PROTECTING ORGANIZATIONAL KNOWLEDGE:

A FRAMEWORK FOR DIGITAL RIGHTS MANAGEMENT SYSTEMS ADOPTION

CLAUDIA LOEBBECKE & PETAR DJEKIC
University of Cologne
Department of Media Management
Pohligstr. 1, 50969 Koeln, Germany
{claudia.loebbecke|petar.djekic}@uni-koeln.de

ABSTRACT

A Digital Rights Management System (DRMS) is an information system that persistently enables description, identification, protection and tracking of different digital rights across operating systems and media. So far, DRMS research has focused on design and modeling rather than on adoption and acceptance. To fill the gap, we develop a research framework on DRMS adoption which is derived from prior research on EDI and E-Business adoption. The research framework proposes three determinants of DRMS adoption: technological readiness, organizational readiness, and external pressure. After in-depth field testing, the framework should contribute to fostering empirical research on DRMS adoption.

Keywords: Digital Rights Management System, Adoption Framework, Knowledge Protection

1 INTRODUCTION

Storing organizational knowledge can be accomplished using written documents which can be physical paper or digital files (Alavi & Leidner, 2001, Section 103 & 1102). Preserving organizational knowledge in digital files has raised managerial concern with regard to protection. Protection implies the enforcement of integrity and security. Integrity refers to the protection from corruption or unauthorized modification (Hou, Wang, Tang, & Liu, 2004). Security points to authorized access only (Popek & Farber, 1978). To overcome integrity and security problems, various technologies, such as watermarking, encryption, and obfuscation, have been developed and implemented. These technologies are often subsumed under Digital Rights Management Systems (DRMS).

A rich body of DRMS literature deals with design and modeling those systems (e.g., Iannella, 2001; Koenen, Lacy, MacKay, & Michelli, 2004; Shapiro & Vingralek, 2001). In addition, there is research concerning DRMS evaluation (e.g., Djekic & Loebbecke, 2005; Jackson, Singh, Waycott, & Beekhuyzen, 2005; Mulligan, Han, & Burstein, 2003). However, more research is necessary for further directing and facilitating DRMS evolution and usage (Benbasat & Zmud, 2003; March & Smith, 1995). The research community also lacks DRMS adoption contributions which should also enable vendors to identify critical DRMS features and requirements.

The remainder of the paper is organized as follows: After defining DRMS and outlining the theoretical background of IS adoption, we develop a research framework for studying the adoption of DRMS in specific.

2 DIGITAL RIGHTS MANAGEMENT SYSTEMS: TOWARDS A WORKING DEFINITION

Technical copy protections such as those embedded in audio CDs can be regarded as early Digital Rights Management Systems (e.g., Djekic & Loebbecke, 2005; McMillan, 2005). Such technical copy protection measures or 'first generation Digital Rights Management Systems (Iannella, 2001) were originally deployed in the early 1980s. Protections such as hardware-keys (Albert & Moorse, 1982; Maude & Maude, 1984) were implemented in order to prevent software piracy, the illegal copying and distribution of software applications. However, technical copy protections only prevent copying of digital files.

Organizations require information systems which support a number of accesses and usage rights such as reading, writing, or copying, under different circumstances in terms of location or time. Information systems offering such functionality are broadly referred to as Digital Rights Management Systems (Kwok, Yang, Tam, & Wong, 2004; Rosenblatt, Trippe, & Mooney, 2001).

We still lack a common understanding of the term Digital Rights Management Systems (DRMS) as Table 1 shows. Broad definitions (Einhorn, 2004; Iannella, 2001, 2004; Intertrust, 2005; Kwok, Cheung, Wong, Tsang, Lui, & Tam , 2003a; Kwok, Lui, Cheung, & Tam, 2003b) bear the risk that any information system capable of controlling access to digital files may be termed DRMS. Too narrow definitions limit DRMS to tracking or security purposes (Fetscherin, 2002; Rosenblatt et al., 2001) and may not fully capture their possibilities. In addition, a blurred differentiation between DRM as process and DRMS as information system (e.g., Einhorn, 2004; Ku & Chi, 2004; Rosenblatt et al., 2001) hampers clearly defining research units and choosing an appropriate research methodology in the context of DRMS adoption.

