International Journal on Advanced Science Engineering Information Technology

Vol.8 (2018) No. 4
ISSN: 2088-5334

A Conceptual Model for Electronic Document and Records Management System Adoption in Malaysian Public Sector

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***Abstract*— The government has spent a large amount of fortune in ascertaining that their information management practice meets the widely accepted standards of practice for enhancing the systematic, speedy, effective and efficient information service delivery. The rapid development of ICT has urged the public sector to shift their operations from manual to electronic system-based in handling the information-related works. Electronic Document and Records Management System (EDRMS) is one of the systems to be considered. However, the adoption rate of such a system is exceptionally below satisfaction due to users are not keen on using it. In this paper, the factors which influence the decision on whether EDRMS should be adopted or otherwise are identified. A qualitative study involving a critical review of the related literature in the area and interviews were employed. The interviews involve EDRMS experts from the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) and the National Archive of Malaysia (NAM). There are 14 factors identified as impacting the decision to adopt EDRMS offered by the Technology Adoption Theories and the literature review. However, only ten factors were considered being validated and ranked by the selected experts. A new conceptual model for EDRMS adoption in Malaysian public sector was then constructed as the outcome of the study.**

***Keywords*— electronic document and records management system (EDRMS); EDRMS adoption; public sector; information management system.**

I. INTRODUCTION

Most public-sector organizations around the world do implement EDRMS to enhance the organization's document management and organizational efficiencies, in addition to meeting the established legal and regulatory requirements [1]. EDRMS has been recognized for its benefits in improving the efficiency and transparency of service delivery, accountability in decision-making and cost-effectiveness. However, the success of such an initiative in the public sector is limited and below satisfactory [2]–[4]. Case studies have found that despite various efforts has been taken by the organization, the rate of adoption of this system is still disappointing [5]. The technology adoption largely influences the implementation of EDRMS in the public sector at the individual level [3]. Low EDRMS adoption rates among individual users could lead to unproductive electronic document and records management since users prefer the manual management over the system [6].

The public sector in Malaysia is also experiencing difficulties in implementing the EDRMS initiative. This was asserted by [7] who revealed that most ICT-related projects adoption in the public organizations had not been proven successful. In a preliminary study carried out by these authors, until August 2017, the number of users who consistently use EDRMS in 48 agencies was only 12,442 which represent 57 percent of the total number of users [8]. Low adoption is among the primary contributing factor to this unsatisfactory situation. Users reject using EDRMS purely due to ignorant of the benefits of the systems and incompetency in knowledge and skill for operating the system.

A roundtable discussion by the Information Governance Laboratory of the Universiti Kebangsaan Malaysia held on April 04, 2017 involving public sector and academic institutions states that user rejection is one of the pertinent issues to be given attention about the adoption and implementation of EDRMS. Additionally, lack of implementation policies, superior management support, and monitoring are among the fundamental factors in determining whether to adopt EDRMS or otherwise

An analysis of the EDRMS adoption models and frameworks from previous studies has discovered that most of these models and frameworks based on organizational perspectives [9]. Not many studies have been undertaken from the individual's perspective (i.e., the system users). Thus, it is timely to investigate the factors influencing the user's adoption to address the issue of technology rejection

and the effectiveness of EDRMS implementation strategy [10]. Past studies also confine the adoption of EDRMS which involve only a single organization such as research conducted at the Portuguese Municipal Council [11]. It is suggested that more research should be carried out by various organizations to obtain more comprehensive results [5]. In this regard, this study involves 27 organizations at the ministry level in the Malaysian public sector.

The theory or model application in a particular context might be different if applied to a different context [12]. The importance of the factors influencing the adoption of EDRMS also depends on the background of the context being studied while some factors need integration. It is unlikely that a universal and general EDRMS adoption model can be created owing to differences in the context, environment, function, goals, and service organizations [5]. Hence, this study identifies and integrates factors influencing the adoption of EDRMS that are appropriate for the context of the study, which is the Malaysian public sector.

