

2000

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Recommended Citation

Ryan, Sherry D.; Abitia, Guillermo Rodriguez; and Windsor, John C., "Factors Affecting the Adoption of Knowledge Management Technologies: An International Perspective" (2000). *AMCIS 2000 Proceedings*. 197.

<http://aisel.aisnet.org/amcis2000/197>

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Factors Affecting the Adoption of Knowledge Management Technologies: An International Perspective

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Abstract

As global competition continues to heighten, organizations are realizing they must effectively use and manage employee knowledge to remain competitive. Information technology (IT) facilitates knowledge management through enabling rapid dispersion of knowledge, collaborative work efforts, and effective storage and retrieval of knowledge. While theoretical and case-based research has explored facets of knowledge management, empirical work concerning the factors that enable adoption of knowledge management technologies is lacking. This research will investigate this important issue through a sample survey of IT executives in the United States, Mexico and Japan. A framework consisting of three categories of variables is used: organizational, technical, and environmental. Findings in each of these areas offer important implications for research and practice.

Introduction

A learning organization is “an organization skilled at creating acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights” (Garvin, 1993, p. 80). Information Technology (IT) is often used by learning organizations to rapidly disseminate knowledge and overcome “the learning curve” when introducing employees to new procedures or products (Quinn et al., 1996). “Knowledge management technologies”, such as intranets, data warehouses, and groupware products, provide organizations with mechanisms to accomplish these activities.

While research on organizational learning has been ubiquitous (e.g., Dodgson, 1993; Lipshitz et al., 1996), research on the adoption of knowledge management technologies has not. This research seeks to fill this void by developing and testing a model incorporating factors hypothesized to affect knowledge management technology adoption.

Research Model

Tornatzky and Fleischer (1990) provide a broad theoretical framework consisting of three components that

influence the information systems adoption process: (1) the organizational context. (2) the technological context, and (3) the external environmental context. While this framework has proven to be useful in past adoption research, the importance of variables within these contexts vary, depending upon the specific technology under consideration. For example, Grover and Goslar (1992) found a significant relationship between adoption of telecommunication technologies and market uncertainty, whereas Chau and Tam (1997) found no such relationship when investigating the adoption of open systems. Therefore, adoption decisions must be studied within suitable contexts and with variables tailored to the particular innovation (Chau and Tam (1997). We used the Tornatzky and Fleischer (1990) framework as a basis for our investigation, customizing the specific components to the adoption of knowledge management technologies (see Figure 1).

Organizational Context

The organizational context describes the attributes of an organization. These attributes include organizational culture, the degree of centralization, and formalization. Organizational context depicts the processes and structure of an organization that impact the adoption of technological innovations. Studies have found significant relationship between these attributes and innovation adoption (Tornatzky and Fleischer 1990; Chau and Tam, 1997). Lipshitz, Popper and Oz (1996) suggest that the learning organization consists of two aspects: structural and cultural. The structural aspect consists of established structures and procedures by which the organization systematically collects, analyzes, stores, disseminates and uses information that is pertinent to organizational effectiveness. Knowledge management technologies, such as intranets, have been identified as supporting these types of activities (Manzoni and Angehrn 1997/1998). The cultural aspect is the result of shared values and experiences, which aggregates individual experiences into a corporate awareness. Because of the interrelationship

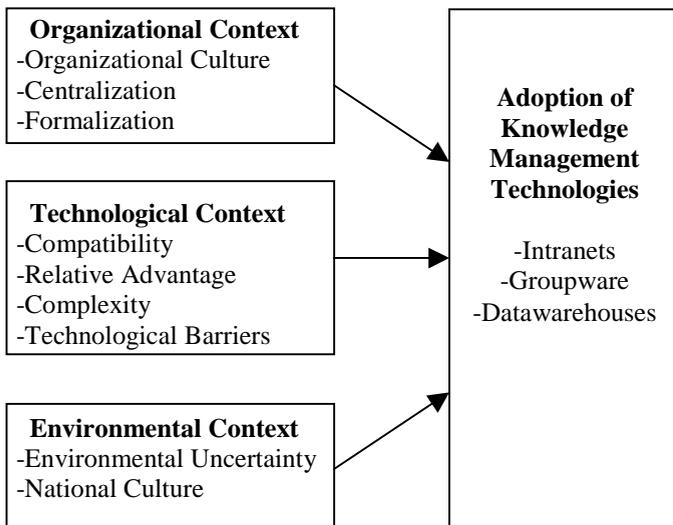
between structural and cultural components, we hypothesize that:

- *H1: A strong learning culture will positively affect the likelihood of knowledge management technology adoption.*

Learning organizations evaluate actions and ideas on their merit, not on the organizational member's status or level in the organizational hierarchy (Lipshitz et al, 1996). Information is disseminated to those who can use it to improve performance in all areas of the organization. Likewise, innovations are sought throughout all levels of the organization. Innovative learning is most likely to occur in organizations characterized by empowering leaders with employees involved in information sharing, often through teams (Slater 1995). For these reasons we hypothesize:

- *H2: Higher levels of centralization will negatively affect the likelihood of knowledge management technology adoption.*
- *H3: Higher levels of formalization will negatively affect the likelihood of knowledge management technology adoption.*

Figure 1. Research Model for Knowledge Management Technology Adoption



Technological Context

The technological context relates to how the characteristics of existing technologies in an organization influence the adoption process (Tornatzky and Fleischer 1990). Brown (1981) and Rogers (1983) summarized innovation characteristic variables that were commonly found to influence the adoption decision. Lai and Guynes (1994) applied three of these characteristics,

compatibility, relative advantage, and complexity to the technological adoption process. Likewise, these constructs are included in the present model, plus a construct entitled perceived barriers found to be significant in a study of open systems adoption by Chau and Tam (1997). Compatibility has been defined as “the degree to which a new innovation is perceived as being consistent with the potential adopter’s current task environment” (Lai and Guynes 1994, p. 76). Whether innovation opportunities can be capitalized upon depends on the degree to which the innovation’s characteristics harmonize with the innovations and practices currently adopted by the organization (Chau and Tam, 1997).

