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ORGANIZATIONAL CAPABILITIES AND THE
ASSIMILATION OF ELECTRONIC PROCUREMENT
IN SERVICE INDUSTRIES

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Abstract

This study seeks to identify the factors leading to the assimilation of electronic procurement (e-procurement) in organizations. Realizing the strategic importance of e-procurement, many organizations have increased their investments to exploit its potential benefits. However, organizations differ greatly in their abilities to assimilate the application and translate it into tangible benefits. This study tries to enhance understanding of barriers and facilitators that affect organizations’ abilities to assimilate e-procurement. Drawing upon perspectives from strategic management and other literature, this study develops a conceptual model that identifies the determinants of organizations’ capabilities to implement e-procurement applications. This study empirically validates the conceptual model, conducting a survey with purchasing executives and managers of organizations in service industries. The conceptual framework and empirical investigation of this study are expected to greatly contribute to both theory and practice. For theory, the study promises to enhance understanding of barriers and facilitators of e-procurement assimilation in organizations. For practice, this study will yield useful implications on how to effectively manage e-procurement assimilation efforts. The findings will make the task more manageable and less stressful for practitioners, eventually facilitating the spread of the application across individuals, work groups, organizations, and society at large.

Keywords: Assimilation, e-procurement, organizational capabilities, resource-based perspective, dynamic capability approach

Introduction

This study examines the question of information technology (IT) assimilation in the context of electronic procurement (e-procurement), focusing on why organizations differ in their abilities to assimilate e-procurement applications. Given the strategic importance of IT to organizational success, IT adoption has been a critical issue for researchers to address. In fact, IT adoption and diffusion within organizations remain central concerns of information systems (IS) research and practice. Over the past decades, researchers within the IS community have striven to conceptualize, empirically validate, and extend various models of IT adoption and diffusion at individual and organizational levels, mostly employing the diffusion of innovation perspective (Rogers 1995).

Most of these prior studies assume that individuals are making a binary choice of adopting innovations for their own independent use (e.g., spreadsheet, word processing applications, etc.) or with a limited number of participants and business processes inside the organizations involved in the adoption process, resulting in limited degree of organizational changes (e.g., electronic mail, CASE tools, EDI, etc.). Also, the diffusion of innovation studies assume that adopters are homogeneous in terms of the level of technical and management skills required to adopt and diffuse an innovation and, therefore, everyone can and will adopt an innovation as long as they have learned about a specific technology and found it valuable for their needs.
E-procurement, the use of the Internet and related technologies for purchasing activities, is becoming one of the promising applications. According to an industry report, e-procurement can save up to 20 percent of annual spend for typical organizations by reducing the price of materials and services by 5 percent to 10 percent and inventory costs by 25 percent to 50 percent and by shortening purchase and fulfillment cycles from 9.72 days to 2.53 days (Aberdeen Group 2001).

Despite the potential benefits, organizations differ in the speed with which they adopt the applications and in the level of actual benefits achieved among the organizations that have adopted. This study addresses this gap, based on the conjecture that organizations may differ in their abilities to successfully adopt and fully utilize IT applications. In fact, many industry reports as well as interviews with several organizations suggest that this task is challenging and stressful for most organizations. The difficulties stem from the characteristics of Internet-based IT artifacts, such as e-procurement, that distinguish them from other IT artifacts in the following aspects: (1) nature of change, (2) degree of uncertainty, (3) organizational changes required, (4) complexity involved, and (5) knowledge needed. In short, e-procurement can create changes in the way organizations conduct business internally and externally and can bring many dynamic changes both outside and inside the organization. This creates a high level of turbulence and, as a result, huge uncertainty to involved parties. Also, e-procurement requires a great deal of organizational change to fully exploit the potential benefits, increasing the complexity of the implementation process. Further, an organization is typically constrained by its knowledge base. Industry reports and exploratory case studies suggest that organizations differ greatly in their abilities to deal with these characteristics of e-procurement applications and to successfully implement and fully utilize them.

