Development And Partial Test Of An Integrated Model Of Knowledge Management System Adoption And Diffusion

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Abstract

This paper develops a research model to examine and identify the factors affecting the diffusion of knowledge management systems in organizations. The proposed research model combines Rogers’s (1995) innovation stages model with two very important social psychology theories–Ajzen and Fishbein’s (1980) theory of reasoned action and Davis’s (1986) technology acceptance model. An empirical study is then undertaken to partially test the model via questionnaire-based survey in Australia. Results of the Australian study are presented along with the future direction.

Keywords: Knowledge Management Systems, Adoption and Diffusion, Model Development, National Survey in Australia.

1. Introduction

As a result of the tough competition in the market place and the shift from resource-based economy to knowledge-based economy, companies are looking at more and more in gaining competitive advantage through managing and maximizing their most valuable asset-knowledge. Although knowledge and knowledge management are not new concepts, knowledge management systems (KMS), which involve the application of IT systems and other organizational resources to manage knowledge strategically in a more effective and systematic way, are relatively recent phenomenon. Given the fact that it is not difficult to find the KMS applications in organisations, the topic of KMS has not been well explored by the researchers and scholars. Meanwhile among the limited literature on KMS, which centres around cases of successes and failures of KM project applications and/or presents factors of successes and/or failure, there is a scarcity of the studies on the empirical perspectives of KMS, especially in the area of adoption and diffusion of KMS. There are no comprehensive studies on the factors of KMS adoption and diffusion available in the literature. This paper addresses the gap and tries to make contribution to close this gap. Equipped with a background of high-level factors of adoption and diffusion of generic technologies, this paper develops a research model to examine and identify the factors affecting the adoption of knowledge management systems in organizations, which can be used in subsequent empirical studies. This paper is organized as follows. The following section presents relevant background to the study on knowledge management and knowledge management systems. The research model and some results of partial test of the model in Australia are presented next. Finally, future directions and conclusions are presented.

2. The Background

2.1 Knowledge Management System

In recent years, Knowledge management has been a hot topic among researchers and scholars. There are heaps of literature on knowledge management, covering various topics. Literature has defined knowledge management in a number of ways (Scarbrough, Swan & Preston 1999;
Duke, Makey & Kiras 1999; Bonner 2000; Malhorta 2000, among many others). In this study, the definition by Ruggles (1998) is adopted, which is as follows: “KM is... an approach to adding or creating value by more actively leveraging the know-how, experience, and judgment reside within and, in many cases, outside of an organization.” (Ruggles 1998, p. 80).

Above definition highlights important elements of knowledge management. The “know-how” aspect of KM emphasizes the “explicit” knowledge, which can be easily captured and codified (Bonner 2000). On the other hand the “experience” and “judgment” aspects of KM reflects the “tacit” or “implicit” knowledge, which is difficult to capture and formalize (Bonner 2000). The definition also emphasizes that primary purpose of knowledge management is to add or create “value”. To add value with knowledge management there is a need for knowledge management systems (KMS), which facilitates the generation, preservation and sharing of knowledge (Duke, Makey & Kiras 1999; Bonner 2000). Like KM, KMS has also been defined in a number of ways. In this research, the broad perspective was adopted for defining knowledge management system (KMS). In line with the broad approach, an operational definition of KMS was developed for the purpose of this study, which says Knowledge management system (KMS) is a broad way or approach to deal with the generation, preservation, and sharing of both tacit and explicit knowledge within and outside of the organization, which essentially involves the applications of Information Technology systems and other organizational resources (Alavi & Leidner 1999).

Some of the common applications of KMS are: (1) organizing and sharing/ transferring of internal benchmarks/best practices, (2) constructing corporate knowledge directories, such as corporate yellow pages, people information archive, etc., (3) creating knowledge networks and knowledge maps; among many others (Alavi & Leinder 2001). In the past, many information systems (IS), such as management information systems, executive information systems, decision support system, knowledge-based systems, etc., have been focusing on the codified/explicit knowledge. Knowledge management systems provide the opportunities to extend the operating scope of information systems through facilitating organization’s effort in managing both tacit and explicit knowledge (Alavi & Leinder 2001).