From the user's perspective, some studies report the cause of adoption failures such as lack of computer skills, improper attitude towards technological advancement, inadequate change management programs, and lack of confidence and trust in adopting the EDRMS. Additionally, the execution of EDRMS is dependable on the embracement of technology at both levels, i.e., the individual and organizational. Nonetheless, only a handful of studies has been performed at the individual level. Thus, user behavior towards the adoption of the system needs to be identified to ensure the system is optimally used and benefits the organization [10].

Based on the above ideas, these authors aim to scrutinize the contributing factors that rule the verdict either to take up EDRMS among individuals (i.e., system users) and then succeeded by constructing an appropriate conceptual model. Bearing this in mind, it is hoped that the system would assist the public sector (1) in comprehending the factors influencing the adoption of the endeavors among users (2) thence develop procedures, policies, and appropriate acts to ascertain that users are willing and looking forward to adopting the system. Such an effort is believed to increase the rate of adopting EDRMS in the public sector.

II. Material And Method

A. Theory Selection

Both theories and models in previous research have given resourceful information and serve as the good basis for examining the factors affecting the adoption of technology. The commonly used models are such as Diffusion of Innovation (DOI), Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM), whilst Theory of Reasoned Action (TRA), and Theory of Planned Behaviour (TPB) [13] are example of the popularly used theories. The UTAUT model and Information System Success Model (ISSM) by DeLone–McLean are adopted to serve as the underpinning theories for the study. The justification for selecting these models is explained in the next section.

1) The Unified Theory of Acceptance and Use of Technology (UTAUT): A total of 8 different acceptance models were analyzed before establishing the UTAUT model [13]. These models comprises of Motivational Model (MM), Theory of Planned Behaviour (TPB), Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), the combined TAM-and-TPB model (C-TAM-TPB), Model of PC Utilisation (MPCU), and a model founded from Social Cognitive Theory (SCT) and a model founded from Innovation Diffusion Theory (IDT).

The UTAUT model incorporates 32 variables which were withdrawn from the eight models. These variables were then downscaled to four variables only namely the effort expectancy, performance expectancy, facilitating conditions, and social influence. This study chose the UTAUT model since it is capable of improving the technology adoption predictive efficiency as much as 70%. Such efficacy is only possible if the factors and the moderating factors are merged. This signifies that UTAUT is superior to TAM where the latter can only predict up to 30%, while other models can only predict from 17% to 53% [13].

Furthermore, UTAUT was employed as it offers a better comprehension of behavioral intention in employing new technologies [5]. In addition to that, UTAUT is globally accepted in the information system adoption in public sectors, not to mention New Zealand [14], Turkey [15], Botswana [10], Tanzania [16], and Yemen [6]. Studies have proven the validity, stability, and viability of UTAUT [17][6]. As such, the choice of using the UTAUT model in the present study seems justifiable. Figure 1 depicts the adopted UTAUT model.

The original UTAUT model consists of four moderators comprises of gender, age, experience, and voluntariness of use as the moderator effect. The experience was not taken into account since it is cross-sectional which is appropriate for longitudinal research. [13]. Public sectors are expected to utilize the system despite the absence of written directives. There is no definitive statement documenting the acts to be taken should users refusing the system. Hence, voluntariness of use is irrelevant in this study since the system is compulsory to all users in the Malaysian public sector. Apart from that, gender and age could impose a significant effect on EDRMS usage and thus, were deliberated for inclusion.

