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UNDERSTANDING THE ADOPTION OF WEB-ENABLED TRANSACTION PROCESSING BY SMALL BUSINESSES

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ABSTRACT

The promise of the Internet and e-commerce has led to the increasing use of the web for transaction processing. Many organizations have adopted web-enabled transaction processing for applications such as processing payments online, selling products online, making travel reservations to name a few. In spite of the trend in this direction, transaction processing is not a major application on the web and its growth has been comparatively slow. As an important area for study, we examine the impact of various contextual factors, such as IS maturity, organizational factors, and environmental characteristics on the perceived usefulness and adoption of web-enabled transaction processing by small businesses. A research model and eight hypotheses were developed based on past literature review. Data were collected from senior managers in small business organizations using an instrument that was carefully developed and tested. Structural equation modeling was performed to test the goodness of fit of the model as well as the hypotheses. The model suggested reasonable fit for the data. Consistent with the TAM model, the results show the importance of perceived usefulness in adoption of web-enabled transaction processing by organizations. Other significant factors are IS maturity of a company, centralization, formalization, and the IS budget.

Keywords: Web-Enabled Services, Innovation Adoption, Transaction Processing, Internet

1. Introduction

Small businesses account for a vast majority of the US businesses and nearly one-half of the gross national product (US Small Business Administration 2001). There is enough anecdotal evidence that the Internet and its applications have been beneficial for small businesses. Therefore, it is imperative to have a better understanding of adoption of one of the important applications of the Internet for e-commerce -- transaction processing, in small businesses.

The Internet and the World Wide Web (WWW) have made dramatic impact on individuals and organizations in less than a decade. E-commerce has been on a steady rise. However, transaction processing[1] on the web is not the dominant use of the Internet or e-commerce although it is an essential application. Some transactions are very simple, such as purchasing a book or transferring funds, and can be processed immediately. Other transactions are

[1] Simply defined, transaction processing is the unambiguous and independent execution of a set of operations on data in a database, which treats the set of actions as a single event (Pete, Computerworld 2001). If any part of the transaction fails, the entire transaction fails and all participating resources are rolled back to their previous state. This includes everything from updating customer records to electronic funds transfers and issuing payroll checks. In E-commerce, many transactions take place, including checking for inventory and discounts, confirming the order, fulfilling the order, and processing of payment.

more complex, such as fulfilling a purchase order or completing an insurance claim, and may take days or even years to process (Business Wire 2003). Industries have adopted electronic transaction processing for different reasons and at different rates. For example, Sabre, the American Airline's electronic flight reservation system has set a standard for how travel reservations are processed. It is a system for electronically distributing airline tickets, hotel rooms, rental cars, and provides pricing and availability information from 400 airlines, 60000 hotel properties, and 41 car rental companies (Kontzer 2004). Telecommunication systems require real time transaction processing during set-up. There is a significant increase in the use of toll-free numbers, call forwarding, along with the advent of debit-based billing, local number portability, and wireless systems with roaming capabilities and follow-me services (Mitra 2000). On the other hand, the chemical Industry's adoption of web transaction systems has been slower than expected. About 67% of chemical firms are generating less than 5% of revenue via e-business portals (Seewald 2003). While the potential is great, it is largely untapped.

The non-propriety nature of the Web and its rapid growth levels the playing field for all participants in any industry. The Internet allows larger firms to enter market niches of small businesses[2] at little or no additional cost. At the same time, the Internet allows small businesses to enter the domain of larger business and compete with them. Moreover, the use of the same information technologies enables small businesses to achieve the same efficiencies as large businesses. In spite of this, the adoption of web-enabled transaction processing by small business has not been as widespread as would have been expected (Quayle 2002). Studies by De Lone (1981), Raymond (1985), and Thong (1999) suggest that small businesses differ from large businesses due to their lack of experience with information systems, dependence on external resources for technical support, and relatively less investment in information systems. Some factors attributing to slow adoption of web-enabled transaction processing by small businesses may include lack of management support for e-business projects, and external problems including customer reluctance to change procurement routines and purchase materials online. Some firms cite internal barriers to e-business, for example customer service representatives who are accustomed to doing their jobs the old way and not wanting to change (Seewald 2003). Barriers to e-business adoption also include: the unavailability of necessary information on the site, fear among employees of being displaced by technology, and fear of becoming disconnected from customers. Research on adoption and implementation suggests that market conditions induce small businesses to use new information technologies. It is suggested that small organizations may be more innovative as a result of greater flexibility and less difficulty in accepting and introducing change. However, lack of resources and expertise may hinder their innovation capacity (Thong 1999, Iacovou 1995).

While some studies indicate that web-enabled transaction systems are not the most common e-commerce applications, there are many that show promise. A survey by the CIO Insight editors suggested that 52.1% of the respondents use e-business to reduce their transactions costs (Perkowski 2003). When asked to name their top Internet priorities, as many as half of the state government, local agencies as well as municipalities cited adoption of online payment systems (Roberts 2000). It appears that many companies and government agencies are interested in conducting transactions on the Internet due to reasons of efficiency and return on investment. Clearly there are many uses of transaction processing on the Internet. However, there are many businesses that have not been able to benefit from it. The adoption of transaction processing in general is at best uneven among many businesses. It is therefore appropriate to examine the underlying reasons for adoption of web-enabled transaction processing especially by small business.

Most of the past literature has accepted the WWW and its applications as an innovation (Mehrtens et al. 2001, Sadowki et al. 2001, Wu et al 2006, Zon et al. 2000). This study treats web-enabled transaction processing as an innovation, and examines the factors that facilitate its adoption. Studies in the field of innovation, which span many disciplines and focus on both organizations and individuals, have defined an innovation as an idea, practice, or object that is perceived as new by an individual or another unit of adoption (Cooper and Zmud 1990, Hage and Aiken 1967). It is about generating ideas, converting ideas into deliverables and realizing the value of those deliverables in the marketplace (McKie 2004). Innovation is synonymous with growth and it is something that every business has to do to compete. Web-enabled transaction processing fits naturally into the definition of an innovation as it has changed the way of doing business. It provides opportunities to organizations to improve efficiency and reduce transaction costs.

