

E-Commerce Sourcing Models

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Abstract

Electronic commerce (EC) involves business transactions, marketing efforts, information gathering, and other functional activities with respect to information technology (IT) both within and without an organization. It provides various opportunities to a firm to adopt different business sourcing models and allows new opportunities to configure organizational structure for both private and public companies within the New Economy. Critical factors for EC success dictate that the firm must re-evaluate its business sourcing model from with complexity theory and the New Economy, thereby emphasizing the need for the firm to effectively coordinate its EC initiatives and consider all sourcing opportunities in this nonlinear, decentralized, alliance-focused, and CRM-based environment. This research will build from 1) an understanding of EC, to 2) the complex systems of EC in the New Economy, to 3) the sourcing mode used in the EC business model.

Keywords

Electronic commerce, outsourcing, sourcing models, complexity theory

Electronic commerce (EC) literature suggests that the complementary technologies of the World Wide Web and the relational database management system (RDBMS) have been integrated to build EC. Integrated, these technologies are known as Web database constructions. It is the scalability and flexibility of Web database construction technology and the client/server foundation on which it is based that have enabled the colossal growth of EC. The literature is ripe with examples of how EC has provided both the ways and the means for virtual stores and Web presence for an unlimited number of private businesses today. Prior to the emergence of these technologies, information technology (IT) was primarily used by businesses as supporting the elimination of extraneous costs and reducing expenses. Today, the new IT systems also help public organizations maximize shareholder wealth through cost savings, increased revenue, and customer service.

Complementarity Theory and the Collaborative Nature of IT

This research is based on complementarity theory that supports the collaborative nature of IT. Complementarity theory is derived from economic theories and is most often used by the body of knowledge to develop a model linking a net value to the electronic system success. This theory provides a rational foundation for understanding the drivers of the value derived by the participants internal and external to the collaboration of EC, and for selecting design characteristics and subsequent sourcing modes in such a way that maximizes cost savings. In the context of EC design, an application of complementarity theory would suggest that when stakeholders in EC can provide a set of related or complementary features, it greatly enhances the benefit to the user while reducing his/her cost of effort and time spent in using the system, thereby maximizing the user's net value. Complementarity theory would also imply that having only a subset of complementary design features in isolation will not bring the desired benefits to the organization's stakeholders (Crafton, 2002).

Complementarity theory explains two main IT issues: (1) the efficient dissemination of information through the organization of information resources, search, and resource linking capabilities, and (2) the global forum for asynchronous and synchronous interactions involving customer relationship management (CRM) and knowledge management issues. Given the large number of design alternatives in an open environment, complementarity theory

provides rationalization why certain features of a collaborative system must be provided in tandem to increase stakeholder benefits and reduce organizational opportunity cost. It also provides the theoretical premise to design and implement Web-based interactive electronic forums, i.e., EC.

Traditionally, management has viewed the organization as a mechanistic, linear system characterized by a simple and predictable cause and effect. However, another theory that supports the collaborative nature of EC and which is a complement to complementarity theory is complexity theory. This theory brings to management an organic, nonlinear, and holistic way of viewing organizational systems in the new information age, the New Economy. Hypothesized outcomes of this research also include a better understanding of the emergent behavior such as sourcing choices of the global networked systems within the EC model. One of the greatest challenges to organizations in the New Economy of EC may be to executives and senior management. "Both the Knowledge Era and the Network Society are reducing the capacity of control and increasing the requirement of distributed intelligence and accountability" (Merry, 1995). The move needed for EC is toward autonomy and self-organization and away from central direction and control with sourcing methodologies intrinsically linked to these moves. The adjustment in thinking and attitude and the resulting disintermediation is proving extremely difficult for many of the formal leaders. Traditional wisdom says an organization should have a CEO overseeing a management team with a vision or strategic intent supported by a shared culture. The organization and its management team should focus on its core competency, build on its strengths, adapt to its environment, and keep a close eye on the bottom line. Goal and strategy formation, environmental analysis, and strategic control are the hallmarks of a viable organization. Most may no longer

be applicable from a complexity theory management perspective in the global economy. The traditional organization is seen as a clockwork machine following linear Newtonian rules. But complexity theory has shown the world does not operate this way. The world displays creative disorder (Lissack, 1996). For EC to succeed, global organization management, indeed management in general, today requires the ability to see systems as unpredictable and non-linear. Ralph Stacey (1993) noted two kinds of managers: One: ordinary management is needed to fulfill day-to-day problem solving through a linear, analytic process; two: extraordinary management is required for the organization to transform itself when in the midst of open-ended and rapid change. Stacey (1993) added that rational decision-making may not work in the New Economy because the givens must be disputed. Extraordinary management requires the development and use of tacit knowledge within the organization, these necessary for the choice sound sourcing modes.

EC managerial issues include finding solutions such as outsourcing to deal with growing complexity and uncertainty. The acceleration in the rate of change, hyper-competition, the crunch economy, the knowledge landscape, the changes in the workforce, all create problems for organizations and their networks, which are complex systems, in the process of changing themselves to better adapt to new environmental conditions. They are problems of how to ensure organizational sustainability in a complex, uncertain, interconnected world. They are multi-layered, nonlinear, interconnected, dynamic, complex problems with which the New Economy has difficulty dealing. Complexity theory helps management understand the uncertain environment and the irregular effects of nonlinearity and interdependence on organizational functioning in the global economy. It focuses attention on the different states in which the organization may be functioning. It explains

why sometimes large efforts give no results and at other times a minor change, such as in sourcing mode, leads to a landslide.