Because of these characteristics of e-procurement applications, successful adoption and diffusion of e-procurement may have more to do with an organization’s capabilities to successfully implement and fully utilize the applications. This study focuses on why organizations differ in their abilities to assimilate e-procurement applications and proposes a conceptual model that may facilitate a greater understanding of how organizations can effectively manage the assimilation (Fichman and Kemerer 1997) of Internet technologies in the context of e-procurement applications. The conceptual model mainly draws upon theoretical perspectives from the field of strategic management, namely the resource-based perspective (RBP) and the dynamic capabilities approach (DCA). This model will be later empirically validated using survey data.

Due to the complex environment (both organizational and technological) of the assimilation process, it is unlikely that a general theory of IT adoption could be applied or developed that would be robust across the various types of e-procurement applications in different assimilation contexts. Thus, this study proposes to examine a particular kind of activity, namely purchasing of indirect materials and services, in the context of services industries where a larger portion of procurement of organizations in these industries consists of indirect materials and services.

Theoretical Foundations and a Conceptual Model

Theoretical Foundations

The RBP explains the creation, maintenance, and renewal of competitive advantage in terms of organization-specific factors, instead of industry-level effects. More specifically, the RBP tries to link the explanation of competitive advantage to characteristics of the resource (Foss 1997), emphasizing organization-specific capabilities and assets and the existence of isolating mechanisms as the fundamental determinants of organizational performance. This perspective views an organization as a bundle of resources and capabilities that possess a particular rent-generating and earning potential, which is highly dependent on coordinative management mechanisms, and the historical dimension of an organization’s activities. From this view, the path-dependent and idiosyncratic nature of embedded routines largely governs an organization’s behavior.

The DCA (Teece et al. 1997) attempts to analyze the sources and methods for organizations to create and capture wealth under rapid technological change. This approach focuses on providing insight into the question of how and why certain organizations build competitive advantage in regimes of rapid change. The DCA explains that organizations’ competitive advantage depends on “distinctive processes or routines (ways of coordinating and combining), shaped by the organization’s specific asset positions, and the evolution path(s) it has adopted or inherited” (Teece et al. 1997). The DCA asserts that more fundamental abilities required for wealth creation are recognizing and sensing new opportunities and implementing effectively and efficiently to capture them by quickly making the relevant internal resources come into play.
Conceputal Model and Propositions

The RBP and DCA emphasize the ability of an organization to maintain and adapt the resources and capabilities that are the basis of its competitive advantage as a determining factor of an organization’s behaviors. Together, these perspectives explain that an organization’s behavior is not always rational in the economic sense; instead, behavior greatly depends on capabilities and resources inside the organization that are embedded in its people (knowledge) and organizational routines (structure and process). That is, organizations must have capabilities to sense the radical changes in technologies and the market and to modify old routines, so that they can use these changes to create and sustain competitive advantages. The RBP and DCA provide a useful framework for the analysis of a firm’s behaviors with regard to competitive advantage and, therefore, seem very promising in facilitating the effort to understand what factors may influence the assimilation level of e-procurement applications.

In the interest of space, we present only key constructs and their conceptual relationship with very brief discussions on major propositions and the constructs.

Assimilation

Assimilation is defined as the process spanning from an organization’s first awareness of an innovation to, potentially, adoption and wide diffusion (Fichman and Kemerer 1997), and the specific scales are designed and used for this study, which consist of the following six phases: (1) apprehension among individual organization members concerning the applications; (2) informal consideration/discussion among key decision makers concerning the applications’ suitability; (3) formal investigation and evaluation of the applications according to financial and strategic criteria; (4) adoption decision made and search/evaluation of specific solutions and/or services in progress; (5) implementation of specific solutions and/or services in progress; and (6) deployment of the applications as a part of the formal purchasing process. This study investigates the assimilation process of e-procurement, rather than a binary choice of adoption or non-adoption, or the intention to adoption, to elicit the differing effects of factors throughout the assimilation process. The determinants of the early phases of assimilation may differ from those for the later phases. Thus, we conjecture that the factors that affect the stages before the adoption decision and those affecting further diffusion after the adoption may be different.