In the case of transaction processing by an organization, an individual cannot adopt an innovation until the organization has already adopted it. The focus in this article is on organizational decision making. Compared to

[2] The Small Business act defines a small business as "one that is independently owned and operated and which is not dominant in its field of operation." The law also states that in determining what constitutes a small business, the definition will vary from industry to industry to reflect industry differences accurately (US Small Business Administration 2006)

innovation decision process by individuals, the innovation process in organizations is more complex. Implementation usually involves a number of individuals, perhaps including people for and against the new idea, each of who play an important role in the decision-making process (Rogers 2003).

Studies of organizational innovativeness help illuminate the characteristics of innovative organizations. Some of these characteristics such as perceived usefulness are equivalent to characteristics of innovative individuals, but certain characteristics such as centralization and formalization do not have an individual counterpart. The broad assumption in research on innovation in organizations is that organizational variables act on innovation performance in a manner over and above that of the aggregate of individual members of the organizations. Given our focus on accessing the affect of organizational variables on adoption of innovations, individual innovation factors such as behavioral attitudes, ease of use, observability, and triability (Davis 1989, Rogers 1995) become less important as they do not have much direct impact on how and why organizations adopt innovations. In addition, since the impact of adoption of innovations in organizations is long term, individual innovation factors are much less of concern to decision makers (Sia et al. 2004). Our organizational perspective should be of special interest to senior executives and technology managers in organizations.

2. Literature Review and Research Model

Much literature was reviewed to identify the factors that may influence the adoption of web-enabled transaction processing. Research on issues pertaining to small businesses in the Information Systems (IS) domain has focused on the organizational characteristics associated with IS success. Some key studies are identified here. For example, research has investigated the affects of structural organizational factors on innovation adoption (Grover and Goslar 1993). Factors that were considered within the context of organizational adoption of web-enabled services are: information systems (IS) maturity, organizational factors, external environmental factors, and perceived usefulness of web-enabled transaction processing systems. Further, it was proposed that mature IS departments would be more proactive in adopting new technology. Among the factors related to the internal structure of organization, centralization, formalization, IS budget, and organizational slack were considered important for innovation adoption (Rogers 1995). Innovation literature suggests that external factors that facilitate adoption include: environmental uncertainties, including dynamism, hostility and heterogeneity (Dimaggio and Powell 1983, Pierce and Delbecq 1977). The Technology Acceptance Model (TAM) shows that perceived ease of use and usefulness of a technology are the determinants of its usage (Davis 1989). While individuals may consider ease-of-use as a factor in adopting, organizations adopt an innovation primarily because of its usefulness and potential benefits (Hu et al. 1999) – so only perceived usefulness is included in the study.

We describe the research model in full detail below along with the relevant literature (Figure 1). Each of the variables is described and hypotheses developed.

2.1 Organizational Adoption of Web-enabled Transaction Processing

This is the dependent variable of the study. Rogers (1995) suggested that adoption of an innovation involves the decision to commit resources to the innovation. It can be defined as a decision to make full use of the innovation as the best course of action available (Rogers 1995). Higa and Wijayanayake (2000) examined the adoption of telework by Japanese organizations and employed the rate of adoption of telework as a dependent variable to measure adoption. White et al. (1998) assessed the adoption of the World Wide Web (WWW) by publishers of information and suggested degree of adoption and nature of adoption as two important dependent variables. Fiorito et al. (2000) studied the adoption of Information Technology by US National Unions and employed Information Technology (IT) use as the dependent variable. Thus, a number of researchers have studied adoption and usage of the IS applications.

Transaction processing is the unambiguous and independent execution of a set of operations on data in a database, which treats the set of actions as a single event (Pete, Computerworld 2001). While individuals may use the web for transaction processing (e.g., purchasing airline tickets, transferring funds electronically, making reservations, etc.), our focus is on the organizational adoption of the web for transaction processing (e.g., checking for inventory and discounts, making an order, confirming an order, fulfilling the order, payment processing, selling goods, providing service, etc.). A firm may engage in transaction processing with its customers, suppliers, and other entities in its value chain for coordinating activities such as payments and purchase orders, processing bids or keeping track of inventory thereby reducing the cost and time of obtaining products and services from outside the firm (Laudon and Laudon 2002, Pflughoeft et al. 2003).

2.2 Perceived Usefulness

The concern here is the usefulness of the innovation to the organization, and not an individual per se. Perceived usefulness (PU) from an individual's perspective is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1986). Within an organizational context, we define perceived usefulness as "the degree to which an individual in the organization believes that using

a particular system enhances the performance of the organization". If a particular technology is deemed useful to the organization, it is expected that it will be adopted.

The effective use of web-enabled transaction processing can lead to improved efficiencies in operations with savings in cost and time. The use of the web for routine activities such as transaction processing can free up the limited employees in small businesses to enhance interpersonal relationships within and outside the organizations. Thus, employees who envisage improved performance will adopt the technology due to anticipated raises, promotions, bonuses, and other rewards (Pfeffer 1982), leading to organizational adoption over time. Thus, we make the hypothesis:

H1: Perceived usefulness of web-enabled transaction processing is *positively related* to its degree of adoption in small businesses.