In this paper, we define Digital Rights Management (DRM) as the process of issuing and managing digital rights with digital rights being the set of access and usage rules relevant to one or more digital file(s). Building on Iannella (2001; 2004) and Ku & Chi (2004), we then define DRMS as information systems that persistently enables description, identification, protection and tracking of different digital rights across operating systems and media. DRMS can be realized through a set of software applications and hardware components. (Different from Einhorn (2004), Fetscherin (2002) and Kwok et al. (2004), we exclude payment features in DRMS since billing is not directly related to managing digital rights.) Based on our definition, a DRMS requires the components shown in Table 2.

Two commercial DRMS examples which comply with our definition are Microsoft Windows Media Rights Manager (Microsoft, 2004) and SealedMedia (SealedMedia, 2005).

TABLE 1
Digital Rights Management (DRM) and
Digital Rights Management Systems (DRMS) in the Literature

Study	Definition	
	Digital Rights Management	**Digital Rights Management System**
Einhorn (2004)	Operation of a control system that can monitor, regulate, and price each subsequent use of a computer file that contains media content such as video, audio, photos, or text.	-
Fetscherin (2002)	-	Enabling rights protection of intellectual property digital content, and increase security and privacy of confidential and personal information exchange over semi-open or open networks, e.g., Internet.
Iannella (2001; 2004)	Description, trading, identification, monitoring, tracking, and protection of all forms of rights on tangible and intangible assets including management of rights holders' relationships.	-
Intertrust (2005)	Collection of technologies for electronically enforcing business rules on digital information.	-
Ku & Chi (2004)	Aggregation of security technologies to protect the interests of the content owners, allowing for maintaining persistent ownership and control over their content.	Specifying, managing and enforcing "rules" in all aspects of the digital content, particularly in its usage and distribution.
Kwok et al. (2003a); Kwok et al. (2003b)	Prevention of unauthorized use of digital files in any format.	Controlling the usage and distribution of digital content.
Rosenblatt et al. (2001)	Business processes that for legal and commercial purposes track rights, rights holders, licenses, sales, agents, royalties, and associated terms and conditions by using digital technology and applying it to intellectual property in digital form.	-
Safavi-Naini, Nicholas, & Uehara (2004)	Allowing content owners control and monitoring of multimedia content distribution through electronic channels.	-

TABLE 2
DRMS Components

Component	Functionality
Description	Set of access and usage rules for digital files supported in a hardwired, embedded, or external manner (Kwok et al., 2004; Park, Sandhu, & Schifalacqua, 2000). Hardwired rules are statically embedded in the DRMS itself, thus the same set of rules applies to all managed files. Embedded rules are stored in the managed digital file itself, while external rules are stored separately from it. Rights supported by a DRMS can vary allowing the user to read, write, change, or copy the managed file depending on location and time. Digital rights are usually expressed using a Right Expression Language (REL) such as XrML (ContentGuard, 2005).
Identification	Matching granted and actual rights by comparing the rights associated with the digital file to the user's rights. Rights granted to the user are identified through authentication using passwords or license files. Depending on the DRMS (hardwired, embedded, external), the identification process can be handled online or offline.
Protection	Ability to deny unauthorized access if the user's rights violate the rights defined for the specific digital file. This component includes ensuring integrity of the managed digital file (Kwok et al., 2004), i.e., protection from tampering and malicious attacks in order to gain unauthorized access. Protection is often achieved by allowing access only through a virtual machine (Park et al., 2000), which supports the identification processes.
Tracking	Monitoring or tracing access and usage of managed digital files. The scope of tracking may include access time, duration, and location as well as information on individuals or organizations requesting access.
Persistence	Assuring that digital rights are durable in order to enforce proper identification and protection. This includes durability across time and across different storage or transfer media such as USB sticks, e-mail, and operating systems.