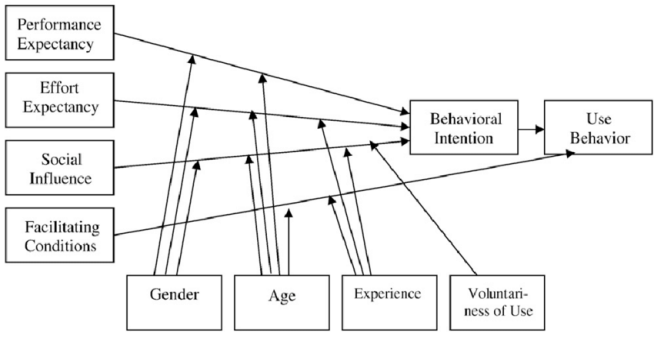

Fig. 1: UTAUT model

2) DeLone–McLean Information System Success Model (ISSM)

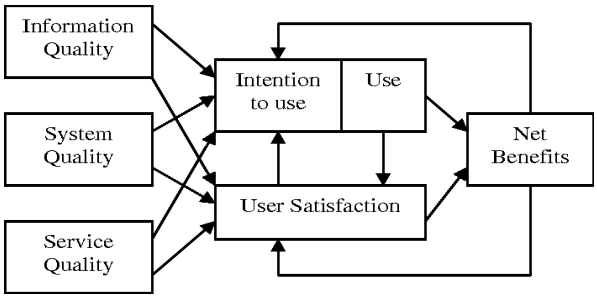

Fig. 2: DeLone-McLean Information System Success Model

The factors from ISSM are proposed in this study to define EDRMS capabilities from different angles [18] as shown in Figure 2. Among the strengths of the ISSM are its parsimony and its explanation of both causal relationships and the process among the construct. Even though DeLone and McLean [19] state that the most suitable variable to measure information system success is the system usage, but the intention to use (adoption) also plays an essential role of the system's success since psychologically, users will use the system if they have an intention to do so. The DeLone–McLean ISSM was initially developed to measure the success of the system, but later it has been extended to predict usage behavior, primarily because the model explains the causal relationship between the usage and other dimensions of IS success [20].

B. Factors Influencing EDRMS Adoption

The literature has yielded 14 factors, which have influenced the adoption of EDRMS in the public sector. Four factors were adapted from the UTAUT model, three factors from the DeLone–McLean ISSM and another six factors from the literature. Table 1 provides the descriptions and sources of the factors.

TABLE I
FACTORS INFLUENCING EDRMS ADOPTION

No.	Construct	Operational Definition	Source(s)
1	Performance Expectancy	The degree to which individuals believe that EDRMS can help improve job performance	[3], [13], [21]
2	Effort Expectancy	The degree of ease associated with EDRMS use	[3], [13], [21], [22]
3	Social Influence	Individuals can be influenced by the attitudes and behaviors of other individuals and vice versa	[3], [13], [21]
4	Facilitating Conditions	The implications of organizational and technical infrastructure in supporting EDRMS use, such as user's ability, knowledge, and resources (e.g., training)	[3], [13], [21]
5	System Quality	Quality features that should be available on EDRMS: easy to use, user-friendly, stable, and good response time	[6]
6	Information Quality	EDRMS capability to provide accurate, up-to-date, adequate, and relevant information	[23], [24]
7	Service Quality	The support received by the users from the EDRMS implementation team and the organization's ICT support team	[6]
8	Perceived Value of Records	The user's belief that knowledge artifacts (e.g., written documents, letters, emails, etc.) are valuable and are worthy to be stored	[14]
9	Top Management Support	The top management understanding level concerning the IS function's importance, the devotion of support and time to the EDRMS initiative in proportion to its budget and potential, and review of the strategy and results	[6]
10	Training	The importance of providing training to users in the organization to increase the level of awareness and skills in managing EDRMS	[25]
11	Financial Support	The financial support for the requirements of EDRMS	[6]
12	Policy	The user's belief that the policy can provide a way or manner of action selected from various alternatives to guide and determine current and future decisions	[25], [26]
13	Security	The user's belief that the use of technology can ensure the safety of documents and records	[14], [25]

Extensive literature review revolving around the EDRMS implementation in the public sector was executed followed by semi-structured interviews. The former technique has outlined a research question, i.e., "What factors influence the adoption of EDRMS in the public sector?" Searches were conducted using strings such as "EDRMS adoption," "UTAUT model," "Information System Success Model," "information management system," and "public sector," in various online databases (ACM, Emerald, Science Direct, IEEE, and Google Scholar).

