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ABSTRACT

While IT adoption has been the focus of much research, this paper combines aspects of research that have received little attention. First, this paper focuses on the factors affecting IT adoption from the firm-level. Second, a novel technology such as digital imaging technology (DIT) is investigated. Not only is this very relevant but this moves away from the much researched technology, EDI. Lastly, while much of the IT literature focusing on IT adoption at the firm-level emphasizes large organizations, this research looks into small businesses.

To investigate IT adoption from a small business perspective, three factors are identified that influence the DIT adoption in small firms. These factors are: organizational readiness, perceived benefits, and external pressure. In short, small firms will be investigated to determine what factors affect the adoption of DIT within the banking industry. A survey package will be sent to 167 CEO's from independent banks in Alabama.

Keywords

Adoption of IT, Small Business, Interorganizational Systems, Digital Imaging Technology.

INTRODUCTION

Under new legislation, which will take effect in October 2004, any institution processing a check can make an electronic copy of it and send it at the click of a button. Check 21, otherwise known as the Check Clearing in the 21st Century Act, does away with the requirement that original checks be physically presented for payment. Instead, as checks are presented, they will be digitally imaged instantly rather than flown or trucked around the country. The Federal Reserve Board first broached the idea of check clearing by electronic image after the 9/11 terrorist strikes brought transportation and check clearing to a halt, leaving $47 billion worth of checks floating in limbo for days (Coombes, 2003).

Approximately 50 billion checks are written in the United States each year, and significant economic resources are expended on their collection and return. Savings will be considerable by processing checks electronically. According to NACHA, the Electronic Payments Association, banks and merchants can save 5 to 25 cents per transaction. Furthermore, the banking industry also says that processing checks electronically will make it easier to track and prevent fraud (Coombes, 2003).

This act is designed to provide banks with additional flexibility in processing checks by requiring banks to accept substitute checks in place of original checks. The act does not, however, require banks to accept checks in electronic form nor does it require banks to use the new authority granted by the act to create substitute checks. This market-based approach permits each bank to decide whether to make use of this new authority. This decision will be based on the bank's internal business case analysis, which will assess the costs and benefits of using the new authority. In short, this research examines the factors that determine whether banks will adopt digital imaging technology to exploit the opportunities created by the Check 21 Act.

Given the impact of this new legislation, the objective of this study is to test a predictive model that presents three factors as determinants of the adoption of digital imaging technology. To construct the model, we identified and organized the factors that were found to be influential in prior IT adoption research, particularly Electronic Data Interchange (EDI). This research should be valuable in testing the generalizability of factors (which are determinants of EDI adoption) to another interorganizational information technology innovation.

The rest of the paper is presented as follows. The following section discusses technology adoption. This is followed by a proposed theoretical framework and model. Lastly, the research methodology is discussed.

TECHNOLOGY ADOPTION

The appropriate starting point for insight into the adoption of technology is the literature on the diffusion of innovations (DOI). Diffusion of innovations theory deals with how innovations spread through a population of potential adopters over time. Rogers identified five generic innovation attributes that influence rates of adoption: 1) relative advantage, 2) compatibility, 3) complexity, 4) trialability, and 5) observability (Rogers, 1983). However, most of Rogers' work is based upon studies of adoptions by individuals. Accordingly, there has been much criticism when diffusion theory is applied to organizational innovations (Attewell, 1992).

In review of IT innovation studies, Fichman (1992) argues that classical diffusion variables themselves are unlikely to be strong predictors of adoption and diffusion for complex organizational technology, suggesting that additional factors, either as independent or control variables be added. This supports Zmud's (1982) contention that "much of the inconclusiveness of prior research can be attributed to a failure to recognize that innovation attributes can be perceived very differently according to the specific organizational context involved." Accordingly, many researchers have suggested, to be useful, any borrowed theory needs to be tailored to match the context of the application. Many of the conflicting results on organizational innovation reported in the literature could be attributed to the contextual differences in the studies. Thus, innovation adoption decisions must be studied within appropriate contexts and with variables tailored to the innovation (Chau and Tam, 1997).

THEORETICAL FRAMEWORK

A model for digital imaging adoption needs to take into account factors that affect the propensity to adopt and the specific technological and environment circumstances of an organization. An examination of the adoption literature reveals two frameworks which provide excellent starting points in developing an adoption model. One framework is from Tornatzky and Fleisher (1990) and the other is Iacovou et al. (1995). Both are very similar. First, in the Tornatzky and Fleisher framework, there are three elements that influence the process by which innovations are adopted. They are 1) the external environment context, 2) the technological context, and 3) the organizational context. The Iacovou et al. framework corresponds almost exactly with the Tornatzky and Fleisher framework, with its elements being 1) interorganizational (almost the same as environment), 2) technological, and 3) organizational. Furthermore, the factors that make up the elements are very similar.