The Innovation Diffusion Process: the Birth of Outsourcing

Organizations are influenced by the actions of their peers and competitors through innovation diffusion process (Rogers, 1995). The decision by Kodak, for example, to outsource its entire IT operations was considered a major event in the IT community that legitimized large-scale outsourcing of IT functions. Loh and Venkatraman (1992b) tested this hypothesis and suggested that there indeed was a “Kodak effect” in the IT outsourcing industry wherein internal influence became important in the sourcing decision after the Kodak announcement. However, Hu et al (1997) disputed these results based on an expanded data set and found that there was no such Kodak affecting the IT sourcing industry. Peer pressure in the context of EC was not just a matter of following trends; it rapidly became a matter of holding on to customers and impacted sourcing modes. In almost every industry, customers expected to find detailed product information at the click of a mouse and in many of these industries, large segments of customers moved their purchasing online for convenience. Therefore, any significant EC initiatives by competitors had to be quickly duplicated, firms often found themselves lacking the resources to do so, and sought outside help. Borders’ partnership with Amazon.com is a case in point.

In one of the earliest of their many research articles on IT sourcing, Lacity and Hirschheim (1993) conducted exhaustive interviews with executives at 14 Fortune 500 companies and came to the conclusion that there was little that an outsourcing provider could do that an internal IT organization could not. However, this observation was based on an

environment that was relatively stable and the principal factor to motivate outsourcing was the economies of scale that could be achieved by an outsourcer. In the case of EC, with both technologies and business processes in a state of flux, it is unlikely that EC initiatives would exhibit properties of production factors subject to economies of scale. Therefore, even very large firms frequently turned to new, boutique firms for assistance in implementing EC projects.

McFarlan and Nolan (1995) were among the first to point out the idiosyncrasies of IT outsourcing caused by the rapid advances in technology. Based on approximately a dozen detailed case studies of outsourcing decisions, McFarlan and Nolan pointed out that the motives of clients and vendors are antagonistic in many ways. Whereas clients expect vendors to provide the latest technologies, vendors try to extend the life of existing systems to maximize profits. In the IT domain, significant technological changes are often unforeseeable at the time of signing the contract, creating possibilities of litigation and dispute over providing support for such improvements. The researchers, therefore, suggested that IT outsourcing is attractive when the tasks are only of operational significance and for new application development, the presumption should be in-house development unless internal capabilities are lacking. In such cases, it is not worth dwelling on how the firm got to the point where internal capabilities were inferior, but rather, how to extricate itself from the situation.

Teng et al (1995) used resource dependence theory, discussing where all firms are dependent in varying degrees on some elements in their environments, usually as a result of the control of these elements on some needed resources. Here the researchers suggested that firms should enter into outsourcing relationships when its internal IT operations fell short of

expectations. They surveyed 188 senior executives responsible for IT outsourcing and found that perceived discrepancy in information quality and IT support quality were significantly related to the observed change in outsourcing behavior. IT cost effectiveness and the financial performance of the firm was not significant. Grover, Cheon, and Teng (1996) carried this research further to study the relationship between observed outsourcing and perceived success. They found that service quality, the visible deliverables and reliability of service, were a significant mediating variable for outsourcing success, particularly when the market for outsourcing become increasingly competitive. Another important mediating variable for outsourcing success was identified as partnership quality.

Lee and Kim (1999) also found evidence for the mediating role of partnership quality in a sample of 36 client organizations in Korea. Partnership quality was found to be strongly correlated with outsourcing success. Thus, fostering a co-operative relationship based on trust, communication, business understanding, benefit and risk share, and commitment is critical to get the greatest benefit from outsourcing.

Though other determinants of outsourcing such as “competence gaps” were beginning to emerge in the literature in the mid 1990’s, the idea that cost savings were the major determinant of outsourcing continued to be popular. Lacity, Willcocks, and Feeny (1996) interviewed managers associated with 62 outsourcing decisions in 40 firms between 1991 and 1994 using cost savings as the measure for the success of an outsourcing relationship. They found that most “total outsourcing” decisions where outsourcing firms handle more than 80 percent of the IT budget, experienced significant problems due to ill-defined “relational” contracts, or organizational alliances, and inflexibility to business and technological changes. Firms with total insourcing experienced problems, too.

Since the beginning of the 90's, customer loyalty has become the key word of companies. Putting the customer at the center of the company and at the center of strategy is the essence of CRM (Customer Relationship Management) (Dyché, 2001). The expansion of Internet, access to information, visibility, and offer comparisons have changed the rules and the customers are now the drivers of the economy (Crafton, 2002). Customers want more services, better prices, high quality, and quick delivery (Crosby, 2002). Furthermore they want to interact in total freedom through the media they choose (Barge & Poupee, 2002). They ask for personalization and want to be recognized individually. Companies have all the technology in-hand necessary to satisfy customers' needs, but it is a real challenge (Kalustian, 2002). The business world is changing even as the information age evolves (O'Conner, 2002). CRM evolves to electronic-CRM (e-CRM) and now mobile-CRM (m-CRM) (Pargman, 2000). Firms must integrate all the processes and technology required to provide its products and services to customers through multiple channels in a simple, efficient, and comprehensive way. In this connected world, companies have to find simple rules and strategies that will help them to construct solid, long-term relationships with their customers. Management needs to explore sourcing modes that lead their firms toward alliances with loyal customers in order to survive and grow. Wireless technology is perhaps no longer a choice for companies in the New Economy (Rheingold, 1993). There are many challenges involved in building m-CRM sourcing strategies (Pang, 2002). Many experts place m-CRM as the strategy leader for organizations and their sourcing modes in the near future.