3 THEORETICAL BACKGROUND: THE TECHNOLOGY-ORGANIZATION-ENVIRONMENT (TOE) CONCEPT

The Technology-Organization-Environment (TOE) concept (Depietro, Wiarda, & Fleischer, 1990) has been used in different IS adoption studies (e.g., Chau & Tam, 1997; Chwelos, Benbasat, & Dexter, 2001; Swanson, 1994).

According to Depietro et al. (1990), the adoption of technological innovations by organizations is influenced by the technological, organizational and environmental contexts: The technological context relates to internal and external technologies and technical skills relevant to an organization. (Cragg & King, 1993; Kuan & Chau, 2001; Kwon & Zmud, 1987; Zhu, Kenneth, & Xu, 2003). The organizational context describes the intra-organizational mechanisms and

structures influencing innovation adoption such as financial resources or managerial support for innovations. The environmental context reflects the field an organization operates in and its influence on an organization's adoption decisions.

The TOE-concept has been employed for analyzing the organizational adoption of EDI (Chwelos et al., 2001; Iacovou, Benbasat, & Dexter, 1995; Kuan & Chau, 2001) and E-Business (Zhu et al., 2003). Following Swanson (1994), EDI or E-Business can be classified as Type III innovation. A Type III innovation affects the whole organization and its core business spanning across different units within and outside the organization.

DRMS represent a Type III innovation as they potentially affect the whole organization. So it seems appropriate to study organizational DRMS adoption using the constructs applied in previous EDI and E-Business adoption studies based on the TOE-concept.

Table 3 depicts those constructs. Only constructs previously found statistically significant (Chwelos et al., 2001; Iacovou et al., 1995; Kuan & Chau, 2001; Zhu et al., 2003) are listed. Explicitly building on the model proposed by Iacovou et al. (1995), Chwelos et al. (2001) tested via a case study approach and via a quantitative survey among 317 organizational members. Similarly, Zhu et al. (2003) and Kuan & Chau (2001) tested their models by surveying 3,552 and 725 senior organizational members.

TABLE 3
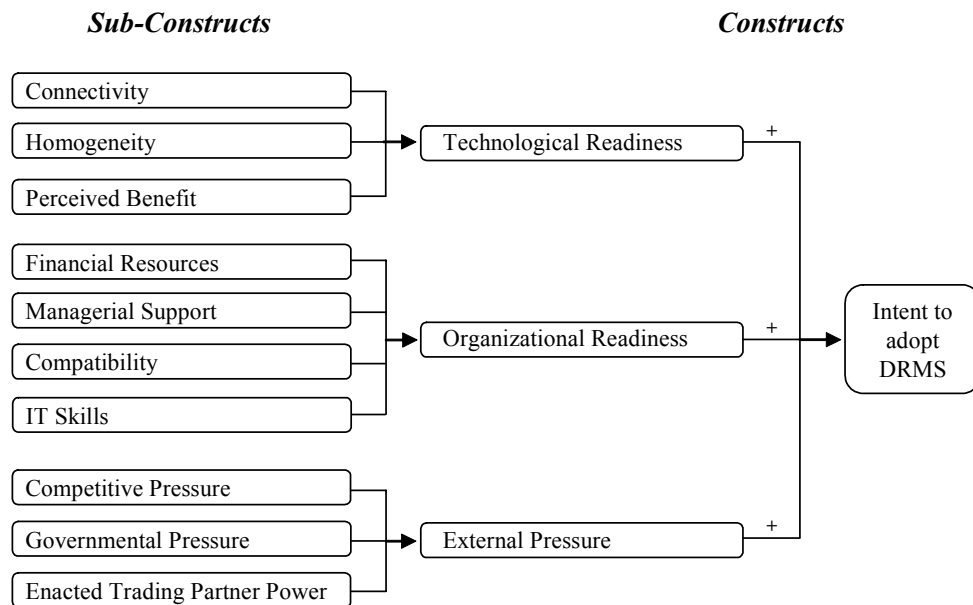**Prior Studies on Type III Innovations Utilizing the TOE-Concept**