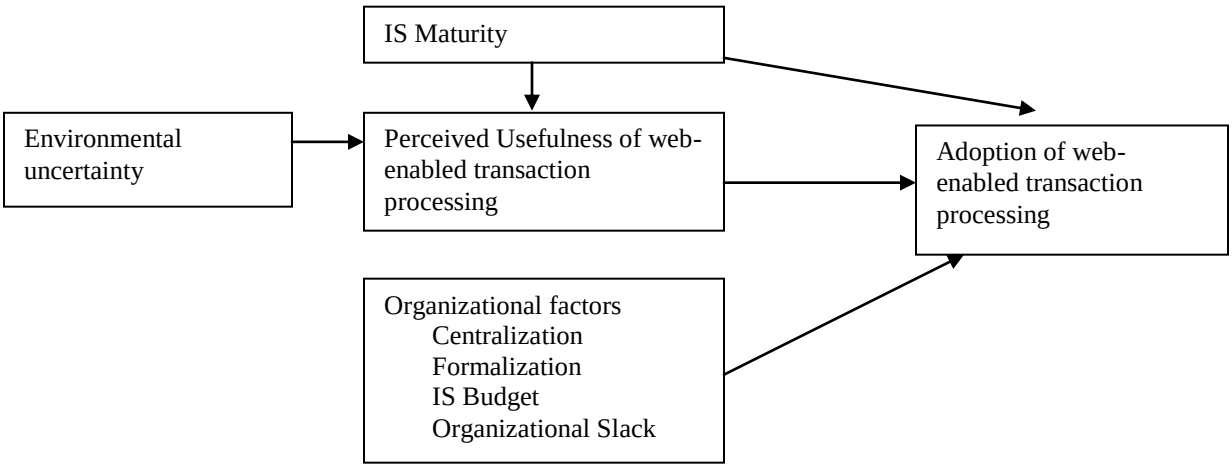

Figure 1: Research Model: Factors Affecting Adoption of Web-Enabled Transaction Processing

2.3 Information Systems Maturity

IS maturity has been discussed in various contexts. Some of the factors are the extent of infusion and diffusion of technology by organizations (Thong 1999, Sullivan 1985), the necessity of a formalized planning process that includes strategic, tactical and operational planning to ensure consistency of IS and organizational goals (Grover 1993, McFarlan 1971), and top management's role in fostering information systems with the potential to provide an impact (Premkumar and King 1992, Ives and Learmouth 1984). It was found that an industry's environmental factors influence the direction and pace of strategic deployment of IT, and that companies vary substantially in the extent to which IT has integrated with their primary strategies. Consequently, there may be several internal conditions present in organizations that are most successful in strategic utilization of IT (Johnson and Carrico 1988). Case studies of motivators and inhibitors of small business suggest that the lack of IS knowledge is among the key inhibitors in the development of IS applications (Cragg and King 1993). Thong (1999) suggests that due to small business' lack of IS knowledge, they depend on outside sources. Irrespective of the source of knowledge base, it is the learning by doing that reduces barriers and facilitates adoption of innovations (Pflughoeft et al. 2003). Thus a greater IS sophistication or maturity may provide the organization with the knowledge base to integrate new technologies. Organizations with a mature IS group tend to be more proactive in evaluating the advantages of web-enabled services and implementing them. Simply put, they are more likely to adopt new innovations (Shim and Min 2002). Studies of adoption and use of IT have shown that top management support and enthusiasm is a key motivator of adoption and use of new information technologies (DeLone 1988, Thong 1999). At the same time, these businesses are more likely to perceive the usefulness of web-enabled services for transaction processing and adopt them. Thus we frame the two hypotheses:

H2: IS maturity is *positively related* to the degree of adoption of web-enabled transaction processing in small businesses.

H3: IS maturity is *positively related* to the perceived usefulness of web-enabled transaction processing in small businesses.

2.4 Environmental Uncertainty

Innovation literature has consistently recognized that environmental uncertainty is a consequence of dynamic and hostile (i.e., competitive) environment and heterogeneity. The more dynamic and hostile the environment, the greater the need for innovation and the more likely it is that firms will be innovative (Miller and Freisen 1982).

When competitors' products change rapidly or when customer needs fluctuate, it is assumed that innovation will be common. In stable environments, it is less likely to be true (Burns and Stalker 1961). Another environmental dimension is germane, namely, heterogeneity. Firms operating in many different markets are likely to learn from their broad experience with competitors and customers. They tend to borrow ideas from one market and apply in another. According to Wilson (1966), the greater the diversity of the organization, the greater the probability that innovations will be proposed. Moreover, diversity in organization personnel, operating procedures, technologies, and administrative practices increases with environmental heterogeneity (Miller and Freisen 1982). Uncertainty stimulates a change in strategy or policy and can ultimately lead to innovation. Accordingly, Pierce and Delbecq (1977) hypothesized that "environmental uncertainty will be positively related with organizational innovation (initiation, adoption and implementation)".

Environmental pressures on small businesses to use web-enabled technologies are high and come from various sources (Zhuang 2005). Larger organizations usually exercise higher bargaining power and control over buyers, suppliers, and customers compared to small businesses (Porter 1980, Pfeffer and Salanick 1978). Smaller businesses are more vulnerable compared to their larger counterparts. Market pressures by larger partners are critical factors in the adoption of EDI by small businesses (Iacovou et al. 1995). Thus, when larger firms use transaction processing, they compel smaller businesses to adopt it as well. In addition, the competitor's adoption and use of a new technology have the potential for enhancing their competitive positions encouraging other firms to adopt or remain at a competitive disadvantage (Porter 2001). So, the more uncertain and changing the environment, the more likely small businesses will find innovations useful, in turn leading to their adoption. Thus, the hypothesis:

H4: Environmental uncertainty is *positively related* to perceived usefulness of web-enabled transaction processing.

2.5 Organizational Factors

After reviewing the literature, we identified the following organizational factors relevant in our context: centralization, formalization, IS budget, and organizational slack.

Centralization, referring to the concentration of decision-making activity, increases the predictability of outcomes of decisions (Hage and Aiken 1967). In a centralized structure, top-level decision makers are less likely to differ in their goals and values than lower level decision makers (Jarzabkowski 2002). Higher degree of decentralization implies high involvement of lower level decision makers, with more diverse goals and values. This variability increases unpredictability in decision-making. Nakamura (2003) and Nelson (2002) suggest that centralization can prevent wasteful duplication of effort. Centralization can encourage employees to be more cooperative about sharing discoveries and techniques, reducing risk and duplication of effort. In addition, organizations that follow a systems-structural perspective of management can hypothesize that centralization improves effectiveness because it gives the decision maker the ability to plan, coordinate, and control (Ruekert and Walker 1985). Studies of adoption and use of IT have shown that top management support and enthusiasm is a key motivator of adoption and use (DeLone 1988, Thong 1999). In small businesses, with higher workloads and absence of spare capacity, centralized decision making can free the limited employees to focus on important operational activities. Furthermore, with centralization, personal interaction, cooperation and transfer of knowledge are more manageable enabling adoption of innovations.