Electronic Commerce Sourcing Initiatives

DiRomualdo and Gurbaxani (1996) identified a rigorous classification scheme to examine the impact of the business potential of EC initiatives on the sourcing mode chosen by firms. Sanders, Gebelt, and Hu (1997) provided empirical support for the importance of motives other

than cost in the sourcing decision. Based on a survey of individuals in 34 companies that had entered outsourcing arrangements between 1988 and 1993 and whose contracts were more than two years old, it was found that technological and strategic reasons were the strongest motivations for outsourcing. The role of cost savings was not very clear. Corroborating the suggestions of Lacity et al. (1996), they found that a tight contract was an important ingredient for outsourcing success and contrary to expectations, outsourcing was more successful in companies that viewed IT as a core function and failures were more prevalent when IT was considered a commodity. Partnerships were also generally more successful than mere supplier relationships.

Using financial data, Smith, Mitra, and Narasimhan (1998) tried to identify the motives of 29 firms that entered large-scale outsourcing relationship between 1988 and 1994. Using non-parametric tests, they found that firms that outsourced had significantly lower overhead costs, lower cash reserves and higher debt before the outsourcing event. They also had increased long-term debt, declining growth rates and increasing financial leverage prior to the event. Since there was no significant trend in these firms to focus on core competencies, they argued that firms entered into outsourcing arrangements primarily to reduce costs and to generate cash. In the context of the banking industry, Ang and Straub (1998) found that production costs economies and transaction cost economies were influential in IT outsourcing decisions and smaller banks were more likely to outsource than larger banks.

The literature on IT sourcing focuses on cost savings. From the point of view of cost savings and overall satisfaction, researchers have been consistent in recommending against outsourcing when technologies are immature and/or unfamiliar either because the client has insufficient knowledge to write the terms of a contract (Lacity et al., 1996; Sauders et al., 1997)

or because outsourcing diminishes the knowledge gained or the learning opportunity. However, contrary to these suggestions, recent research suggests that some of the most commonly outsourced IT functions are Internet services, where technologies are changing rapidly, making it difficult to write tight contracts, and one of the strongest motivations for the use of outside help is to gain outside expertise (Lackow, 2001). In addition, EC offers a fertile context to examine the influence of co-ordination costs because EC involves alliances between many stakeholders within and without the firm (Brynjolfsson, 1994; Malone & Crowston, 1994; Staub & Watson, 2001; Ven & Delbecq, 1976). The expansion of EC, during the period of 1997 to 2002, is expected to significantly influence IT sourcing decisions. Apart from the differences between traditional IT projects and EC projects outlined earlier, the commercial use of Internet technologies was new to both IT firms and the traditional “brick-and-mortar” firms during this period (Earl, 1996). There were rapid changes in organizational models (such as advertising versus subscriptions versus revenue sharing models) and technology platforms (such as open source versus proprietary). Whereas IT firms had the opportunity to leverage their technical knowledge among multiple clients, traditional non-IT brick-and-mortar firms had the opportunity to create profit centers by combining technical knowledge with their business knowledge. Therefore, the literature leads to an examination of the influences of various factors on the sourcing decisions for EC systems.

IT Cost Savings

One of the primary drivers for IT outsourcing identified in prior research is an attempt to reduce costs. For example, Lacity and Willcocks (1998) found that over 80 percent of their respondents cited cost savings as a reason for IT outsourcing and expectations of cost savings continue to find importance in recent practitioner literature (Dash, 2001). IT cost savings to the extent of 15 to 20 percent were cited in the banking industry as a result of outsourcing (Ang &

Cummings, 1997). Outsourcers are expected to achieve these cost savings because of factors such as the adoption of superior management practices and economies of scale in training and development (DiRomualdo & Gurbaxani, 1998) and competitive pressures of the marketplace (Saarinen & Vepsalainen, 1994). These savings can be a significant driver for EC outsourcing because “cost savings” has been suggested as one of the principal ways by which firms can attain competitive advantage (Porter, 1998).

Following the basic profit-maximizing hypothesis to managing projects it would be suggested that all else being equal, firms compare different development modes and choose the lowest cost mode when they decide whether to make or buy (Ang & Straub, 1998; Tirole, 1988). Firms would therefore choose outsourcing when outsourcing is expected to be less expensive and insourcing when insourcing is expected to lower development costs for electronic systems.

Prior Experience and Sourcing Modes

Firms with prior outsourcing experience are likely to have better information about the elements of outsourcing contracts that may help them identify avenues for future cost savings. They are also likely to have better negotiation, contracting, and monitoring skills, and are therefore likely to save more as their experience with IT outsourcing increases (Mahoney, 1992).

These prior experiences can translate into current expectations. Research in managerial decision-making suggests that decision-making situations are framed by managers in terms of familiar contexts gained from prior experience to give meaning to current observations (Beach, 1997). These frames have been found to significantly influence current decisions (Beach, 1997; Kahneman & Tversky, 1979). Since prior IT outsourcing experience is expected to lead to success in achieving cost savings from outsourcing and EC initiatives are generally led by the IT groups in companies, past outsourcing experiences are likely to be projected into the present

through the non-linear decision-framing process to influence expectations of cost savings from outsourcing EC development.