A total of ten experts (six from MAMPU and four from NAM) were involved in the interview. These two agencies were selected owing to the role they played as the leading agencies in executing the implementation of EDRMS. The criteria for choosing these experts are such as their roles, experience, involvement in the development,

implementation or control of solutions, strategies, or policies (as indicated in Table 2).

TABLE II
EXPERT CHARACTERISTIC

	Role in Current Organisation	Years of Experience in Public Sector	Experience in Related Fields
E1	Information Management Expert (Top management)	35 years	8 years
E2	Information Management Expert (Senior management)	12 years	7 years
E3	Information Management Expert (Operational)	11 years	7 years
E4	National Archives of Malaysia Expert (Management)	20 years	20 years
E5	ICT Expert (System development)	15 years	11 years
E6	National Archives of Malaysia Expert (Management/Operational)	15 years	12 years
E7	ICT Expert (System development)	14 years	5 years
E8	National Archives of Malaysia Expert (Management/Operational)	10 years	6 years
E9	ICT Expert (System development)	10 years	5 years
E10	National Archives of Malaysia Expert (Operational)	9 years	6 years

The 13 identified factors were then validated and ranked by the experts based on their knowledge and experience about the implementation of EDRMS in the Malaysian public sector. The ranking sheet uses a scale from low to high priority (1 to 10) is used to identify the importance and to prioritize the factors that influence EDRMS adoption by the users in the public sector. The results of the ranking factors are used for the implementation team to strategize EDRMS. The interview takes about 30 to 50 minutes long. Conversations were recorded, transcribed, and analyzed. The process that involves familiarisation, transcription, organization and coding, description, and reporting was applied to analyze the gathered data [27].

III. RESULTS AND DISCUSSION

The interview has affirmed the 13 factors identified from the literature. However, after validation three factors were merged, and one factor was dismissed as it does not fit the Malaysian public sector context. Table 3 provides the list of factors after being ranked by the experts.

TABLE III
FACTOR RANKING BY THE EXPERTS

Factors		Factor Ranking										%
		1	2	3	4	5	6	7	8	9	10	
1	Performance Expectancy										10	100
2	Effort Expectancy									1	9	99
3	System Quality								1	2	7	96
4	Training									5	5	95
5	Top Management Support									8	2	92
6	Facilitating Condition									9	1	91
7	Service Quality								1	8	1	90
8	Information Quality								5	5		85
9	Policy							4	6			76
10	Training							5	5			75
11	Security						5	5				65
12	Perceived Value of Records			7	3							33
13	Financial Support	8				2						18

All the experts agreed that performance expectancy and effort expectancy are among the substantial factors influencing EDRMS adoption. Most users are interested in using the system if only they think the system can improve their quality of work and is easy to use. System quality, top management support, and training are also among the top five listed factors; however, two experts (E2 and E7) suggest that top management support and training can be grouped and described further under the facilitating condition based on the definition. The experts also proposed that financial support is dismissed as the EDRMS implementation in the Malaysian public sector is entirely funded by MAMPU.

Also, expert (E1) recommended that level of management should be considered as a new moderating effect to the proposed conceptual model on the basis that it could affect the performance expectancy, effort expectancy, and social influence. Level of management is identified as one of the factors influencing the EDRMS adoption in the Malaysian public sector, and the addition of this moderator needs to be tested to ascertain the most influencing level. This was agreed by experts (E3 and E5) who state that low-grade users are likely probable to adopting EDRMS compared to users considered as high-grade. In light of this, such a factor is taken into account in this study. The management levels involve three stages: (1) strategy management, (2) tactical management, and (3) operational management. Ten factors were taken into account after identification and analysis, and a conceptual model of the research was proposed.