For the purposes of this research, we will construct a new model very similar to the models cited above using most of the same factors. In this model, the intent to adopt digital imaging technology (DIT) is determined by three factors: perceived benefits, organizational readiness, and external pressure. The constructs organizational readiness and external pressure are both composed of subconstructs. The organizational readiness construct consists of: financial resources, IT sophification, and dissatisfaction with existing system. External pressure consists of industry pressure and competitive pressure. The resulting research model is depicted in Figure 1.

Organizational readiness, as used in by Iacovou et al (1995) measures whether a firm has sufficient IT sophistication and financial resources to partake in the adoption of IT. IT sophistication (Pare and Raymond, 1991) includes the level of technological expertise within the organization and assesses the level of management understanding of and support for using IT to achieve organizational objectives. Financial resources, simply, are an organization's capital available for IT investments.

Furthermore, another subconstruct will be added to the organizational readiness construct. Dissatisfaction with existing system, relating to the degree which the management sees the existing system not meeting its desired levels of performance, will be added (Chau and Tam, 1997). The satisfaction level with existing systems also plays a significant role as motivation is concerned. Organizational innovation proceeds in phases in which problems are first identified and then solutions are compared and evaluated (Rogers, 1983; Tornatzky and Fleischer 1990). A high dissatisfaction level with existing will provide the impetus to find new ways to improve performance.

> **Hypothesis 1**. *Higher organizational readiness will lead to greater intent to adopt DIT*.

Perceived benefits refer to the anticipated advantages DIT can provide the organization. Benefits are both direct and indirect in nature. Direct benefits include cost savings to include transaction savings and fraud savings. Indirect benefits also offer advantages to the organization such as improved customer service.

> **Hypothesis 2**. *Higher perceived benefits will lead to greater intent to adopt DIT*.

External pressure includes the influences arising from two sources within the competitive environment: competitive pressure, relating to the ability of DIT to maintain or increase competitiveness within the industry; and industry pressure, relating to efforts of the industry associations to encourage DIT adoption.

> **Hypothesis 3**. Higher external pressure will lead to greater intent to adopt DIT.

Figure 1. Intent to Adopt DIT
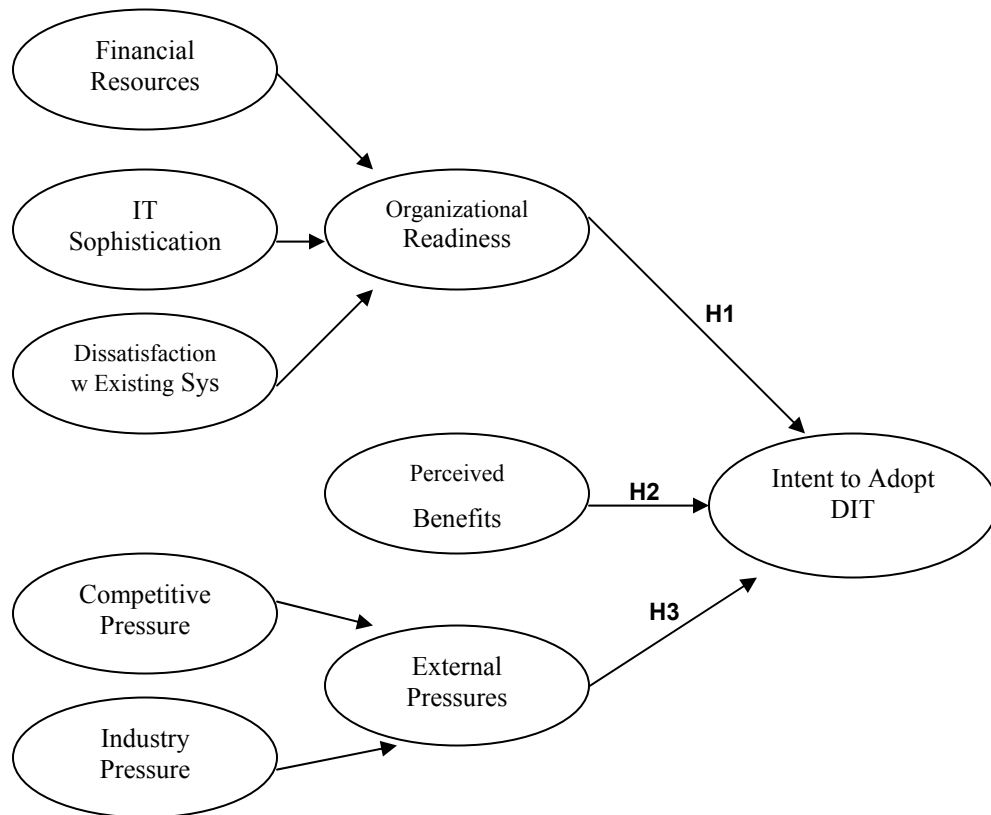
RESEARCH METHODOLOGY