IT Outsourcing Experience May Impact the Extent of Cost Savings Expected

Research suggests that prior outsourcing experience is likely to have additional second-order effects on the relationship between IT cost savings expectations and the sourcing mode apart from direct influence on expected cost savings. This comes from a systematic complementary influence of prior outsourcing relationships on current decision-making behavior of managers. The concept of risk associated with an IT project was explored in detail by Keil, Tan, Wei, Saarinen, Tuunainen, and Wassenaar (2002). They defined risk as a non-zero probability that some undesirable outcomes will occur. Based on the definition and complementary theory, a decision is considered risky if its outcome is uncertain and may result in a loss. Considering the decision to continue a software project as a risky decision, they found evidence for a relationship between risk propensity and risk perception and also for the moderating influence of uncertainty avoidance in national cultures on the relationship. Given that outsourcing is a risky endeavor (Earl, 1996), the influence of prior outsourcing relationships on risk taking is expected to influence outsourcing behavior. The literature suggests this will occur in two ways: the impact of prior outcomes and problem domain familiarity (Sitkin & Pablo, 1992).

Prior research on risk behavior suggests that outcome history influences risk behavior through its impact on two individual factors: risk propensity and risk perception (Sitkin & Pablo, 1992; Sitkin & Weingart, 1995). Risk propensity is defined as an individual's current tendency to take or avoid risks. Risk perception is defined as an individual's assessment of how risky a situation is in terms of probabilistic estimates of the degree of situational uncertainty, how

controllable that uncertainty is and confidence in those estimates (Sitkin & Weingart, 1995). The influence of risk propensity on decision-making is that it affects the relative salience of threat or opportunity in a situation and thus leads to biased risk perceptions. When individuals have high risk-propensity, they weigh potentially negative outcomes more heavily than positive outcomes and thereby overestimate the probability of loss relative to the probability of gain. Individuals with low risk-propensity do just the opposite. Though prior research considered risk propensity as a stable dispositional attribute, current research conceptualizes it as an individual trait that can change over time and is thus an emergent property of the non-linear decision-making process. Sitkin and Weinart (1995) and other complexity theorists have suggested that this conceptualization can account for the important role of past experience and the capacity of people to adapt -- as complex adaptive systems -- while simultaneously suggesting that as individual gain more experience, they may be less susceptible to contextual influences and more likely to exhibit cross-situational consistency.

Sitkin and Weinart (1995) also found that successful outcome histories influence behavior in risky situations in two ways: (1) influencing how much decision makers lean a priori toward taking risks (direct influence on risk propensity) and (2) by influencing what kinds of information they attend to (effect on risk perception). In the context of the EC sourcing decision, as managers complete increasing numbers of IT projects through outsourcing, they are likely to modify their overall mental representation (knowledge management) of how well they have managed outsourcing relationships and achieved cost savings in the past. These prior successes from outsourcing would increase a manager's propensity to take risks and in turn direct attention to low-risk aspects of the decision and lead managers to overestimate their ability to derive benefits from outsourcing.

In addition to the influence of prior outcomes, experts suggest that an individual's familiarity with a problem domain as a result of increased levels of past experience can affect risk perceptions independently of the resulting outcomes (Sitkin & Pablo, 1992). With increased experience, decision makers are more likely to focus on their own abilities and past successes rather than on current situational constraints. They may therefore simultaneously underestimate the actual risks involved and overestimate their ability to overcome unforeseen problems.

Both of the above effects suggest that under similar conditions for expected cost savings, as managers' past experience with IT outsourcing increases, they would increasingly tend toward outsourcing while deciding upon the sourcing mode for EC systems. Prior outsourcing experience is thus expected to show a moderating effect on the relationship between IT cost savings expected and the sourcing mode (Baron & Kenny, 1986; Venkatraman, 1989.)

Methodology for Re-Evaluation

A logistic regression and content analysis was used as methodology for re-evaluation of the sourcing model. The "observed sourcing decision" of the managers was used as the dependent variable. Information regarding EC initiatives was obtained from the Factiva database. Factiva and the Dow Jones Interactive database merged as of April 2003. Factiva is a searchable full-text database of nearly 8,000 newswires, newspapers, magazines and trade journals. It also has comparative data on companies and industries and company SEC filings. Since EC initiatives are typically announced publicly in reasonable detail through the business press, information regarding such initiatives was collected using a full-text search of announcements made by companies. The period of 2001-2002 was used. The content analysis scheme was used to classify the announcements. The coding was done with the help of the content analysis software, Nvivo 2.0 Educational package. Nvivo is a software

program for professional support and training for qualitative research. It allows for data analysis and enables quick coding of the announcements and easy retrieval once a coding scheme has been defined. It also facilitates quick search of documents and easy ad hoc creation of coding schemes. The software also enables quick recovery of sections in the project that have been coded for specific variables.

Hypothesis Number	Hypothesis	Literature's principal citations
H1	The business' sourcing mode will tend toward outsourcing as the extent of cost savings expected from outsourcings increases.	Ang & Straugh, 1998
H2	Prior IT outsourcing experience will positively influence the extent of IT cost savings expected	Beach, 1997; Lacity & Willcocks, 1998
H3	The client's prior IT outsourcing experience will moderate the relationship between IT cost savings expected and the sourcing mode. As prior experience increases, the sourcing mode tends toward outsourcing.	Keil, 2000; Sitkin & Weingart, 1995