2.2 Diffusion
Diffusion is “the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers 1995, p. 5). The four main elements of a diffusion process are: the innovation, communication channels, time, and the social systems (Rogers 1995). According to Rogers (1995, p. 11), “an innovation is an idea, practice, or object that perceived as new by an individual or other unit of adoption”. In this research context, the innovation is referring to the Knowledge Management System. Communication channels are “the means by which messages get from one individual to another” through the mass media and interpersonal channels (Rogers 1995, p. 18). The diffusion of Knowledge Management System occurs through both mass media and interpersonal channels. The third element of diffusion “time”, in this study of diffusion of Knowledge Management Systems, refers to: (1) the time from which an individual first acquires the knowledge about the Knowledge Management System through to its adoption (or rejection) to continuing usage, (2) the relative earliness/lateness with which the Knowledge Management System is adopted across the organization (Rogers 1995). A social system is “a set of interrelated units that is engaged in joint problem-solving to accomplish a common goal. The members of units of a social system may be individuals, informal groups, organizations, and /or subsystems” (Rogers 1995, p. 23). In this study, the social systems
represent sample organizations in Australia. At the organizational level, the unit of adoption is the organization while the social system is the organization's external environment. At the individual level, the unit of adoption is the end-user, while the primary social system is the reference organization's internal social environment (Brancheau & Wetherbe 1990).

Many of the past studies on innovation diffusion have applied model(s) by Ajzen & Fishbein's (1980) Theory of Reasoned Action (TRA) and Davis's (1986) Technology Acceptance Model (TAM). Building on Ajzen and Fishbein’s (1980) Theory of Reasoned Action (TRA) and Davis’s (1986) Technology Acceptance Model (TAM), this study suggests a research model by combining the theory of innovation diffusion with TRA and TAM from social psychology. Basically this research suggests that some external factors influence the perceptions about an innovation, which in turn affect the diffusion of the innovation and lead to the use of an information system, ie. “External Factors” → “Perceptions” → “Diffusion”. This simple model is generic in nature and is likely to be applicable, with some adjustments, in various innovation diffusion processes. This simple research model serves as the conceptual framework for the development of the KMS adoption and diffusion model, which is discussed in the next section.

3.0 The Research Model
The research model as shown in Figure-1 was framed on the Rogers’s (1995) stage model of innovation diffusion, Ajzen and Fishbein’s (1980) theory of reasoned action, and Davis’s (1986) technology acceptance model. The theory of reasoned action (TRA) and the technology acceptance model (TAM) provide the theoretical framework needed to identify the factors that impact the diffusion of KMS. The TRA and TAM also provide the theoretical base to describe the relationships between the external influences, perceptions about KMS, and the diffusion of KMS. The research model suggests that the external influences/variables-including the individual difference factors, the organizational factors, management support factors, the KMS characteristics, environmental factors- will influence the diffusion of knowledge management system in an indirect way with its influence being mediated by the perceived usefulness about KMS (Rogers 1995; Davis 1986; Davis, Bagozzi & Warshaw 1989; Venkatesh & Davis 2000; Ajzen & Fishbein 1980; Moore 1987; Igbaria et al. 1997, etc). At the same time, the research model postulates that the perceived factors of perceived usefulness (Davis 1986), perceived ease of use (Davis 1986), subject norms (Venkatesh & Davis 2000; Ajzen & Fishbein 1980), and perceived voluntariness (Moore & Benbasat 1991) have direct effect on the diffusion of KMS. KMS diffusion process includes three stages: Initiation of KMS, Adoption of KMS, and Implementation of KMS (Rogers 1995). Also as per TAM (Davis 1986, 1989, 1993; Davis, Bagozzi & Warshaw 1989), perceived user-friendly affects perceived usefulness.

Although in Davis, Bagozzi and Warshaw’s (1989) technology acceptance model, external variables are hypothesized to affect both perceived usefulness and ease of use/user friendly, however there is no link between external variables and perceived user friendly in the model. Justification for this is based on the past studies, such as Alavi & Leidner 1999; KPMG 2000; The Conference Board 1999, etc., which have shown that organizations only embark on KM & KMS when they can see the potential benefits/usefulness of the systems. At the same time, past studies of TAM, e.g., Davis, Bagozzi & Warshaw 1989; Adams, Nelson & Todd 1992; Keil, Beranek & Konsynski 1995, have suggested that in many cases a new IT is adopted primarily because of its perceived usefulness. In other words, the user is paying more attention on whether the new IT is instrumental in achieving tasks that are not inherent in the use of the IT itself. Much of the TAM-related research appears to support this notion (Davis,
Bagozzi & Warshaw 1992; Gefen & Straub 2000). Also, according to the theory of innovation diffusion, most adopt a new IT as a result of its extrinsic value, such as perceived usefulness (Moore, 1991). The field study in Western Australia provides further support to this notion.