Study	Sub-construct	Construct	Context
Chwelos et al. (2001): Intent to adopt EDI Systems	- Competitive Pressure - Enacted Trading Partner Power	External Pressure	Environmental Context
		Perceived Benefit	Technological Context
	- Financial Resources - IT Sophistication - Trading Partner Readiness	Readiness	Organizational Context
Iacovou et al. (1995): Intent to adopt EDI Systems	- Competitive Pressure - Imposition by Trading Partners	External Pressure	Environmental Context
		Perceived Benefits	Technological Context
	- Financial Readiness - Technological Readiness	Organizational Readiness	Organizational Context
Kuan & Chau (2001): Presence of an EDI System		Industry Pressure	Environmental Context
		Government Pressure	
		Technical Competence	Organizational Context
		Financial Cost	
		Perceived Direct Benefit	Technological Context
Zhu et al. (2003): Intent to adopt E-Business Systems	- Consumer Willingness - Internet Penetration	Consumer Readiness	Environmental Context
		Competitive Pressure	
		Lack of Trading Partner Readiness	
		Firm Size Firm Scope	Organizational Context
	- IT Infrastructure - Internet Skills - E-Business Know-How	Technology Competence	Technological Context

4 RESEARCH FRAMEWORK TO STUDY DRMS ADOPTION

We present our framework for studying DRMS organizational adoption in Figure 1. The constructs and sub-constructs are derived from studies listed in Table 3. They are adapted or supplemented if necessary to reflect issues specific to DRMS adoption.

FIGURE 1
Research Framework to Study DRMS Adoption

Sub-Constructs   *Constructs*

Connectivity
Homogeneity → Technological Readiness +
Perceived Benefit

Financial Resources
Managerial Support
Compatibility → Organizational Readiness +
IT Skills

→ Intent to adopt DRMS

Competitive Pressure
Governmental Pressure → External Pressure +
Enacted Trading Partner Power

4.1 Intent to Adopt

The dependent construct is the intent to adopt a DRMS. Such intent is given if an organization is implementing a DRMS as defined above or plans to implement one within the next 24 months (Chwelos et al., 2001; Zhu et al., 2003). Organizations that already have fully implemented and use a DRMS are not considered. Those would be better studied using a framework for technological acceptance (Davis, 1989; Venkatesh, Morris, Davis, & Davis, 2003).

For each construct in the framework, we propose a positive influence on the organization's intent to adopt a DRMS.

4.2 Technological Readiness

Technological readiness reflects the relationship between technologies implemented within the organization and the innovation, here the DRMS. A lack of technological readiness may inhibit

adoption. The technologies already deployed may interfere with the new technology and hence prevent the organization from fully exploiting its potential.

Proposition 1: The higher an organization's technological readiness, the higher is its intent to adopt a DRMS.

4.2.1 Connectivity

Connectivity describes the organization's intra- and inter-organizational network links. Examples include the use of e-mail, presence of an Intranet, external accessibility of intra-organizational information systems, and regular data exchange along the supply chain. Connectivity is important as the interest in a DRMS is closely related with the ability to distribute and share digital files. An organization with a high degree of connectivity may have a greater incentive to adopt and implement a DRMS than an organization with a lower level of connectivity.

Proposition 1a: The higher the connectivity within an organization, the higher is its technological readiness to adopt DRMS.