Table 1: Research hypotheses for sourcing mode choice in EC non linear systems

Variable Name	Type	Definition
Observed sourcing decision	Dependent Variable	Completed external partnerships for IT functions in the past
Relationship structure	Independent Variable	Joint venture, minority equity stake, or contractual relationship
Cost savings	Independent Variable	Expectations to reduce IT costs through outsourcing
IT business potential	Independent Variable	Expectation that the activity

will help in the discovery of
new IT based business
applications for the future

Table 2 Explanation of the Variables to be Studied

Since EC initiatives were a significant event for firms during the period studied, they were typically announced publicly in reasonable detail through the business press. One noted asset in information retrieval and data collect was the researchers' backgrounds as Publishers and Editors of U.S. newspapers. Information regarding such initiatives was collected using a full text search of announcements made by companies for the proposed period of 2001-2002 in the two leading newswires: PRNewswire and BusinessWire. These newswires provided comprehensive coverage of public announcements by firms, were available on Factiva's database, and have been used in prior IT research (Subramani & Walden, 1999). Relevant announcements were retrieved using a search string to match words in announcements of interest. The goal, while selecting the search string, was to maximize the collection of relevant announcements while screening out irrelevant announcements. After examining a number of candidate announcements, the following search string was used and the resulting announcements were scanned to add relevant announcements to the Nvivo database:

```
(co=<list of companies>) and ((dns=internet) or (key=EC )) and wc>300) and (lp=e-commerce or EC or e-business or e commerce or (online near1 business) or (online near1 sales))
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This string of code looks for announcements in the database that feature companies provided in the list following the keyword "co". The keywords "dns" and "key" denote the news category descriptor and keywords respectively and will be used to restrict the search to those announcements that related to the Internet or Electronic Commerce. This eliminated

announcements made by companies that were not directly related to EC activities. “Wc” denoted word count and a minimum limit of 300 words was used because many announcements were only for information purposes, where the press was informed about certain activities without providing any relevant details. By eliminating announcements with small word counts, these researchers were able to focus attention on announcements that were more likely to have information of interest. The final keyword “lp” denoted lead paragraph and was used to narrow the announcements to those where some EC activity was mentioned in the lead paragraph. This eliminated announcements where EC was mentioned in passing but was not the focus of the announcement.

These researchers hypothesized from years spent as a newspaper owners and publishers that there would be significantly more information available for larger, publicly traded firms than for smaller firms. Therefore, to be consistent in the study, these researchers used the list of the Standard and Poor’s (S&P) 500 firms as the basis for search. For over 140 years, the S&P has been the pre-eminent global provider of independent, widely recognized investment data, valuation, analysis, and opinions. S&P sets the standard as the globally pre-eminent provider of independent, widely recognized investment data, valuation, and opinions. The S&P 500 Index consists of 500 stocks chosen for market size, liquidity, and industry group representation and is one of the most widely used benchmarks of U.S. equity performance. Since the guiding principle for inclusion in the S&P 500 index is “leading companies in leading industries”, the companies in this group were typically large firms and their performance significantly affected their own industries, in particular, and the overall economy, in general. Though the search results occasionally yielded announcements by firms

outside the S&P 500, the vast majority of the announcements used in the research were related to initiatives by firms in the S&P 500.

The researchers found that some of the announcements needed to be discarded since they were not useful for the study. Examples included topics on the setting up of Web sites with no clear commercial intent such as informational Web sites and content management arrangements. Similarly, these researchers also were aware that announcements regarding partnerships between two or more software firms to develop new software services to help clients leverage the Internet also did not contribute to the research and were discarded.

Data for a variable used in this research was obtained by examining past announcements made by client firms. The variable was “prior IT outsourcing” contracts. The search string used to collect this data item is shown below:

```
(co=ABS) and (lp=outsourc$4 or contract$3 or parner$4 or engage$4) and  
(lp=IT or IT or (information w/1 (system$1 or technolog$4)))
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A wildcard search is made possible by the \$ sign in the search string. If there is uncertainty in the search, for example, on how to spell a word, wildcards can be very useful to the researcher. They are also often used to concatenate words or when researchers might want to investigate a variation of a word. The two most commonly used wildcards include: 1) the question mark (used to symbolize a single alphanumeric character in a search; 2) the asterisk (used to symbolize zero or more alphanumeric characters. The literature suggests that researchers avoid the asterisk as the first character in a search string because this may retrieve every record from the database (Staub, 2001). In the code above, contract\$3 will match terms with up to three letters beyond “contract” such as contract, contracts, contracted, and contracting. Operators are also used in the suggested coding scheme to combine search

terms to identify a concept in the announcements documents. The two most commonly used operators are “AND” and “OR”.

Content Analysis

Content analysis was used in the research. This is a research technique was chosen for the systematic, quantitative, and objective description of the manifest content of communication. Content analysis is widely used in management research (Jauch et al, 1980; Krippendorff, 1980; Maritan, 2001) and is a research tool often used to establish the presence of concepts or certain words within texts. These texts in a single study may also represent a several different types of incidences, such as Palmquist's 1990 study of two composition classes, in which he analyzed classroom discussions and lectures, teacher and student interviews, out-of-class interaction sheets, and writing journals. When conducting a content analysis, the text is coded or broken down into manageable categories; these may be word, word sense, phrase, sentence, or theme. These will studied using one of content analysis' basic methods, i.e., relational or conceptual analysis.

Content analysis has historically been a time consuming process for researchers. It was often performed manually, and then later on mainframe computers, which were slow, and were used to analyze data cards that had been themselves manually punched in by human coders. Often just single studies employed thousands of these cards. Time constraints and human error and made this method impractical for large texts though it was an often utilized research method up until the 1950's. In early content analyses the studies were limited to an observation of the frequency of the occurrence of identified terms (word counts. Researchers began investigating need for more sophisticated methods of analysis by the mid-1950's focusing on concepts rather than simply words, and on semantic relationships rather than just

presence (de Sola Pool, 1959). While both traditions still continue today, content analysis now most often used to explore mental models, and their affective, linguistic, social, cognitive, historical, and cultural significance. These mental models are simply a network or group of interrelated concepts that demonstrate subconscious or conscious perceptions of reality. These internal mental networks of meaning are constructed as inferences are drawn and information gathered.