Knowledge: Technical IT Skills and Managerial IT Skills

Technical skills refer to the know-how needed to build IT applications using the available technology and to operate them to make products or provide services. These skills enable organizations to effectively manage the technical risks, and may be a possible source of sustained competitive advantage from IT (Mata et al. 1995). Knowledge-intensive, complex technologies cannot be easily transferred from one organization to another, and require the potential adopter to create the knowledge to incorporate the technology into its own unique business context. Technical IT skills are usually explicit and codifiable and, therefore, they are highly transferable even when they are heterogeneously distributed. Also, organizations that need technical skills can get assistance from technical consultants and contractors. However, industry surveys often identify the lack of technical know-how as one of the common barriers that organizations are facing in considering e-procurement adoption. Research on the adoption of computer innovations in organizations provides two findings that support the importance of technical knowledge for the adoption and implementation of the innovation: (1) organizations delay adoption of these complex technologies until they obtain sufficient know-how to implement the computer innovation successfully, and (2) a lack of technical knowledge often is a barrier to implementation (Rogers 1995). Also, Feeny and Wilcocks (1998) state that technical skills play an important role in achieving two core IS capabilities: architecture planning and making technology work.

Managerial skills encompass, in the case of IT, management ability to conceive of, develop, and exploit IT applications to support and enhance other business functions. Examples of important managerial IT skills include (1) the ability of IT managers to understand and appreciate the business needs of users (such as other functional managers, suppliers, and customers), (2) the ability to work with these users to develop appropriate IT applications, (3) the ability to coordinate IT activities in ways that support these users, and (4) the ability to anticipate the future IT needs of users (Mata et al. 1995). In the RBP, these skills are likely to be sources of sustained competitive advantage. These managerial IT skills are usually heterogeneously distributed across organizations and difficult to move from one organization to another. Unlike technical skills, managerial skills take longer to develop by IT managers within organizations. The development and use of these managerial skills are often socially complex processes because they require close interpersonal relationships between IT managers and between IT managers and functional business managers and outside parties such as suppliers (Mata et al. 1995). Also, managerial IT skills are usually not easy to codify and cannot be transferred at low cost and with little loss in richness or understanding.
This discussion leads to the following propositions:

**PROPOSITION 1a.** Technical IT skills are positively related to the degree of e-procurement assimilation.

**PROPOSITION 1b.** Managerial IT skills are positively related to the degree of e-procurement assimilation.

**PROPOSITION 2.** Managerial IT skills will have a more significant impact on the degree of e-procurement assimilation than technical IT skills.

**Organizational Routines: Decision Making and Implementation Routines/Processes**

Organizational routines are well-practiced patterns of activities inside the organization that determine what and how things are conducted. Some examples include methods of production, hiring procedures, decision-making architecture, and coordination mechanisms between different departments. These patterns of activities tend to be heterogeneously distributed and not easily transferable because they have been developed over a period of time within a specific organization and embedded within its organizational processes, culture, etc. Christensen (1997) emphasizes the existing processes—the patterns of interaction, communication, coordination, and decision-making currently used in the organization—as the ones that will get the new job done effectively. Based on these assertions, this study identifies several types of organizational routines/processes as especially important for an organization to properly cope with disruptive, complex technologies, such as e-procurement.

First, appropriate decision architecture is needed to make a correct decision in a timely manner. The ability to scan the environment, to evaluate markets and competitors, and to quickly accomplish reconfiguration and transformation ahead of the competition determines the ability to adjust the requirements for change and to carry out the necessary adjustments. Organizations need structures and different decision-making protocols so that they can achieve responsiveness under rapid technological change by facilitating entrepreneurial and innovative behavior. Co-location of decision rights with the pertinent knowledge and an incentive system that aligns individual and organizational objectives are considered to improve an organization’s ability to process the information needed for decision making at the requisite speed and effectiveness (Mendelson 2000). Second, knowledge transparency refers to practices, technologies, and systems that improve the diffusion of knowledge and information within the organization (Mendelson 2000). Knowledge transparency especially is important to facilitate the integration and coordination that are often involved in implementing system-level or socially complex innovations effectively. Prahalad and Hamel (1990) argue that core competencies are the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies. Core competence is communication, involvement, and a deep commitment to working across organizational boundaries, involving many levels of people and all functions. Also, Christensen emphasizes “heavyweight teams” as tools to create new processes—new ways of working together that constitute new capabilities. Finally, organizations do not change their routines often. Organizations with strong flexible organization practices adapt their resources and capabilities over time and take advantage of new market opportunities to create new sources of competitive advantage. This discussion leads to the following propositions:

**PROPOSITION 3.** The higher the level of co-location of decision rights, the higher the degree of e-procurement assimilation.