The survey method will be used to test the model because it provides a basis for establishing generalizability, allows replicability, and has statistical power. First, a literature search was carried out within the domain of constructs to generate sample items. Then, a pilot study will be conducted with 4 or 5 CEO's from independent banks in the Tallahassee, Florida area. Finally, we drew our sample from the whole population of independent banks in Alabama. The survey instrument will be administered to approximately 167 CEO's from each of the independent banks. CEO's were chosen as they ultimately will make the decision to adopt digital imaging technology. The firm is the unit of analysis in this research.

The items for the questionnaires are drawn from previous technology adoption research. However, some items are modified to fit the context of this research. The following will give a sample of items pertaining to each construct. Most items employ a seven-point Likert-type scale. *The perceived benefits* construct features the following items: increased productivity, paper reduction, improved customer service, overhead reduction cost, etc. The *financial resources* construct will feature the following items: financial cost of DIT, total revenue of firm, etc. The *IT sophistication* construct features the following items: top management attitude toward IT and importance of IT for various objectives such as operational costs reduction, productivity improvements, improved competitiveness, and improved decision quality. The *dissatisfaction with existing system* construct features the following two items: 1) Does your existing check dealing system serve the needs of the company; and 2) Are you satisfied with the price/performance of your system? The *competitive pressure* construct features the following items: percent of industry using DIT, does the adoption of DIT allow your organization of stay competitive, and pressure to adopt DIT place on your organization by your competitors. The *industry pressure* construct features the following items: pressure to adopt DIT place on your organization by industry sources. The dependent variable, *intent to adopt DIT*, is a binary measure: adopters and non-adopters. Banks will be classified as adopters if they 1) had already implemented DIT or 2) if a plan had been developed and the plan has a definite timetable and budget.

Content validity of all items will be carefully accessed. First, the items are verified by a colleague with expertise in measurement theory and questionnaire design. Second, the initial questionnaires will be pilot tested by sending them to 4 or 5 CEOs of independent banks in the Tallahassee, Florida area. The CEOs will be contacted by telephone interview to solicit

their opinions on the questionnaire and to identify any items found to be confusing or ambiguous. Questions will be used to test the CEOs understanding of the items, allowing for a further check of content validity. The responses will be analyzed and any necessary revisions will be made to the questionnaire. Also, the pilot study will help determine whether to send the questionnaire by email, fax, or mail, or a combination of the three.

Next, a package of research surveys will be sent to a total of 167 CEO's of independent banks in Alabama. This sample of banks has average assets of approximately $85 million. Their growth rate, on average, over the past 5 years has been about 5 to 6 percent a year. Furthermore, the banking industry is one of the most highly regulated industries. This regulation places tremendous constraints on banks, not allowing them to deviate greatly from one another. Additional research will be done to see how the average independent bank in Alabama compares with other independent banks across the nation. Preliminarily, it appears this sample of independent banks may be generalizable to the whole population of independent banks in the United States.

There are a few limitations to this research method worth mentioning. First, the response rate of this research is will need to be at least 50% to achieve an adequate power. While this rate of response is typically very difficult to achieve, we feel it will attained as we should have the support of a very well thought of insider within the Alabama independent banking community. Furthermore, this study should be highly relevant to the independent banks which will hopefully help the response rate.

Second, since this study will be conducted in Alabama, it may limit the generalizability of our results to Alabama-based banks and those in similar contexts. Therefore, caution must be exercised when generalizing these findings to banks operating in other geographical areas.

CONCLUSION

This study should further the IT adoption research by examining the generalizability of a model that has been generally limited to EDI technology. It will investigate a very relevant technology which provides great opportunity to improve check processing efficiency and provide improved services to customers. Also, this research involves the neglected research area involving IT in small business. Lastly, this work furthers firm level research in the IT adoption domain.

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