Michael, and Min, 1998; Hitt and Brynjolfsson, 1996). IT labor expense is computed by multiplying the number of IT employees by industry-specific average labor rates and then deflating using the Index of Total Compensation from the Bureau of Labor Statistics.

The net equation, a ratio normalized for sales volume, takes the total IT hardware investment, adds it to three times the labor expense, and then divides by the firm's total sales. Taking the IT asset investment and dividing it by the firm's total assets may compute another ratio using assets rather than sales as the normalizing factor.

IT Decentralization Measurement

A feature inherent in the adoption of SaaS is the reassignment of certain tasks from within the IT subunit to external providers or SaaS-affected subunits elsewhere in the firm. This shifting of roles and responsibilities represents the relocation of specific IT tasks and is measured as the perception of IT support needed for subunit with respect to the application functionality (including business process design), maintenance, and support. Based on practitioner surveys that reveal SaaS service contracts are being negotiated directly with non-IT subunits (Preston 2012), further measurement will be ascertained as the perception of SaaS provider-subunit relationship management without assistance from the IT subunit. This line of questioning will seek to ascertain what IT tasks, if any, have been subsumed by the SaaS-affected subunit.

Environmental Dynamism Measurement

The nature of the industry environment will be captured using both perceptual and numerical data. Perceptual information delineating the environment by market turbulence, competitive intensity, and technological turbulence is provided through the survey instrument devised by Jaworski et al. (1993) and found in Appendix 6. This survey will be distributed to top level and line level managers. Rather than rely solely on managerial perceptions for understanding environmental dynamism, we will also calculate corroborating information from numerical data.

Multiple indicators of the environment – dynamism, munificence, and complexity – have been prescribed in organizational literature (Dess and Beard, 1984; Keats and Hitt, 1988; Palmer et al. 1999) and may be approximated by numerical data. Using the methods described by Xue et al. (2012), dynamism is measured as the volatility in industry sales and volatility in industry operating income (see also Keats et al. (1988)). Munificence is measured as growth in industry sales and growth in industry operating income (see also Dess et al. (1984)

Growth and volatility of industry sales are measured with a two-step process following the proscribed method of Keats et al. (1988) and Palmer et al. (1999). Taking the natural logarithm of the total sales of industries cataloged by four-digit NAICS codes and regressing against an index variable of years, over a period of five year provides the foundation from which the antilog of the regression coefficient is used as a measure for sales growth. Further, the antilog of the standard error of the regression coefficient represents the measure of sales volatility. This same approach is then used to determine the growth rate and volatility of industry operating income.

According to extant literature (Dess et al. 1984; Keats et al. 1988), environmental complexity is measured through the use of three indicators. First, Grossack's (1965) dynamic measure of industry concentration is a regression of current-year market shares of all firms in a given industry upon their shares 5 years ago. The reciprocal of this regression coefficient is an indicator of monopoly power, which is one measure of complexity. A lessening of monopoly power indicates higher levels of competitive rivalry, hence greater complexity. Second, the four-firm concentration ratio is the total sales of the top four firms in an industry divided by the total sales of that industry. This is a measure of oligopoly, and similar to monopoly indicate the amount of competitive rivalry, which translates into environmental complexity. Third, the Herfindahl–Hirschman Index (Hirschman 1964) also denotes industry concentration, with higher values indicating lower degrees of complexity through reduced competition.

IT Transformation Measurement

The adoption of SaaS will by its nature result in lower requirements for internal IT personnel. But because we argue for the creation of concentrated organizational slack, we believe that rather than shrink the workforce the IT subunit will use this opportunity to shift roles away from applications support and maintenance and toward a greater emphasis on innovative applications development designed for differentiation or efficiency-related outcomes.

The transformation of the IT subunit may be operationalized as changing roles of IT personnel through hiring, training, or reassignment, a comparison of the types of projects with which IT becomes involved pre- and post-SaaS, and the differential perceptions of the IT function within the firm by IT and non-IT employees. All three of these characteristics will be captured in semi-structured interviews and survey instruments with top level and line level managers and surveys of task level employees.

IT-centric Innovation Measurement

Many researchers determine levels of innovation by capturing patent activity (Hagedoorn and Cloodt, 2003; Xue et al. 2012), but we believe that this unnecessarily limits measurement of innovation. Instead we choose to broadly investigate perceptions and roles related to innovative activity. Kleis et al. (2012) offer

three mechanisms by which IT donates to innovation: 1) knowledge management, 2) innovation production assistance, and 3) inter-organizational coordination. Line level manager surveys will seek to determine if additional IT personnel have been allocated to any of these three areas after adopting SaaS as a means to gauge IT-innovation activity.

But we believe that IT is now also delivering innovation directly in the value chain. An example of this is UPS's ability to reroute packages prior to delivery, this after a five-year IT development effort to ensure economical logistics operations (UPS 2012). Managerial and employee perceptions of broadly-defined IT innovation, whether the end result is associated with differentiation or efficiency, within the firm before and after SaaS adoption will be gathered through semi-structured interviews and survey instruments.

Firm Performance Measurement

Firm performance specific to IT management has been operationalized as simply business process improvement, regardless of whether efficiency or innovation is the goal (Melville et al. 2004). Building on that idea is the notion that IT resources influence firm performance through improvements in customer management, performance management, and process management capabilities (Mithas et al. 2011). Very little research has been conducted into the relationship between IT-focused innovation and firm performance, hence our difficulty with operationalizing this predictor-criterion pathway. Lacking a clearly defined operationalization of firm performance, we will confine this measurement to standard financial metrics (ROA and ROE) along with perceptions of firm performance relative to industry and chief competitors using interviews and survey instruments.

LIMITATIONS

Of significant importance to this research is the density of the SaaS implementation in terms of the number of employees affected as a ratio of the firm-wide employee headcount. Because many SaaS implementations are priced by seat, the number of affected workers will reflect the amount of slack that may be generated as a result. Without sufficient SaaS effects to be counted, the presence of slack may be of practical insignificance.

Even if measurable and significant slack is generated, management must still choose to concentrate that slack within the IT function so as to create a contribution to innovation. Exigent circumstances may direct managerial decision-making toward a redistribution of slack to other functions within the firm.

With sufficient slack and favorable managerial decisions, the IT function may have to adapt its budgeting process in order to fund innovative activities outside of traditional support roles. The failure of any of these three antecedents may inhibit the detection, measurement, or contribution of slack toward new IT-centric innovation and its concomitant effect on firm performance.

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