**PROPOSITION 4.** The higher the level of knowledge transparency, the higher the degree of e-procurement assimilation.

**PROPOSITION 5.** The more organization practices are flexible, the higher the degree of e-procurement assimilation.

**Innovation Characteristics and Institutional Forces**

Perceived benefits based on innovation characteristics remain one of the most basic driving forces of adoption behavior, and many previous IT adoption studies, drawing on the diffusion of innovation perspective, commonly have tested the adopter’s perceived benefits from innovation characteristics, such as compatibility, relative advantage, and complexity.

In addition, the institutional approach (DiMaggio and Powell 1997) emphasizes the role of organizational environments for an organization’s behavior under uncertainty. This approach may provide a meaningful explanation for an organization’s behavior.
on the assimilation of IT innovation that especially involves a high level of uncertainty. Among the three mechanism of institutional forces presented by DiMaggio and Powell (1991), mimetic process and normative process especially provide an adequate perspective on the assimilation of e-procurement, which involves radical changes and a high level of uncertainty. Under this situation, organizations are more likely to benchmark and mimic other model organizations in the specific industry or in the overall market. Also, they are more likely to pay attention to what other organizations in the same professional community are doing. In doing so, organizations are more likely to learn and be convinced about the potential benefits from the applications, leading to more assimilation efforts. This discussion leads to the following propositions:

**Proposition 6.** Perceived benefits are positively related to the degree of e-procurement assimilation.

**Proposition 7.** The higher the level of institutional forces, the higher the degree of e-procurement assimilation.

**Research Method**

**Survey Development and Pretest**

First, a literature search was conducted to develop sample survey items, followed by interviews with several purchasing managers and reviews by IS faculty members to assess the face validity of survey items. Later, a pretest was implemented involving purchasing directors and managers from 67 member organizations of the National Association of Educational Buyers (NAEB) to test reliability and construct validity of survey items. Preliminary analysis was conducted to assess the reliability and the validity of the survey items by computing the Cronbach’s alpha and implementing an exploratory factor analysis. The Cronbach’s alpha for all constructs except one construct exceeds 0.7, which is generally acceptable for survey research. The factor loadings are also as expected except a couple of constructs. Based on this analysis, constructs were carefully revisited to correct the potential problems. Some of the survey items were modified or deleted, and some new items were added for the broad-based survey.

**Data Collection and Analysis**

Broad-based surveys are now underway using a Web-based survey. The first phase of the broad-based survey has been conducted with purchasing executives and managers from following two different contact sources. First, for the educational services industry, the National Association of Educational Buyers (NAEB) member contact database with the total size of 1,328 is used. Second, for the other services industries, a random sample of size of 3,672 has been drawn from the Dun and Bradstreet’s Million Dollar Databases for organizations with more than 100 employees that have an identifiable purchasing structure in place in terms of the availability of the contact information for purchasing executives/managers in each organization. Initial invitation letters have been sent out, followed by first and second reminders in two or three week intervals. So far, more than 400 respondents have participated in the survey, resulting in 370 usable samples for data analysis. Also, the second phase of the survey is now underway with the members of National Institute of Governmental Purchasing (NIGP) under the auspices of the institute.

A preliminary analysis is conducted to examine the measurement model using confirmatory factor analysis and its result is summarized in Table 1. The results indicate that each of the underlying indicator variables loads significantly on constructs. A more complete analysis with additional data will be presented and discussed in the conference.

**Expected Results and Potential Contributions**

The conceptual framework and empirical investigation of this study are expected to greatly contribute to both theory and practice. For theory, the study promises to enhance understanding of barriers and facilitators of e-procurement assimilation in organizations, especially focusing on barriers and facilitators that affect organizations’ abilities to assimilate e-procurement. This study will also yield useful implications for practitioners on how to effectively manage e-procurement assimilation efforts, making the task more manageable and less stressful.
Table 1. Summary of Preliminary Confirmatory Factor Analysis