Formalization represents the use of rules in an organization (Hage and Aiken 1967). As power becomes more centralized (i.e., fewer people make more decisions), it becomes imperative to develop clear-cut rules because of pressures of time. Leaders cannot spend all of their time making decisions, so they codify past decisions into rules to specify what job occupants are supposed to do. Decisions can become rules for routine procedures or problems as well as guidelines for the behavior of job applicants. Crozier's studies have suggested a relationship between low participation in decision-making and a high degree of job codification (1969). The reason for expecting a relationship between low participation in decision-making and rule observation is that if few people participate in decision making, there is likely to be little commitment to new policies on the part of non-participants. Under these circumstances, there is a greater need for enforcement of rules in order to ensure conformity with organizational regulations. Likewise, formalization is thought to lead to greater efficiency in adoption because the predefined rules and procedures serve to routinize repetitive activities (Pugh et al. 1968, Ruekert and Walker 1985, Rapert and Wren 1998) that may be needed in implementation.

Organizational slack refers to the extra resources available in excess of what is required for the normal operation of an organization. From a psychological viewpoint, innovation is more likely in the presence of organizational slack because it buffers organizations from downside risk and because the legitimacy of experimenting is less likely to be questioned (Thompson 1969, Singh 1986). There is support in the literature for this assertion (Mohr 1969, Singh 1986). Proponents argue that slack plays a crucial role in allowing organizations to innovate by permitting them to experiment with new strategies and innovative projects that might not be approved in

a more resource controlled environment (Nohria and Gulati 1996).An argument can be made that its presence allows an organization to interact or compete in its environment more boldly (Singh 1986). Thus, slack resources are expected to facilitate risk taking and innovation. The often-cited work of Nolan (1979) suggests that organizations encourage innovation and extensive application by maintaining low control and high slack. Rosner (1968) noted that slack resources are able to help a firm bear the costs of innovation and to explore new ideas in advance of actual need. Further, quality innovation benefits from ample information (Kanter 1988). Organizations with greater slack resources can afford sophisticated information search activities, such as an integrated computer information system to enhance search processes (Smith et al. 1992). In addition, Mone et al. (1998) identified higher levels of uncommitted resources as a factor that positively affects innovation in response to organizational decline. Lack of resources and expertise are assumed to be a major reason that hinders the adoption of innovations by small businesses (Thong 1999, Iacovou 1995).

Finally, many organizations manage competitive pressures from the environment by investing in information technology. A higher IS budget allows the organization the flexibility to adopt new innovations. Cragg and King (1999) suggest that lack of IS knowledge is one of the biggest inhibitors in the adoption of technology for small businesses. Greater investment in resources not only help reduce IS knowledge barriers, but may also reflect a firm's financial position and the top management's support and enthusiasm for information technologies. In recent years, the availability of low cost hardware, increased powers and capacity of computers, and a variety of user-friendly software have made it possible for small businesses to enhance their IT usage and take advantage of the strategic possibilities of IT (Pollard and Hayne 1998). It should be noted that all of these four organizational variables might directly affect the ability to adopt a new innovation irrespective of the perceived usefulness. Furthermore, these variables do not appear to have any direct affect on the perceived usefulness of the innovation. Thus we make the hypotheses:

H5: The degree of centralization is *positively related* to the degree of adoption of web-enabled transaction processing in small businesses.

H6: The degree of formalization is *positively related* to the degree of adoption of web-enabled transaction processing in small businesses.

H7: The degree of organizational slack is *positively related* to the degree of adoption of web-enabled transaction processing in small businesses.

H8: The IS budget is *positively related* to the degree of adoption of web-enabled transaction processing in small businesses.

3. Research Methodology

The organization is the unit of analysis for this research. The survey methodology was used. As described in the previous section, there are eight variables in the research model. A questionnaire was prepared based on the concepts and constructs discussed in previous sections. Items for the constructs were taken from developed and tested instruments.

IS budget was operationalized as a percentage of annual sales revenue (CIO.com 2005). Bourgeois (1981) made the case for financially derived measures for organizational slack. Some studies have suggested archival financial data to measure slack (Bourgeois 1981, Singh 1986). Since such data was not available for our dataset, we operationalized organizational slack as the average profit made by the organization in the last five years. In as much as possible, items from existing instruments were used for the other constructs. The studies from which the scales were adopted are shown in Table 1. Operationalization of the constructs is shown in Appendix A. The questionnaire was first pretested to refine the wording of the instrument, thereby reinforcing face validity (Churchill 1979). Pretesting was performed by administering the questionnaire to researchers and professionals working in organizations.

The study was conducted in the year 2003 by sending questionnaires with return envelopes to randomly selected organizations from an Internet-based federal government database of small businesses (pro-net.sba.gov). The database provides a mailing list with the name and address of a contact person. All respondents contacted were considered to be top management team members, including reporting assistant and middle managers (Woolridge and Floyd 1990). The sample respondents were randomly selected from the federal government Pro-*Net* website. This site has an Internet-based database containing information about more than 195,000 small, disadvantaged, and women-owned businesses. It is free to federal and state government agencies, as well as to prime and other contractors seeking small business contractors, subcontractors and/or partnership opportunities. The organizations in the database are classified into four main industry types: service, research and development, construction, and manufacturing industries. The names of senior managers were used as recipients for questionnaires.