Figure-1 The Research Model

4. Partial Test Of The Research Model In Australia
A more specific (operational) model (see Figure-2), which has been operationalized from Figure-1, was tested in Australia. The operational model examined in Australia is derived from literature and field study conducted in Western Australia. The empirical study was carried out via a questionnaire based survey in Australia. A national survey was conducted among top 1,500 (based on revenue) organizations in Australia. The questionnaires were distributed to 1500 managers in those companies, who appeared to be most relevant to our study. The criteria for selecting sample is to look for research subjects who are knowledgeable in KMS and thus can provide “objective” opinion on KMS in helping identifying the factors influencing the adoption and diffusion of KMS in organization. In the end, 304 questionnaires were returned, 19 of them were found to be incomplete. This resulted in 285 valid responses. There were also 196 undelivered questionnaires and 55 firms declined to participate in the study. Thus the final effective response rate was 23%. The results of the national survey established the reliability (See Table-1; all construct reliability >0.7) and validity (all t-values >2) of the instruments. At the mean time, 11 links of the operational model (see Figure-2) are significant while the remaining 5 links are not significant (see Table-2). To save page the full results are not presented in this paper, which are available from the authors upon request.

5.0 Future Directions and Conclusions
Our immediate plan is to test the comprehensive model in China and do a comparative study between Australia and China to research the impact of national culture on the adoption and diffusion of KMS. Past research, such as Straub 1994, Straub, Keil & Brenner 1997, has found that national culture plays important role in explaining the differences in the IT diffusion in cross-cultural studies. Given the fact that Australia and China do not have the
The Operational Model Tested in Australia

Table-1 Construct Scale Reliability

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Construct Scale Reliability</th>
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<th>Construct Scale Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Influence</td>
<td>0.731</td>
<td>Voluntary Use</td>
<td>0.766</td>
</tr>
<tr>
<td>Individual Factor</td>
<td>0.788</td>
<td>Subject Norms</td>
<td>0.822</td>
</tr>
<tr>
<td>Organizational Factor</td>
<td>0.814</td>
<td>Initiation</td>
<td>0.502</td>
</tr>
<tr>
<td>Management Support</td>
<td>0.798</td>
<td>Adoption</td>
<td>0.810</td>
</tr>
<tr>
<td>KMS Characteristics</td>
<td>0.837</td>
<td>Pilot Implementation</td>
<td>0.786</td>
</tr>
<tr>
<td>Task Complexity</td>
<td>0.815</td>
<td>Organic Growth</td>
<td>0.819</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>0.864</td>
<td>Organizational Implementation</td>
<td>0.796</td>
</tr>
<tr>
<td>User Friendly</td>
<td>0.748</td>
<td>Diffusion</td>
<td>0.820</td>
</tr>
</tbody>
</table>

Table-2 Significance of Links in the Operational Model(Australia Study)

<table>
<thead>
<tr>
<th>Links</th>
<th>T-Value</th>
<th>Significance (5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Inspiring → Perceived Usefulness</td>
<td>0.331</td>
<td>No</td>
</tr>
<tr>
<td>Individual Factors → Perceived Usefulness</td>
<td>2.771</td>
<td>Yes</td>
</tr>
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<td>Organizational Factors → Perceived Usefulness</td>
<td>1.343</td>
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</tr>
<tr>
<td>Management Support → Perceived Usefulness</td>
<td>1.241</td>
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</tr>
<tr>
<td>KMS Characteristics → Perceived Usefulness</td>
<td>1.176</td>
<td>No</td>
</tr>
<tr>
<td>Task Complexity → Perceived Usefulness</td>
<td>3.002</td>
<td>Yes</td>
</tr>
<tr>
<td>User Friendly → Perceived Usefulness</td>
<td>4.302</td>
<td>Yes</td>
</tr>
<tr>
<td>User Friendly → Organic Growth</td>
<td>5.924</td>
<td>Yes</td>
</tr>
<tr>
<td>Perceived Voluntary Use → Organic Growth</td>
<td>2.013</td>
<td>Yes</td>
</tr>
<tr>
<td>Subject Norms → Organic Growth</td>
<td>1.585</td>
<td>No</td>
</tr>
<tr>
<td>Perceived Usefulness → Initiation</td>
<td>21.973</td>
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</tr>
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<td>Initiation → Adoption</td>
<td>20.723</td>
<td>Yes</td>
</tr>
<tr>
<td>Adoption → Pilot Implementation</td>
<td>23.151</td>
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</tr>
<tr>
<td>Pilot Implementation → Organic Growth</td>
<td>3.642</td>
<td>Yes</td>
</tr>
<tr>
<td>Organic Growth → Organizational Implementation</td>
<td>31.243</td>
<td>Yes</td>
</tr>
<tr>
<td>Organizational Implementation → Diffusion</td>
<td>31.243</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Figure-2 The Operational Model Tested in Australia
same culture (Hofstede 1991), it is interesting to see the role of the National Culture in the adoption and diffusion of KMS across the globe. This paper presents the development of a research model for investigating the factors impacting on the diffusion (spread and sustained use) of knowledge management system— a topic that has not been well explored in the literature but represents primary concern of knowledge management systems. An operational version of the research model of KMS adoption and diffusion was tested in Australian organizations via survey. The Australian study proves the soundness of the instruments.

References

KPMG, Knowledge Management Research Report 2000, KPMG Consulting