Figure 3 presents the proposed conceptual model for this study. The model was developed based on the final ten factors that were validated and ranked by the experts. The factors were arranged according to the underlying theories. The model was then used to examine the factors that impacted the adoption of EDRMS. These are extracted from the UTAUT model which are performance expectancy, effort expectancy, social influence, and facilitating condition, which represents the direct determinants of behavioral intention (intention to adopt EDRMS).). Six additional factors, which are system quality, information quality, service quality, the perceived value of records, policy, and security, were obtained from DeLone–McLean ISSM model and the literature.

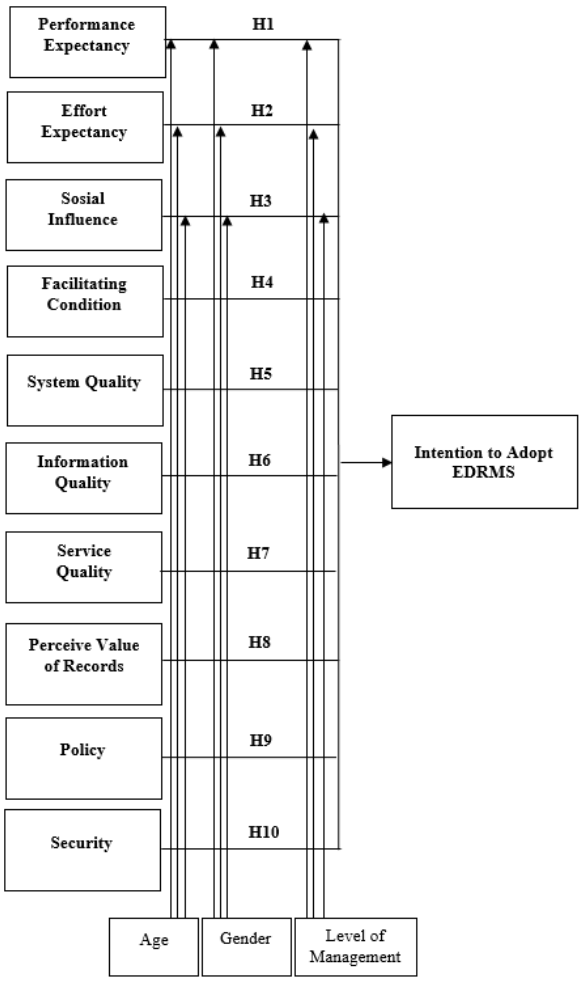

Fig. 3: Proposed Conceptual Model

The description and proposed hypothesis (H) to be tested for each factor in the conceptual model are as follows:

1) Performance Expectancy: Also referred to as "perceived usefulness" [13], many users regard a new system as troublesome but do not affect their work performance. Users may choose to adopt or reject a technology depending on their assumptions on how good the technology can facilitate and simplified their job [22]. H1: Performance Expectancy effect positively on Intention to Adopt EDRMS and is moderated by Age, Gender, and Level of Management.

2) Effort Expectancy: The term effort expectancy is also referred to as "perceived ease of use", this factor was accounted for the perceived effort amount that person requires to spend to learn, understand, and operate EDRMS [13]. H2: Effort Expectancy effect positively on Intention to Adopt EDRMS and is moderated by Age, Gender, and Level of Management.

3) Social Influence: Social influence indicates environmental factors, such as the resolution of superiors, colleagues, friends, or relatives, on user's behavior [13]. Such a resolution would impact the user's intention in adopting EDRMS. H3: Social Influence effect positively on Intention to Adopt EDRMS and is moderated by Age, Gender, and Level of Management.

4) Facilitating Condition: Facilitating conditions represents the effects of organizational and technical infrastructure in substantiating the EDRMS utilization [22]. Previous research by [28] reports that the factors affecting users appreciation of a system are by (1) countering their resistance and easing their worries, (2) providing adequate training (3) full support from the top management and (4) provide an efficient and effective system. H4: Facilitating Condition effect positively on Intention to Adopt EDRMS.