Table 1: Scales and Reliability

Construct	Abbreviation for the Constructs	Study	Cronbach's Alpha	Sample
IS maturity	IS	Grover and Goslar 1993	0.79	154 firms
Environmental Uncertainty	EU	Miller and Friesen 1982	0.74	52 business firms
Centralization	CENT	Caruana et al. 1998	0. 78	150 export manufacturing firms
Formalization	FORM	Caruana et al. 1998	0.71	150 export manufacturing firms
Perceived Usefulness	PU	Moon and Kim 2001	0.93	152 graduate students
Adoption of Web-Enabled Services	AD	Moon and Kim 2001	0.83	152 graduate students

3.1 The Pilot Study

A pilot test was carried out before the final survey. The primary purpose of the pilot was to check the reliability of the instrument. The search engine of the Internet database randomizes the order of the organizations it shows for every search. For the final list of firms to which the survey was to be sent out for the full study, every 40th organization was selected from the randomly generated list. There were in all 3073 firms in the final list. The first 1000 firms were sent surveys by mail for the pilot test. The rest of the 2073 organizations were sent questionnaires for the full study. For the pilot test, in approximately two weeks, 113 usable responses were received. The six latent constructs of the research model containing 30 items were tested for reliability. Individual construct reliability was assessed. To improve the instrument, items were eliminated if their corrected item-total correlations were below 0.5 or if their correlation with the two-item criterion scale was below 0.4 (Doll and Torkzadeh 1988). These cutoffs are arbitrary; there are no accepted standards. However, they are comparable to those used by previous researchers (Dolbier 2000, Ives et al. 1983). The results of the pilot study are shown in Table 2. As a result of the pilot, 8 items were deleted based on reliability assessment, resulting in 22 items for the six constructs. Besides these items, questions were added to collect demographic data.

Table 2: Results of Pilot Test--Cronbach's Reliability Coefficients for the Constructs

Construct	Abbreviation of the Constructs	Number of Items Before Pilot Test	Cronbach's Alpha Before Pilot Test	Number of Items After Pilot Test	Cronbach's Alpha After the Pilot Test
IS Maturity	IS	7	0.83	6	0.85
Environmental Uncertainty	EU	9	0.58	3	0.70
Centralization	CENT	5	0.70	4	0.78
Formalization	FORM	4	0.77	4	0.77
Perceived Usefulness	PU	3	0.98	3	0.98
Adoption	AD	2	0.90	2	0.90

3.2 The Full Study

The remaining 2073 of the 3073 organizations were sent questionnaires for the full study. At the end of a month, a total of 215 responses were received in all for the entire study including the pilot test. A sample size of 150 and above is considered good for such a study (Anderson and Gerbing 1988).The pilot data was included with the full study as there was no change in the selected questions from the pilot to the full. Pearson's chi-square test for homogeneity was performed to check for bias between the pilot test and full study samples (Nahm et al. 2004). No discernible difference was found in the profile of the respondents from the pilot and the full study. The combining of the two data sets helped us increase the sample size without compromising the quality of the data by any significant amount. Of the 215 responses, 211 were usable. One hundred and twenty one envelopes were returned unopened due to changes in respondents' addresses.

To test for non-response bias affects in our sample, we sent additional mails to non-respondents asking for information about their demographic variables such as job title, and industry profile after the data collection period was closed (Nahm et al. 2004, Ramaswami 2002, Sakaguchi 2004). Pearson's chi-square test of homogeneity was

used to compare the first mailing group (n=215) and the second mailing group (n=99). We found no statistical differences between respondents and non-respondents on each of the variables, indicating no evidence of non-response bias associated with our sample.

The respondents were asked to identify their job titles within their respective organizations. The number of respondents and their profile are shown in Table 3.

Table 3: Number of Responses and Profile of the Respondents in Management

Position	**Overall sample**	**Manufacturing**	**R& D**	**Construction**	**Services**
Top Management	176	50	41	33	52
Middle Management	27	5	10	7	5
First Line Management	8	0	3	1	4
Total	211	55	54	41	61

3.3 Measurement and Structural Model Testing

The instrument was further tested for psychometric properties using the full set of data. In addition to Cronbach's alpha (α), variance extracted and convergent and discriminant validity were calculated. A value greater than 0.5 for variance-extracted occurs when the indicators or items truly represent the hypothesized latent constructs (Byrne 1998, Hair et al.. 1998). Convergent validity is evidenced when items from the same construct correlate highly. The analysis of convergent validity and variance extracted showed that all proposed constructs satisfy the recommended values. The variance extracted and composite reliability of the constructs is shown in Table 4. Discriminant validity is "the extent to which an independent assessment method diverges in its measurement of different traits" (Byrne 1998). Fornell and Larker (1981) proposed a method for evaluating discriminant validity. It was proposed that the square of the correlations between the constructs should be less that the variance explained by the construct. All constructs showed a good level of discriminant validity as shown in Table 5.

This discussion concludes that the measurement instrument used in this study has passed important criteria for measurement reliability and validity.

Table 4: Average Variance Extracted and Convergent Validity

Construct	**Abbreviation**	**Average Variance Extracted**	**Convergent Validity or Composite Reliability**
IS Maturity	IS	0.55	0.85
Environmental Uncertainty	EU	0.72	0.88
Centralization	CENT	0.80	0.92
Formalization	FORM	0.74	0.92
Adoption of web-enabled services	AD	0.97	0.98
Perceived Usefulness	PU	0.97	0.98

Table 5: Discriminant Validity - Comparison of Variance Extracted and Square of the Correlation between the Constructs

Constructs	IS	EU	CENT	FORM	AD	PU
IS	0.55					
EU	0.00	0.72				
CENT	0.01	0.00	0.80			
FORM	0.01	0.00	0.18	0.74		
AD	0.23	0.01	0.03	0.04	0.97	
PU	0.16	0.00	0.01	0.02	0.50	0.97

As strong theoretical foundations supported the area under study, it was appropriate to evaluate the associations of the constructs with structural equation modeling (SEM) (Joreskog and Sorbom 1993). The model was tested using structural equation modeling techniques using LISREL 8.51.