4.2.2 (Operating System) Homogeneity

Homogeneity, a supplementary sub-construct, reflects the diversity of operating systems in an organization's IT infrastructure. While the Microsoft Windows operating system dominates many IT infrastructures, the ongoing diffusion of mobile end-devices or alternative operating systems has increased the diversity in IT infrastructures within organizations. However, current DRMS are limited to specific operating systems, i.e., the increasing diversity hampers DRMS usage, for instance when rights information cannot be exchanged or transferred among different DRMS and operating systems. Understanding the influence of homogeneity on DRMS adoption also

contributes to the research on DRMS interoperability (Koenen et al., 2004; Kravitz & Messerges, 2005).

Proposition 1b: The higher the homogeneity within an organization, the higher is its technological readiness to adopt DRMS.

4.2.3 Perceived Benefits

Perceived benefits relate to the anticipated advantages DRMS can provide and are similar to the relative advantage in Rogers's (1983) Diffusion of Innovations theory. DRMS supersedes two ideas, technical copy protection and file systems access rules. In comparison to technical copy protection (Albert & Moorse, 1982; Maude & Maude, 1984), DRMS support not only a broader scope of digital rights and media formats , but also offer persistence.

Proposition 1c: The higher the perceived benefits of DRMS, the higher is its technological readiness to adopt DRMS.

4.3 Organizational Readiness

Organizational readiness, focusing on socio-organizational issues, measures an organization's capabilities and support for DRMS adoption. This includes financial resources needed for procuring and implementing DRMS and its compatibility with working styles and management support.

Proposition 2: The higher the organizational readiness of an organization, the higher is its intent to adopt DRMS.

4.3.1 Financial Resources

The financial resources are required for the initial DRMS investment, the operational costs, and the costs of training users (Chwelos et al., 2001; Premkumar & Ramamurthy, 1994). The initial investment for installation and configuration of a DRMS reaches from $50,000 to $100,000, depending on the number of users and the number of media formats supported. The required resources should be assessed in relation to the DRMS benefits (Premkumar, Ramamurthy, & Crum, 1997).

Proposition 2a: The larger the financial resources of an organization, the higher is its organizational readiness to adopt DRMS.

4.3.2 Managerial Support

Managerial support reflects political issues and concerns related to DRMS adoption and implementation as DRMS enforce access and usage rules which may imply a loss of access rights for some organizational units and members. Managerial support may facilitate adoption based on strategic rationale in spite of technological or environmental inhibitors (Dedrick & West, 2004); it may have a similarly strong influence as other organizational or environmental factors (Chwelos et al., 2001; Cooper & Bhattcherjee, 2001)

In the study by Chwelos et al. (2001), managerial support is included in 'IT Sophistication'. We differentiate between managerial support and sophistication in IT usage and think that outr terminology better fits the operationalization used in prior research (e.g., Chwelos et al., 2001).

Proposition 2b: The higher the managerial support in an organization, the higher is its organizational readiness to adopt DRMS.

4.3.3 Compatibility

Compatibility reflects the degree to which an innovation is consistent with past experiences, existing values, and needs of potential adopters (Rogers, 1983). Organizations and individuals are used to access and copy digital files in certain ways, e.g., making backup copies. The Fair Use regulation (US Code, Title 17, Chapter 1, §107, §117) allows for copying and distribution of copyrighted material for "criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research" (US Code, Title 17, Chapter 1, §107). However, it is not fully accounted for by commercial DRMS (Durk & Cohen, 2001; Felten, 2003; Fox & LaMacchia, 2001).

Proposition 2c: The higher the compatibility in an organization, the higher is its organizational readiness to adopt DRMS

4.3.4 IT Skills

IT-Skills describe the expertise and knowledge of organizational members to use IT (Chau & Tam, 1997; Chwelos et al., 2001; Iacovou et al., 1995; Pare & Raymond, 1991). Better technical expertise may facilitate adoption (Crook & Kumar, 1998) as DRMS benefits are probably better anticipated and as the dependency on technical support from DRMS supplier decreases (Dedrick & West, 2004).

Proposition 2d: The higher the IT Skills within an organization, the higher is its organizational readiness to adopt DRMS.