- *H4: Higher levels of compatibility will positively affect the likelihood of knowledge management technology adoption.*

Not all innovations are relevant to an organization. The degree of relevance depends on the potential benefits and the ability to adopt (Chau and Tam, 1997). Therefore, the assessment of relative advantage will vary from firm to firm and will implicitly or explicitly include a cost-benefit trade-off analysis of adopting a particular innovation. Relative advantage can be described as a perception held by the potential adopting firm as to the degree to which a new innovation is superior to the practice(s) it will supersede and any other solution that might be possible (Lai and Guynes 1994).

- *H5: Higher levels of relative advantage of knowledge management technologies will positively affect the likelihood of knowledge management technology adoption.*

Complexity is defined as the degree to which an innovation is perceived as difficult to understand (Lai and Guynes, 1994, p. 77). When a technology is difficult to understand, it is harder to obtain management commitment to proceed. Therefore we hypothesize:

- *H6: Higher levels of perception that knowledge management technologies are complex will negatively affect the likelihood of adoption*

Chau and Tam (1997), in a study of open systems adoption, found that perceived barriers also impact IT adoption.

- *H7: Higher levels of technological barriers will negatively affect the likelihood of adoption.*

Environmental Context

The external environmental context is the climate in which an organization conducts its business. These factors, which are external to a firm, include national

culture, governmental relationships, competition and industry type. Among these, competitive market forces and market uncertainty, are major factors in the innovation process. Environmental uncertainty is an important factor identified in IT innovation studies (Grover and Goslar, 1993).

- *H8: Higher levels of market uncertainty will positively affect the likelihood of knowledge management technology adoption.*

National culture has been shown to affect the adoption of certain technologies (Straub1994; Straub, Keil, Bonner, 1997). Hofestede’s (1980) cultural dimensions provides a theoretical basis for investigating the relationship between national culture and IT adoption. Hofestede describes four dimensions which distinguishes different cultures: (1) power-distance – the degree of inequality among people which the population of a culture considers normal; (2) uncertainty avoidance – the degree to which people in a culture feel uncomfortable with uncertainty and ambiguity; (3) individualism – the degree to which people in a culture prefer to act as individuals rather than as members of a group; (4) masculinity – the degree to which values like assertiveness, performance, success, and competition prevail among people of a culture over gentler values like the quality of life, maintaining warm personal relationships, service, etc. Futhermore, each country has been rated on each of these dimensions. In a study of E-mail adoption in three countries, Straub et al. (1997) created a context specific index based upon their predictions of how each cultural dimension would influence E-mail adoption. Likewise, we also investigate each dimension and create an index based on Hofestede’s dimensions that is specific to the knowledge management adoption process.

- *H9: Higher levels of the national culture index will positively affect the likelihood of knowledge management technology adoption.*

Methodology

The methodology for this research is a field survey distributed in the United States, Mexico, and Japan. This research methodology allowed us to obtain a broad and varied sample in terms of geographical distribution and organizational size. The questionnaire was created in English but translated to Spanish and Japanese for distribution in Mexico and Japan, respectively. Consistent with previous IT adoption research, our target respondents were senior IT executives responsible for managing the corporate IT functions. We use these executives as “key informants” to report on organizational properties rather than on personal attitudes and behaviors (Venkatraman 1989). A pilot test was conducted prior to broad distribution.

Methods of Measurement

The dependent variable, adoption of knowledge management technologies will be determined by a binary measure: adopters or non-adopters. Organizations will be classified as adopters if they meet the following criteria: (1) the knowledge management technology is installed and (2) it is operational and used by members of the organization. Organizations will be asked about three knowledge management technologies: intranets, data warehouses, and groupware.

The independent variables will be measured by existing, previously-validated scales whenever possible:

Organizational Context

Organizational Culture	Adapted from Tracey, Tannenbaum, and Kavanaugh (1995)
Centralization	Miller & Friesen (1982)
Formalization	Grover & Goslar (1993)

Technological Context

Compatibility	Adapted from Lai and Guynes (1994)
Relative Advantage	Adapted from Lai and Guynes (1994)
Complexity	Adapted from Lai and Guynes (1994)
Perceived Barriers	Adapted from Chau and Tam (1997)

Environmental Context

Environmental Uncertainty	Miller & Friesen (1982)
Cultural Index	Adapted from Straub, Keil, and Brenner (1997).

Statistical Analysis

Logistic regression will be used to test the research hypotheses. This multivariate statistical technique was chosen because the dependent variable is dichotomous. Also, logistic regression analysis requires fewer assumptions than discriminant analysis.

Importance of the Study

Knowledge management “has taken the information technology world by storm” (Emery 1997), yet empirical work concerning factors that influence the adoption of knowledge management technologies is lacking. This study will contribute significantly to the Information Systems (IS) literature by providing, not only a description of factors influencing the adoption of knowledge management technologies in the United States, but also, how those factors differ in other countries.

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