Multiple measures of fit were used as suggested by Hu and Bentler (1999). The chi-square (χ^2) goodness-of-fit statistic assesses the degree of departure of the sample covariance matrix from the fitted covariance matrix (Hu and Bentler 1999). A nonsignificant and small chi-square is desirable. However, when the sample size is large and the

model contains a large number of indicators, χ^2 can easily become significant (Byrne 1998). This problem with χ^2 has long been recognized (Chou and Bentler 1995). Therefore, we report several additional fit indices (Hu and Bentler 1999). CFI is an incremental fit index that "measures the proportionate improvement in fit by comparing a target model with a more restricted, nested baseline model". The GFI is based on a ratio of the sum of squared discrepancies to the observed variances. The recommended value for both CFI and GFI is above 0.9. Another index is Non-Normed Fit Index (NNFI) whose recommended value is also above 0.9. The Root Mean Square Error of Approximation (RMSEA) is an absolute fit index which assesses "how well an a priori model reproduces the sample data" and its cut-off is around 0.08 (Joreskog and Sorbom 1993).

4. Structural Model Testing Results

Given a satisfactory measurement model fit for the models, the structural equation model was assessed for adoption of web-enabled services for transaction processing. Anderson and Gerbing (1988) suggested that the measurement model provides an assessment of the convergent and discriminant validity while the structural model provides an assessment of the predictive validity. Mulaik et al. (1989) expanded the idea and recommended assessing the fit of the structural equation model among latent variables (that is, the structural model) independently of assessing the fit of the observed variables to the latent variables (that is, the measurement model). Their rationale was that even for a few latent variables, most parameter estimates define the relationships of the observed variables to the latent variables in the measurement model, rather than the structural equation relationships of the latent variables themselves. Consequently, we can propose that the structural equation model specifies the direct and indirect relationships among the latent variables and is used to describe the amount of explained and unexplained variance (Schumaker and Lomax 1996).

Eight structural paths exist in the structural model. The model fit statistics were χ^2 (df = 222, N = 211) = 404.49, p <. 00001, RMSEA = 0.063, NNFI = 0.92, CFI = .93 and GFI =. 86. Overall, the statistics demonstrated a moderate fit to the model (Byrne 1998). Figure 2 shows the estimated standardized path coefficients and their t values. The significant paths, estimated standardized path coefficients and t values are shown in bold. Six out of eight paths were significant. They were IS maturity -> adoption, centralization->adoption, formalization-> adoption, organizational slack-> adoption, IS budget -> adoption, perceived usefulness -> adoption. A summary of the estimated standardized path coefficients and hypotheses testing is presented in Table 6.

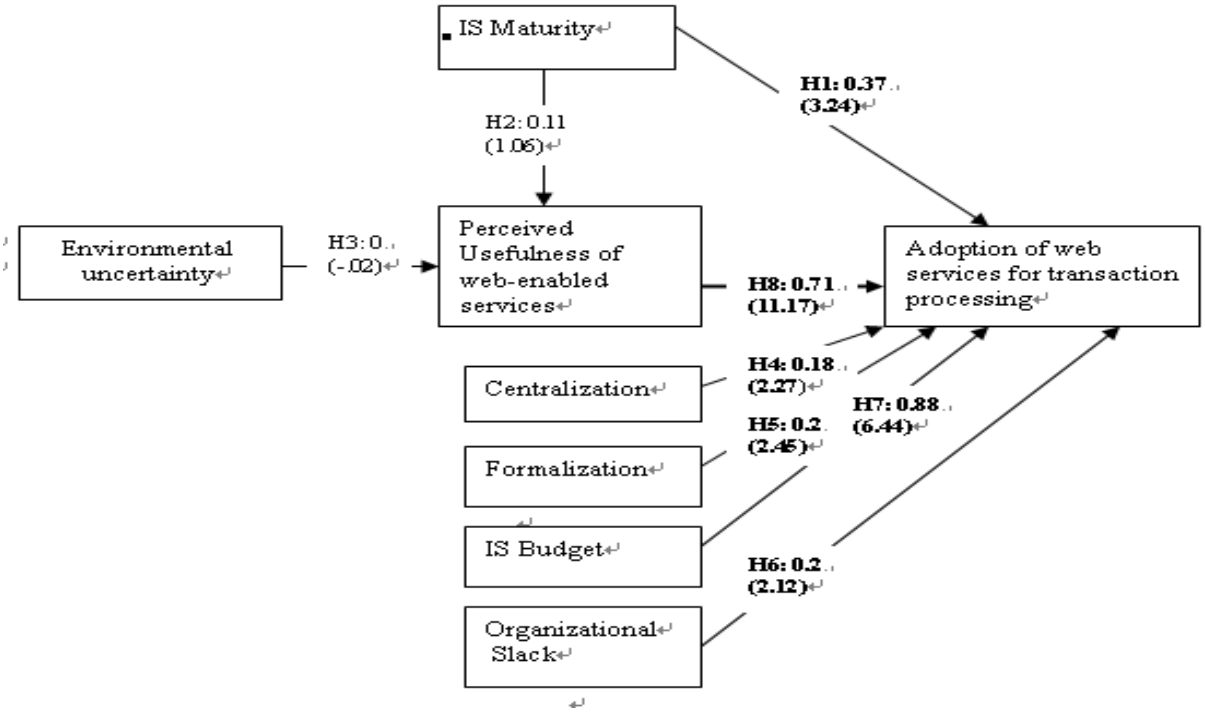

Figure 2: Standardized path coefficients for the model (t values of estimated coefficients are in parentheses. Significant paths are in bold).