4.4 External Pressure

External pressure reflects an organization's environmental context and encapsulates the influences arising from the organizational environment. They play an important role in DRMS adoption, as an organization may be obliged to adopt DRMS due to legal regulations or due to pressure from suppliers.

Proposition 3:   The higher the external pressures on an organization, the higher is its intent to adopt DRMS.

4.4.1 Competitive Pressure

Intense market competition or competitive pressure within the industry foster innovation adoption and diffusion (Chau & Tam, 1997; Iacovou et al., 1995; Premkumar et al., 1997; Zhu et al., 2003). Adopting IS innovation may help an organization to gain a competitive advantage and thus maintain or leverage its competitiveness (Porter & Millar, 1985; Premkumar, Richardson, & Zmud, 2004). DRMS induced competitive advantage may result from increased security of digital files within an organization as it can reduce information leakage to outsiders of an organization.

Proposition 3a: The higher the competitive pressure on an organization, the higher is its external pressure to adopt DRMS.

4.4.2 Governmental Pressure

The pressure to adopt a technical innovation may result from government regulations. An example is the paper reduction act which required federal agencies to adopt e-commerce by January 1997 (Kuan & Chau, 2001). Also, the Sarbanes-Oxley Act (2002) "to protect investors by improving the accuracy and reliability of corporate disclosures made pursuant to the securities

law, and for other purposes" presents such a governmental pressure. The act may drive companies to adopt DRMS to comply with the requirements regarding audit trails and protection from document tampering (Sarbanes-Oxley, 2002, Section 103 & 1102).

While DRMS present a preventive control for enforcing digital rights, legal regulations such as copyrights serve as deterrent controls (Gopal & Sanders, 1997). The strength of deterrent controls depends on the law enforcement. If organizations perceive the level of law enforcement as insufficient, they may be more likely to adopt DRMS in order to protect legal claims.

Proposition 3b: The higher the governmental pressure on an organization, the higher is its is its external pressure to adopt DRMS.

4.4.3 Enacted Trading Partner Power

Enacted trading partner power represents an organization's capacity to influence other organizations (Dahl, 1957; Emerson, 1962; Hart & Saunders, 1997). Such power often originates from dependencies resulting from need for specific resources or performances (Chwelos et al., 2001; Iacovou et al., 1995; Kuan & Chau, 2001). Online music stores like Napster or the iTunes Music Store which operate as intermediaries between music publishers and online customers illustrate the importance of the enacted trading partner power for DRMS adoption. The digital rights granted by the stores to the customers are defined by contracts between the intermediaries and the publishers forcing the intermediaries to adopt a DRMS in order to avoid uncontrolled distribution of the music files.

Proposition 3c: The higher the enacted power of trading partners on an organization, the higher is its external pressure to adopt DRMS.

5 MEASURING THE CONSTRUCTS

For measuring the constructs contained in the framework (see appendix for the scales employed), we build as much as possible on previous research (see Table 4). Thus, we leverage the validity of our instruments and make eventual empirical results comparable (Straub, 1989). We recommend a structure-equation-modeling approach for statistical testing using PLS since the constructs are measured using multiple items (e.g., Chwelos et al., 2001; Segars & Grover, 1998). As structure-equation-modeling requires at least ordinal data, we suggest a survey for data collection. Respondents should be senior informed managers (Chau & Tam, 1997; Premkumar & Ramamurthy, 1994).

TABLE 4
Sources for Instruments

Construct	Sub-construct	Source
Intent to Adopt		Chwelos et al. (2001)
Technological Readiness	Connectivity	-
	Heterogeneity	-
	Perceived Benefits	Kuan & Chau (2001); adapted
Organizational Readiness	Financial Resources	Chwelos et al. (2001);
	Managerial Support	Chwelos et al. (2001)
	Compatibility	Agarwal & Karahanna (1998);
	IT Skills	Zhu et al. (2003);
External Pressure	Competitive Pressure	Chwelos et al. (2001)
	Governmental Pressure	Kuan & Chau (2001); adapted
	Enacted Trading Partner Power	Chwelos et al. (2001)

5.1 Intent to Adopt

We measure an organization's intent to adopt DRMS using two items different from a single binary variable used in other studies (e.g., Kuan & Chau, 2001; Zhu et al., 2003).