| Q1_1  | Compatibility | 1    | .805 | .071 | 12.082 | *** | .538 |
| Q1_2  | Compatibility | 0.853 | .734 | .064 | 11.649 | *** | .477 |
| Q1_3  | Compatibility | 0.749 | .691 | .071 | 11.829 | *** | .562 |
| Q1_4  | Advantage     | 1    | .739 | .071 | 12.082 | *** | .538 |
| Q1_5  | Advantage     | 1.039 | .718 | .084 | 12.373 | *** | .516 |
| Q1_6  | Advantage     | 1.016 | .682 | .086 | 11.810 | *** | .466 |
| Q1_7  | Advantage     | 0.916 | .750 | .071 | 12.082 | *** | .538 |
| Q3_1  | Technical IT Skills | 1    | .867 | .053 | 19.116 | *** | .667 |
| Q3_2  | Technical IT Skills | 1.196 | .869 | .057 | 20.947 | *** | .754 |
| Q3_3  | Technical IT Skills | 1.007 | .817 | .053 | 19.116 | *** | .667 |
| Q3_4  | Managerial IT Skills 1 | 1    | .922 | .036 | 25.190 | *** | .749 |
| Q3_5  | Managerial IT Skills 1 | 0.9 | .866 | .036 | 25.245 | *** | .749 |
| Q3_6  | Managerial IT Skills 1 | 0.9 | .866 | .036 | 25.245 | *** | .749 |
| Q3_7  | Managerial IT Skills 2 | 1    | .924 | .030 | 31.123 | *** | .862 |
| Q3_8  | Managerial IT Skills 2 | 0.936 | .928 | .033 | 22.929 | *** | .664 |
| Q3_9  | Managerial IT Skills 2 | 0.744 | .815 | .033 | 22.929 | *** | .664 |
| Q4_1  | Co-location of Decision | 1    | .788 | .077 | 14.655 | *** | .676 |
| Q4_2  | Co-location of Decision | 0.655 | .499 | .074 | 8.862 | *** | .249 |
| Q4_3  | Co-location of Decision | 0.764 | .605 | .071 | 10.793 | *** | .367 |
| Q4_3a | Co-location of Decision | 0.971 | .776 | .075 | 12.996 | *** | .602 |
| Q4_4  | Knowledge Transparency | 1    | .807 | .063 | 17.652 | *** | .690 |
| Q4_5  | Knowledge Transparency | 1.104 | .831 | .062 | 18.677 | *** | .762 |
| Q4_6  | Knowledge Transparency | 1.151 | .873 | .062 | 18.677 | *** | .762 |
| Q4_7  | Flexibility     | 1    | .752 | .077 | 14.655 | *** | .676 |
| Q4_8  | Flexibility     | 1.131 | .822 | .077 | 14.655 | *** | .676 |
| Q4_9  | Flexibility     | 0.874 | .684 | .071 | 12.377 | *** | .468 |
| Q5_1  | Uncertainty     | 1    | .467 | .071 | 12.377 | *** | .218 |
| Q5_2  | Uncertainty     | 2.39 | .967 | .329 | 7.264 | *** | .935 |
| Q5_3  | Uncertainty     | 1.103 | .481 | .157 | 7.022 | *** | .231 |
| Q5_4  | Mimetic Process | 1    | .767 | .099 | 11.071 | *** | .753 |
| Q5_5  | Mimetic Process | 1.1 | .867 | .099 | 11.071 | *** | .753 |
| Q5_6  | Mimetic Process | 0.512 | .404 | .073 | 7.026 | *** | .163 |
| Q2_1  | Assimilation    | 1    | .589 | .204 | 9.390 | *** | .811 |
| Q2_2  | Assimilation    | 1.915 | .900 | .120 | 9.344 | *** | .397 |

*** p < .0001

* R^2 (= 1 – var(error)/var(x)) measures the reliability of an indicator x. R^2>.10 is considered acceptable.

Model Fit Indices:
- Degrees of Freedom = 505
- Minimum Fit Function Chi-Square = 930.141 (p < 0.001)
- Standardized Root Mean Square Residual = .048
- Tucker-Lewis Index (TLI) = .923
- Incremental Fit Index (IFI) = .940
Further, although this study is developed in the context of e-procurement, the results may also provide useful implications for other IT applications that share similar characteristics. At the conference, we plan to present a more complete analysis with additional data as well as the conceptual model of this study. Also, a brief discussion on possible future work will follow. A potential extension includes an investigation of the link between the degree of e-procurement assimilation and performance improvement.

References