5) System Quality: System quality is related to the quality of the information system (IS) processing, including software and data components [19]. A good system of quality allows users to access and gather information quickly. It can influence the user's trust in adopting the system and assuming the system is always available [29]. In this regard, the quality of EDRMS is critical to ensure that the success of the system will save their time and effort [23]. H5: System Quality effect positively on Intention to Adopt EDRMS.

6) Information Quality: Information quality is a high-value property of information perceived by users. The information characteristics include user specifications, requirements, and expectations [16]. It is related to the system adoption, whereby an information system with high-quality contents will increase the user's interest in adopting the system [16]. System developers need to collaborate and obtain feedback from users to ensure that the system requirements have been met and the quality of the information is complied. H6: Information Quality effect positively on Intention to Adopt EDRMS.

7) Service Quality: Service quality is a good, accurate and reliable service performance promised by the organization and trustworthy is the top feature for system service quality. Service quality is significantly related to intention towards the adoption of EDRMS [23]. H7: Service Quality effect positively on Intention to Adopt EDRMS.

8) Perceived Value of Records: Perceived value of records is translated as "a user's belief that knowledge artifacts (e.g., letters, emails or written documents, etc.) have high-value beyond the current application and are worthy to be maintained and stored for the future" [14]. Users with a higher perceived value of records will view the entire activity as worthy of their effort and time, thus increasing their momentum to keep on using the system. H8: Perceived Value of Records effect positively on Intention to Adopt EDRMS

9) Policy: The policy's objective is to create and manage trustworthy, authentic and usable records for supporting the business functions and activities if required [26]. The policy positively influences the technology adoption and provides a conducive environment to a proper records management [6]. On the other hand, the lack of records management policy would negatively affect the organization's accountability. It is difficult to assure and seek the commitment from the organization to comply with the records management standards and meet the legal requirements. Organisations need to establish and promote records management policy for the invention and governance of original, dependable, comprehensive, and functional records that can reinforce business activities and

influence the users to employ the system [26].H9: Policy effect positively on Intention to Adopt EDRMS.

10) Security: Security is one of the fundamental constructs in the implementation of electronic records initiative. Organisations have to give priority to the security of electronic records [14]. Consumers are willing to adopt EDRMS given that security is ensured [6]. Particular attention should also be given to information that is vital to the national security, information that can maintain the public's trust in the government, and also information for securing critical government functions. H10: Security effect positively on Intention to Adopt EDRMS.

IV. CONCLUSIONS

As the result of implementing EDRMS, the Malaysian public sector has been able to improve records management services and thus, improve the efficiency of the work processes. These, in turn, has led to higher user satisfaction, improved government transparency, and significant reductions in operating costs. Therefore, the panel of experts has also shown their interest and has encouraged cooperation to be given to this study as it recognizes the importance of EDRMS initiatives to the public sector.

The study has constructed a conceptual model which is suitable for investigating the factors affecting the adoption of EDRMS in the public sector. However, the proposed model was constructed by relying upon the literature review, which has its limitations. The proposed model has yet to be taken for validation and reliability test before its adoption by the public sector for embarking on EDRMS.

Upon being validated by the selected experts, ten factors affecting the adoption of EDRMS by the Malaysian public sector are suggested. Four factors were taken from the main UTAUT model while another six factors were obtained from the combination of information system success model and literature review. Performance expectancy, effort expectancy, and system quality are recognized as critical factors in influencing EDRMS adoption in the Malaysian public sector.

Level of management is a factor which is rarely mentioned in previous studies but has been found significant by the experts who then proposed these factors should be added as the moderator in the proposed conceptual model which is expected to moderate the performance expectancy, effort expectancy, and social influence.

All the identified factors should be considered for the development of policy for EDRMS utilization in the Malaysian public sector.

ACKNOWLEDGMENT

The research is financially supported by Research Grant GGPM-2016-010, GUP-2017-046, Universiti Kebangsaan Malaysia and the Public Service Department of Malaysia.

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