5.2 Technological Readiness

IT infrastructure connectivity has not been studied as separately before. We measure the use of e-mail, browser, groupware tools, and instant messaging software to reflect an organization's level of connectivity.

Homogeneity has not been studied before either. We assess the percentage of installations of Windows operating systems within the organization for each device or system from which digital files can be accessed using three items:

IT Skills are measured by the organizational members' ability to send e-mails and browse websites (Zhu et al., 2003). We propose to also investigate the percentage of the organizational members having a degree in computer science or information systems, or a similar education.

Perceived benefits are studied via data security, data integrity, increased productivity, and overhead cost reduction (Kuan & Chau, 2001).

5.3 Organizational Readiness

Financial resources are measured via three items, the organization's total revenue in the past year (Chwelos et al., 2001), the significance of the DRMS implementation and development cost compared to the overall information system budget (Chwelos et al., 2001), and the significance of the DRMS cost in comparison to its benefits (Premkumar & Ramamurthy, 1994).

Managerial support is investigated by rating top management's attitude towards the deployment of information technology and specifically DRMS in the organization (Chwelos et al., 2001).

5.4 External Pressure

Competitive pressure is assessed using three items, the perceived diffusion of DRMS in the industry, the assessment whether the DRMS adoption contributes to remain competitive, and competitors' pressure to adopt DRMS (Chwelos et al., 2001).

Governmental pressure is composed of two items (Kuan & Chau, 2001), the relevance of governmental regulations and the importance of the Sarbanes-Oxley Act for adopting DRMS. Further, we measure the role of copyright and patent enforcement in the DRMS adoption decision.

The enacted trading partner power is composed of two items (Chwelos et al., 2001), the influence a specific partner has on the decision whether or not to adopt DRMS and the trading volume with a specific trading partner.

6 SUMMARY AND OUTLOOK

Organizations increasingly need DRMS to control access to and usage of digital files which contain valuable organizational knowledge. Many studies researched DRMS design (e.g., Hwang, Yoon, & Lee, 2004; Iannella, 2001; Koenen et al., 2004; Kwok et al., 2003a; Shapiro & Vingralek, 2001) and complementarily the Right Expression Languages (e.g., Safavi-Naini et al., 2004; Wang, DeMartini, & Wragg, 2005) or DRMS evaluation (e.g., Djekic & Loebbecke, 2005; Fetscherin & Schmid, 2003; Mulligan et al., 2003).

DRMS adoption has barely been addressed so far. However, understanding the drivers and barriers of DRMS adoption has become increasingly important as more and more information is stored in digital form.

We contribute a framework for empirically studying DRMS adoption based on the TOE concept previously studies in the EDI and E-Business domain. Following the TOE concept, the intent to adopt DRMS is influenced by three constructs, technological readiness, organizational readiness and external pressure. In addition to previous studies, we introduce homogeneity and connectivity to be studied in DRMS adoption.

Obviously, to assess the frameworks theoretical and practical relevance, the results of the quantitative empirical validation and test of the constructs and items as described in section 5 have to be analyzed and assessed. Also, supplementary efforts towards theory building may be needed to further refine the current items to possibly reveal additional DRMS determinants.