Table 6: Summary of Parameter Estimates for Proposed Model -Adoption of Web-enabled transaction processing

Hypotheses	***Structural Path***	***Standardized Values***	***t values***	***Interpretation***
H1	IS Maturity (IS)-> Adoption (AD)	0.37	**3.24**	Hypotheses supported
H2	IS Maturity (IS) -> Perceived Usefulness (PU)	0.11	1.06	Hypotheses not supported
H3	Environmental Uncertainty (EU) -> Perceived Usefulness (PU)	0	-0.02	Hypotheses not supported
H4	Centralization (CENT)-> Adoption (AD)	0.18	**2.27**	Hypotheses supported
H5	Formalization (FORM)-> Adoption (AD)	0.2	**2.45**	Hypotheses supported
H6	Organizational Slack (SLACK)-> Adoption (AD)	0.2	**2.12**	Hypotheses supported
H7	IS Budget (ISBUDGET) ->Adoption (AD)	0.88	**6.44**	Hypotheses supported
H8	Perceived Usefulness (PU)-> Adoption (AD)	0.71	**11.17**	Hypotheses supported

Note: $p<0.05$

5. Results and Discussion

The goal of this study was to investigate the affect that IS maturity, organizational factors, and environmental uncertainty have on perceived usefulness and adoption of web-enabled transaction processing systems in small businesses. Overall, the results confirm many of the prior studies while providing several areas of differences. There is strong evidence to support that perceived usefulness is a prime motivator for the adoption of web-enabled transaction processing in small businesses. Web-enabled transaction systems are useful to small businesses in accelerating ordering, delivery, and payment of goods and services while reducing company operating and inventory costs (Pflughoeft et al. 2003). For example, the low cost of coordinating activities such as payments and purchase orders using the web instead of costly proprietary systems encourages companies to share, collaborate and coordinate business with a greater number of suppliers (Radding 1999). As small businesses expand their markets beyond physical boundaries and increase their customer base, they rely increasing on the web-enabled services for increasing sales and improving customer bases. Small businesses are able to realize greater market penetration because web-enabled transaction processing may be attractive to existing and new customers. Customer's costs of transactions are reduced and they get more value from timely and accurate information. Perceived usefulness has been established in the Technology Acceptance Model (TAM) as an important determinant of individual adoption of technology (Davis 1989); it is heartening to note its significance in organizational acceptance as well.

IS maturity seems to positively influence the adoption of web-enabled transaction processing. Mature IS organizations have past experience in working with new technologies; thus they have better knowledge and understanding of any potentially useful innovations (Kettinger and Hackbarth 2004). This affects both their perceptions of usefulness of the technology and its actual adoption. They are also in the enabler position to diffuse the technology throughout the organization. Web-enabled transaction processing systems are being adopted by a good number of small businesses and becoming the norm for doing business. There is enough experience and rationalization to adopt these innovations. In fact, as small businesses are linked in supply chains as suppliers, customers, and vendors with larger firms, it will get increasingly difficult for them to do business without web transaction systems (Laudon and Laudon 2002).

Adoption of web-enabled transaction processing systems is positively influenced by centralization and formalization. Central management of policies and procedures for adoption of innovations makes the adoption process efficient and reduces ambiguity (Warger 2002). Centralization can prevent wasteful duplication of effort. Centralization encourages innovators to be more cooperative about sharing discoveries and techniques, thereby reducing risk and eliminating duplication (Nakamura 2003). Web-enabled transaction processing costs are measured

and compared with the firm's total operating costs; thus they require centralized top management's resource commitment towards its adoption. Adoption of these technologies would require a central commitment if they are to be adopted uniformly within small businesses.

The results for formalization were expected. Many organizations attempt to establish a consistent approach to new technology adoption. The approaches may vary from developing internal procedures to having external consultants create documentation in order to encourage employees to follow the procedures. It is suggested that higher levels of formalization signify lower levels of ambiguity and uncertainty, and these elements are conducive to reducing bias and hence facilitating adoption of technologies (O'Connor and Morrison 2001).

Organizational slack was found to be positively related to adoption of web-enabled services. With organizational slack, an organization can interact or compete in its environment more boldly. As slack is generated, the organization can afford to experiment with new strategies, for example, introducing new products, entering new markets and so on (Hambrick and Snow 1977). Slack acts as a buffer that helps a firm maintain stability when facing adverse conditions. Consequently, slack encourages managers to take risks because it allows an organization the ability to absorb the costs associated with failure. Rosner (1968) noted that slack resources are able to help a firm bear the costs of innovation and to explore new ideas in advance of actual need.

IS budget had an important and noteworthy relationship with adoption for our sample of small businesses. It is widely accepted by CEOs, CIOs and CFOs that investing in IS is critical to being competitive in practically any industrial or consumer market anywhere (David et al. 2002). A considerable IS budget helps to investigate and implement new technologies (Harris and Katz 1988). The CIO insight study (Perkowski 2003) suggests that organizations increase their IT budgets for e-business investments and the reasons are to increase revenues, reduce costs and increase productivity. Non-financial reasons for investing are increased customer satisfaction, customer knowledge, error reduction and flexibility. Although the initial cost of setting web-enabled transaction systems is small, firms are required to allocate a significant portion of their resources to develop and maintain these technologies.

Interestingly, environmental uncertainty was not significantly related to perceived usefulness of the web-enabled transaction processing systems. An increase in the number of users confers value to the technology and creates a bandwagon effect, thereby encouraging others to adopt a new innovation (Kauffman et al. 2000, Katz and Shapiro 1991). It may be argued that web-enabled services for transaction processing are more a competitive necessity than an advantage in turbulent markets. General literature in IS suggests that web-enabled transaction processing systems are useful primarily in improving the efficiency and return on investment.

6. Conclusions

This study provides an understanding of the factors that facilitate the adoption of web- enabled services for transaction processing in small businesses. It has important implications for small businesses. This study shows that propositions relatively well accepted for larger organizations are also useful for small businesses. Small businesses should evaluate their organizational structures and be proactive in adopting web-enabled transaction processing technologies. Small businesses would benefit greatly by adopting these technologies to increase their customer base and reduce transaction costs. In order to do so, small businesses should invest in IS to improve their knowledge base and adapt to new technologies. If the trends of adoption of web-enabled technologies continue, even organizations that usually operate in relatively benign environments will have to adopt web-enabled technologies as they become pervasive. In this scenario, it is the technologically aware, fast growing small firms that will make the most significant advances.