Conceptual Analysis

Traditionally, content analysis has most often been thought of in terms of conceptual analysis. In conceptual analysis, a concept is chosen for examination, and the analysis involves quantifying and tallying its presence. This type of content analysis is also known as thematic analysis. However, this term is somewhat problematic, given its varied definitions in current literature (Palmquist, Carley, & Dale, 1997; Smith, 1992). With conceptual analysis, the focus is on the researcher looking at the occurrence of selected terms within a text or texts, although the terms may be implicit as well as explicit. While explicit terms obviously are easy to identify, coding for implicit terms and deciding their level of implication is complicated by the need to base judgments on a somewhat subjective system. To attempt to limit the subjectivity, (as well as to limit problems of reliability and validity), coding such implicit terms usually involves the use of either a specialized dictionary or contextual translation rules.

Conceptual analysis begins with identifying research questions and choosing a sample or samples. Once chosen, the text must be coded into manageable content categories. The process of coding is basically one of selective reduction. This is central idea of content analysis. Text is reduced to categories consisting of a word, set of words or phrases, on

which the researchers can focus. Specific words or patterns are indicative of the research question and determine levels of analysis and generalization.

By reducing the text to categories consisting of a word, set of words or phrases, the researchers can focus on, and code for, specific words or patterns that are indicative of the research question.

Once the research question has been established, the researchers must make his/her coding choices with respect to the eight category coding steps indicated by Carley (1992). These steps include: Decide the level of analysis; Decide how many concepts to code for; Decide whether to code for existence or frequency of a concept; Decide on how you will distinguish among concepts; Develop rules for coding your texts; Decide what to do with "irrelevant" information; Code the texts; Analyze your results.

Issues of Reliability & Validity

The issues of reliability and validity are concurrent with those addressed in other research methods. The reliability of a content analysis study refers to its stability, or the tendency for coders to consistently re-code the same data in the same way over a period of time; reproducibility, or the tendency for a group of coders to classify categories membership in the same way; and accuracy, or the extent to which the classification of a text corresponds to a standard or norm statistically. Gottschalk (1995) points out that the issue of reliability may be further complicated by the inescapably human nature of researchers. For this reason, he suggests that coding errors can only be minimized, and not eliminated. He suggests 80 percent as an acceptable margin for reliability.

The validity of a content analysis study refers to the correspondence of the categories to the conclusions, and the generalizability of results to a theory.

The validity of categories in implicit concept analysis, in particular, is achieved by utilizing more than one classifier to arrive at an agreed upon definition of the category.

Content Analysis and IT Research

Content analysis is also beginning to be used in IT research. For example in a recent study, content analysis was used in the analysis of interview transcripts at eight firms to examine how three contingency forces (corporate governance, economies of scope, and absorptive capacity influenced the mode of IT governance (Sambamurthy & Zmud, 1999).

Following the steps recommend for content analysis (Krippendorff, 1980; Meindl, Ehrlich, & Dukerich, 1985) this research used prior empirical and theoretical research to create the classification scheme described below to categorize the dependent (observed sourcing mode decision) and independent variables.

Construct and citation	Construct definition	Procedural definition	Variable and citation	Measurement
Sourcing mode (Gulati & Singh, 1998; Nam et al, 1996)	Extent to which contractual relations substitute for hierarchical controls	The substitution of contracts for hierarchical controls for implementing the system	Relationship structure (Gulati & Singh, 1998; Nam et al., 1996)	Internal responsibility: 0 Joint venture: 1 Minority equity stake: 2 Contractual relationship: 3
IT cost savings expected from outsourcing (Lacity & Willcocks, 1998)	Expectation to reduce IT costs through outsourcing	Code in increasing order of clients' expectations of cost savings from outsourcing	Cost savings (Lacity & Willcocks, 1998)	0: internal department and cheaper 1: Internal and external organizations are competitive 2: External organization is cheaper 3: External organization is substantially cheaper
Outsourcing experience	Organization's experience with	The number of completed external IT	Projects_completed (Nam et al,	Number of completed external partnerships for IT functions in the

	outsourcing IT functions	partnerships by the firm in the past 5 years	1996)	past
IT Business potential (DiRomualdo & Gurbaxani, 1998)	Expectation that the activity will help in the discovery of new IT based business applications in the future	Code based on the influence of the activity in helping the discovery of new ways to exploit IT in business in the future	Business_fo cus (Clemons & Row, 1991; DiRomuald o & Gurbaxani, 1998)	0: IT improvement 1: Improve cost or quality of existing service 2: Create new product or service

Table 3 From the Literature: Construct, Citation, and Variable Measurement

The sourcing announcement was the unit of analysis in this research. Announcements were coded using the scheme and steps were taken to ensure the reliability of the coding. The content analysis scheme is summarized in Table 3.

Sourcing Mode

Prior research has typically classified governance structures as hierarchical (internal) or contractual based on the extent of equity ownership of one firm in another. Partnerships with greater extent of equity ownership by one firm are considered more hierarchical than those without because equity ownership simplifies the distribution of surplus and creates legal reporting requirements (Gulati & Singh, 1998). However, there are a number of elements associated with internal controls that may not be adequately captured by the extent of equity controls. These elements include: 1) command structure, 2) incentive systems to link rewards to performance, 3) standard operating procedures that allow quick decisions, 4) dispute resolution procedures that specify a hierarchy of entities of appeal, and 5) non-market

pricing systems that help specify compensation when specifications are changed (Stinchcombe, 1985).