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APPENDIX: CONSTRUCT MEASUREMENTS

No	Sub-Construct	Item	Scale
1	Connectivity	% of employees using the Internet	Cardinal; Percentage
2		% of employees using e-mail	Cardinal; Percentage
3		% of employees using groupware tools	Cardinal; Percentage
4		% of employees using instant messaging	Cardinal; Percentage
5	Homogeneity	% of installed desktop computers using Windows operating system	Cardinal; Percentage
6		% of installed server computers using Windows operating system	Cardinal; Percentage
7		% of installed PDA and Mobiles using Windows operating system	
8	Perceived Benefit	Increased Productivity	Ordinal; Likert Scale; 1 = Not at all important; 7 = Extremely important
9		Overhead Cost Reduction	Ordinal; Likert Scale; 1 = Not at all important; 7 = Extremely important
10		Increased Data Security	Ordinal; Likert Scale; 1 = Not at all important; 7 = Extremely important
11		Increased Data Integrity	Ordinal; Likert Scale; 1 = Not at all important; 7 = Extremely important
12	Financial Resources	Total revenue of the organization in the past year	Ordinal; Cardinal; Amount in Dollars
13		Relative to the overall information system budget, how significant would be the financial cost of developing and implementing an DRMS	Ordinal; Likert Scale; 1 = Not at all important; 7 = Extremely important
14		How significant are the financial cost of developing and implementing an DRMS compared to its benefit for the organization	Ordinal; Likert Scale; 1 = Not at all important; 7 = Extremely important
15	Compatibility	DRMS fits our work styles	Ordinal; Likert Scale; 1 = Fully Disagree; 7 = Fully Agree
16		DRMS provide capabilities that run counter our values	Ordinal; Likert Scale; 1 = Fully Disagree; 7 = Fully Agree
17		DRMS are compatible with our past computer experience	Ordinal; Likert Scale; 1 = Fully Disagree; 7 = Fully Agree

No	Sub-Construct	Item	Scale
18	Managerial Support	Rate the attitude of your top management toward the deployment of information technology in your organization	Ordinal; Likert Scale; 1 = Fully Disagree; 7 = Fully Agree
19		Rate the attitude of your top management toward the deployment of DRMS in your organization	Ordinal; Likert Scale; 1 = Very Negative; 7 = Very Positive
20	IT Skills	% of employees who can send e-mails to internal addresses	Cardinal; Percentage
21		% of employees who can browse web sites	Cardinal; Percentage
22		% of employees having a degree in computer science	Cardinal; Percentage
23	Competitive Pressure	Approximately what percent of the organizations in your industry use DRMS?	Cardinal; Percentage
24		In your industry, is the adoption of DRMS helpful in allowing an organization to remain competitive?	Ordinal; Likert Scale; 1 = Not at all Helpful; 7 = Extremely Helpful
25		Rate the pressure to adopt DRMS placed on your organization by your competitors	Ordinal; Likert Scale; 1 = No pressure at all; 7 = Extreme Pressure
26	Governmental Pressure	Significance of progressive mandatory regulations introduced by the government in DRMS adoption decision	Ordinal; Likert Scale; 1 = No Influence; 7 = Strong Influence
27		Significance of the Sarbanes-Oxley Act in DRMS adoption decision	Ordinal; Likert Scale; 1 = No Influence; 7 = Strong Influence
28		Significance of law enforcement efficiency in protecting copyright and patents in DRMS adoption decision	Ordinal; Likert Scale; 1 = No Influence; 7 = Strong Influence
29	Enacted Trading Partner Power	Rate the amount of influence this supplier had in your organization's decision whether or not to adopt DRMS	Ordinal; Likert Scale; 1 = No Influence; 7 = Strong Influence
30		Please attempt to classify the strength of the encouragement or pressure put on your organization by this supplier	Ordinal; No encouragement or pressure, Information Exchange, Recommendation, Request, Reward, Threat, Other (to be specified)
31		Rate the importance of your trading partner in terms of trading volume	Ordinal; Likert Scale; 1 = Not at all important; 7 = Extremely important
32	Intent to Adopt	Does your organization intent to adopt DRMS?	Ordinal; Likert Scale; 1 = No intent to adopt; 7 = Definite Intent to Adopt
33		If your organization is developing EDI or intends to adopt EDI, how soon do you anticipate that it will have an operational EDI system?	Ordinal; Less than 6 months, 6-12 months, 12-18 months, 18-24 months, more than 24 months, no plans to develop DRMS