It is worth recognizing an important limitation of this study. While the characteristics of the sample chosen (all small businesses) lend a degree of homogeneity to the sample, it makes it more difficult to draw generalizable conclusions for all businesses. Future research may attempt to validate these findings to larger businesses, multiple industries and different cultural contexts.

Finally, the distinctiveness of the study is its focus on the organizational adoption of technology. We believe it is a fertile area for future research and encourage others to continue this stream of work.

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APPENDIX A

Operationalization of the Constructs

Note: Items with an ** next to them were deleted in the final survey

IS Maturity (Grover and Goslar 1993)

1. How many functions are dependent on Information Technology in your organization?	Very few functions 1	Some of the functions 2	About half of the functions 3	Most of the functions 4	All of the functions 5
**2. To what extent are mainframe terminals, computers, word processors, process control devices, micros, etc., installed throughout your organization?	Not at all installed 1	Somewhat installed 2	About half installed 3	Mostly Installed 4	Installed everywhere 5
3. How informed are information system managers about your organization's business plans?	Uninformed 1	Somewhat informed 2	Informed about half of the time 3	Mostly informed 4	Well informed 5
4. How informed are your firm's top management about information technology?	Uninformed 1	Somewhat informed 2	Informed about half of the time 3	Mostly informed 4	Well informed 5
5. How formalized is the information system planning in your organization?	Un-formalized 1	Somewhat formalized 2	Formalized about half the time 3	Mostly formalized 4	Very formalized 5
6. To what extent does information system planning take your organization's business plans into consideration?	Does not consider it at all 1	Somewhat considers it 2	Considers it about half of the time 3	Mostly considers it 4	Always considers it 5
7. How involved is top management in information systems planning?	Uninvolved 1	Somewhat Involved 2	Involved about half of the time 3	Mostly involved 4	Very involved 5

Environmental Uncertainty (Miller and Friesen 1982)

**1. How predictable are the actions of competitors?	Very unpredictable 1	Somewhat predictable 2	Predictable about half of the time 3	Mostly predictable 4	Very predictable 5
2. How different are your organization's products/services in reference to customer buying habits?	Very dissimilar 1	Somewhat dissimilar 2	Similar about half of the time 3	Mostly similar 4	Extremely similar 5

3. How different are your organization's products/services in reference to nature of competition in your industry?	Very dissimilar 1	Somewhat dissimilar 2	Similar about half of the time 3	Mostly similar 4	Extremely similar 5
4. How different are your organization's products/ services in reference to market dynamism and uncertainty in your industry?	Very dissimilar 1	Somewhat dissimilar 2	Similar about half of the time 3	Mostly similar 4	Extremely similar 5
**5. How severe a threat does price competition in your industry pose to your organization?	Very severe 1	Somewhat severe 2	Severe about half of the time 3	Slightly severe 4	Not at all severe 5
**6. How severe a threat does product quality/novelty competition in your industry pose to your organization?	Very severe 1	Somewhat severe 2	Severe about half of the time 3	Slightly severe 4	Not at all severe 5
**7. How predictable are customer demands and tastes?	Very unpredictable 1	Somewhat predictable 2	Predictable about half of the time 3	Mostly predictable 4	Very predictable 5
**8. At what rate does technology change in your industry?	Does not change at all 1	Sometimes changes 2	Changes about half of the time 3	Often changes 4	Always changes 5
**9. The organization must frequently change its marketing practices to keep pace with markets and competitors.	Strongly disagree 1	Slightly disagree 2	Neutral 3	Slightly agree 4	Strongly agree 5

Centralization (Caruana et al. 1998)

	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Strongly agree
**1. Any major decision that is made has to have your organization's approval.	1	2	3	4	5
2. In your experience with your organization, even quite small matters have to be referred to someone higher up for a final answer.	1	2	3	4	5
3. Your experience with your organization has included a lot of rules and procedures stating how various aspects of your job are to be done.	1	2	3	4	5
4. You have to ask senior management before you do almost anything in your business.	1	2	3	4	5
5. You can take very little action on your own until the senior management approves it.	1	2	3	4	5

Formalization (Caruana et al. 1998)

	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Strongly agree
1. Whatever situation arises, there are procedures to follow in dealing with the situation.	1	2	3	4	5
2. When rules and procedures exist here, they are usually in written form.	1	2	3	4	5
3. The employees in your organization are constantly checked for rule violation.	1	2	3	4	5
4. There are strong penalties for violating procedures.	1	2	3	4	5

Adoption (Moon and Kim 2001)

1. What is the current usage of web services for transaction processing in your organization?	Do not use at all 1	Use less than once a week 2	Use about once a week 3	Use several times a week 4	Use about once a day 5	Use several times each day 6
2. How frequently do you use the web for transaction processing in your organization?	Extremely infrequently 1	Quite infrequently 2	Neither 3	Quite frequently 4	Extremely frequently 5	

Perceived Usefulness (Moon and Kim 2001)

	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Strongly agree
1. Using the web for transaction processing enhances your organization's effectiveness.	1	2	3	4	
2. Using the web for transaction processing increases your organization's productivity.	1	2	3	4	
3. Using the web for transaction processing improves your organization's performance.	1	2	3	4	

IS Budget (CIO.com Oct-05)

1. How much is the IS budget of your organization?	0-1% of annual revenue 1	1.01-2% of annual revenue 2	2.01-3% of annual revenue 3	3.01-4% of annual revenue 4	4.01-5% of annual revenue 5
	5.01-6% of annual revenue 6	6.01-7% of annual revenue 7	7.01-8% of annual revenue 8	8.01-9% of annual revenue 9	9.01-10% of annual revenue 10

Organizational Slack

1. What is the average profit made by your organization <u>in the last five years?</u>	More than 60.01% loss on sales 1	40.01-60% loss on sales 2	20.01-40% loss on sales 3	0-20% loss on sales 4	No Profit /no loss 5
	0-20% profit on sales 6	20.01-40% profit on sales 7	40.01-60% profit on sales 8	60.01-80% profit on sales 9	Greater than 80.01% profit on sales 10