To capture the systematic differences in hierarchical controls between different governance structures, this research defined the variable *relationship_structure* by building upon the typology introduced by Gulati et al. (1998) in their study of alliances. Following that study and prior MIT research, in decreasing order of hierarchy are Internal IT organizations, joint ventures, minority equity ownership, and contractual relations. These structures differ in their mechanisms for collecting and disseminating information to guide interdependent actions and resolve conflicts (Galbraith, 1977; Nam, Rajagopalan, Rao, & Chaudhury, 1966; Saarinen & Vepsalainen, 1994).

At the hierarchical end of the spectrum, internal IT organizations have an established hierarchy of managers to coordinate activities and resolve disputes between the department and the organization. Following Lacity and Willcocks (1998), vendor buy-in contracts, where vendors supply skilled personnel who work under the supervision of internal managers were also included in this category. In joint ventures, when the partners create a separate entity with ownership distributed among the partners, a separate hierarchy of managers oversees day-to-day operations and address problems as they arise. Dispute resolution procedures are also generally included among the standard operating procedures in joint ventures. Minority ownership relations were one where set of partners takes minority ownership of another partner without creating a separate organization and has less hierarchical controls than joint ventures. Supervision is typically in the form of board membership for investing partners in the invested firm. Though these members are not involved in day-to-day operations of the firm, their presence on the board helps share information, ratify decision, and can help

resolve conflicts as they arise. Contractual arrangements are closest to arms-length market exchanges and do not involve any shared ownership or administrative structures. Members of partner firms work from within their own organizations. None of the elements of a hierarchical relationship are necessarily part of the arrangement and new decisions are negotiated between partners. Such arrangements include licensing, second-sourcing, joint contracts and technology exchange agreements.

The dependent variable *relationship_structure* measured the extent of substitution by the market and is coded in decreasing order of hierarchical controls with internal IT organizations coded 0, joint ventures coded 1, minority investments coded 2, and contractual arrangements coded 3.

IT Cost Savings Expected

The cost savings expected from outsourcing was coded in a straightforward manner in the variable *cost_savings* in increasing order of expected cost savings as perceived by the client organization. When the internal organization was believed to be cheaper than any known IT vendors, *cost_savings* was coded 0; when internal and external vendors were believed to be competitive with each other, *cost_savings* was coded 1; when vendors were expected to save costs compared to internal IS, *cost_savings* were 2; and when clients were superlative in their opinion of cost savings from outsourcing, through expressions such as “significant cost savings expected” or “substantial cost savings expected”, *cost_savings* was coded 3. When no information was available, the variable was coded as unknown.

Prior IT Outsourcing Experience

Prior IT outsourcing experience was measured by the variable `projects_completed`. This was based on the idea that firms learn about the outsourcing process through a “learning-by-doing” process. To collect data for this variable, the researchers first ran an exhaustive search on PRNewswire and BusienssWire for all announcements made by the subject identified all completed IT projects in the period, for which the firm used the assistance of external partners. Unlike data collected solely from publications such as ComputerWorld or InformationWeek, it was hypothesized by the researchers that collecting data from the two newswires would provide a comprehensive collection of all significant projects. Though this procedure did not guarantee that all outsourcing arrangements were captured, they were a best attempt at performing a comprehensive search and were consistent with procedures in earlier research for comprehensive historical search (Gulati, 1995).

IT Business Innovation Potential

Based on a review of the IT literature for the various ways in which IT innovations generate business value, the following focus areas were identified in prior research: 1) support or improve e firm management; 2) decrease costs of existing goods or services; 3) improve their quality; 4) create new products or services for which there is sufficient demand (Clemons & Row, 1991; DiRomualdo & Gurbaxani, 1998).

These were coded into the variable `market_focus` as follows: when the EC initiative focuses on improving or supporting general firm administration with no emphasis on its impact on the products and services sold by the firm, `market_focus` was coded 0. When the focus is on decreasing the costs of existing goods and services or improving their quality as perceived by customers, `market_focus` was coded 1. This included measures such as setting up a Web site to sell products or services to an expanded market because the main

consequences of such an initiative may be interpreted as reducing the cost of selling goods to the new market. When the initiative was aimed at creating new IT based products or services, market_focuse was coded as 2.

Results

The hypotheses were testing using a multinomial logistic regression model to examine the effects of the independent variables on the dependent variable. The size of the firm was used as a control variable following prior IT research on outsourcing (Ang & Straub, 1998). This variable was operationalized as the natural logarithm of capitalization and data was obtained from the Center for Research in Securities Prices (CRSP) database. Academic researchers recognize the CRSP database as one of the most comprehensive, complete, and accurate historical data files on the market. The CRSP files cover securities listed on the NYSE, AMEX and Nasdaq Stock Markets, US Government Treasury issues, and US Mutual Funds.

CRSP first sorts all stocks on the NYSE by market cap and breaks the universe into ten equal groups by number of names. These are called "deciles". Decile 1 is the group of the largest stocks on the NYSE and decile 10 is the group of the smallest stocks on the NYSE. CRSP then includes all equivalently sized AMEX and NASDAQ (OTC) stocks into the NYSE size decile in which they fit by market cap. All Small Cap Indexes are rebalanced quarterly. There are three ranges of indexes: CRSP 9-10 Index: The smallest fifth of NYSE stocks by name and all equivalents from other exchanges. This index is sometimes referred to as "micro-cap" stocks. The CRSP 6-10 Index is the smallest half of NYSE stocks by name and all equivalents from other exchanges. This index is sometimes referred to as "low-cap" or

"small-cap" stocks and is similar in size to Russell 2000 Index. The CRSP 6-7-8 Index includes Deciles 6, 7 and 8 of NYSE stocks and all equivalents from other exchanges.

The general specification of the multinomial logistic regression used in the research was:

$$\ln (P_{ij} / P_{0j}) = a + b_i X_j$$

Where P_{ij} is the probability of the i^{th} event occurring for the j^{th} case. The three possible events are a joint venture ($i=1$), minority equity partnership ($i=2$) and fee for service contracts ($i=3$). P_0 is the probability of internal development. X_j is the vector of independent variables.

The logistic regression was performed using an econometric software program, LIMDEP 8.0. LIMDEP is an integrated program for estimation and analysis of linear and nonlinear models, with cross section, time series and panel data. An evaluation of the descriptive statistics for the variables that were hypothesized to impact the sourcing mode shows that there were no significant problems of colinearity between the predictor variables. There was a moderate degree of correlation between the prior outsourcing experience of firms and their size indicating that larger firms had more outsourcing arrangements than smaller firms. The interpretation of the coefficients, the negative and significant values of constant terms in the models indicated that the three forms of partnership were used less frequently than internal development in the context of EC systems development. The sourcing modes varied in the degree of hierarchical control with the highest control in internal development and reducing degrees of control in joint ventures, minority equity investments and fee for service contracts. Cost savings expectations varied from firms

expecting internal development to result in lower costs to firms expecting external partnerships and expertise to lower costs.

Conclusions

This research provided insight into the factors that influence managerial decisions regarding the sourcing modes for EC projects. The hypotheses were tested using a sample of 115 EC projects that were announced by large firms during 2000-2001. By focusing on large firms, mainly in S&P 500 index, the researchers were able to achieve consistency in size and resources available to firms in the sample. This was considered important because prior research suggest that large firms achieve economies of scale and scope in IT operations, whereas smaller firms do not. Information on these announcements was gathered by extensively searching for information regarding each announcement in the important publications that report developments in Information Technology and are available from the Factiva database. These announcements were then content-analyzed to categorize the evidence regarding each construct of interest and the impacts of the hypothesized variables were tested by a multinomial regression using LIMDEP 8.0.

In general, it was found that dependence on internal resources was the most commonly used mechanism for the implementation of EC systems in the sample of firms under study. Also, cost savings expectations from outsourcing were an important concern in the outsourcing decision. As the cost savings expectations from outsourcing increased, the extent of substitution by the market for EC development increased. Also, firms tended to use relatively high degree of internal control for EC initiatives with high business potential and avoided the use of fee-for-service mechanisms for implementing such projects. Also, firms

that had greater experience in outsourcing, in the sense of having announced a greater number of IT outsourcing contracts in the past, were more likely to use joint ventures to implement EC projects than firms with less experience with outsourcing.

The results have significant implications for IT managers deciding upon the ideal choice of sourcing mode for an EC initiative. The study results summarize the determinants of the choice by the sample of large firms in the study. Cost savings expectations are an important consideration in the choice of sourcing mode. As the expectations of cost savings from outsourcing increased, the firms in the sample increasingly used market mechanisms (service providers) compared to internal resources. Firms were also concerned about the business potential associated with the project and when the business potential was high, they preferred joint ventures and internal development to the use of market mechanisms. This indicates that the move toward outsourcing based on cost savings expectations was mitigated by the desire to develop relevant capabilities for high-potential projects through increased day-to-day involvement.

Finally, a point of interest for service providers was found in the effect of prior outsourcing experience. Firms that had greater experience in outsourcing were more likely to use joint ventures than firms with less experience in outsourcing. This indicates a willingness of firms to use limited forms of market involvement in general as a result of outsourcing experience. Though prior research has found support for the influence of trust between partners on the success of an outsourcing relationship, this research finds empirical support for a move toward market-oriented mechanisms as a result of prior outsourcing experience, indicating that such trust (or some other mechanisms influenced by outsourcing experience of

client firms) can actually lead to an increased reliance of market-based mechanisms for the development of EC systems.

The findings of this research have important implications for EC systems development and outsourcing research. In particular, the preference for joint ventures over internal development when business potential is high implies that the sourcing mode decisions for EC systems development represented a balancing act whereby firms retained adequate day-to-day control over development while leveraging the benefits of external expertise. Therefore, suggestions in prior IT outsourcing research that internal development should be the preferred mode when the associated business implications are significant (Lacity et al, 1996) must be qualified in the case of EC. Where appropriate, outside help may provide the necessary resources to create a differentiated position with arrangements such as joint ventures providing the necessary opportunities for hands-on experience.

The main limitation of this research was the method of content analysis used to categorize the values of the predictor and dependent variables. Though the researchers took extensive precautions to limit subjective bias, it would be useful to replicate the research using more objective measures for the constructs. There are also limitations associated with limiting the sample to large firms. These firms are likely to maintain extensive in-house IT operations with extensive training and recruitment programs to acquire the relevant skill sets. These firms are also more likely to have slack resources and established mechanisms to set up joint ventures and other forms of partnerships. It would, therefore, be useful to examine the factors that influence the sourcing decisions for EC in smaller firms to see if any additional factors become important.

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