https://doi.org/10.17576/apjitm-2020-0901-05
Asia-Pacific Journal of Information Technology and Multimedia
Jurnal Teknologi Maklumat dan Multimedia Asia-Pasifik
Vol. 9 No. 1, June 2020: 58 - 68

Received: 4 March 2020
Accepted: 8 May 2020
Published: 15 June 2020

THE ROLE OF BUSINESS PROCESSES IN INFLUENCING THE DECISION SUPPORT CAPABILITIES OF ENTERPRISE CONTENT MANAGEMENT SYSTEM (ECMS): TOWARDS A FRAMEWORK

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ABSTRACT

Facing an unprecedented explosion of digital content, many organisations have been left with a large repository of unstructured information. Huge volumes of electronic content have been captured and stored within organisations' repositories, depriving organisations of the ability to analyse this data properly. As a result, many organisations are facing crucial problems, such as (1) employees wasting 30% of their time looking for relevant information; (2) operational and maintenance cost increases to handle large amounts of data; and (3) loss of opportunities to gain a strategic advantage through proper analysis of organisational data. To overcome these problems, the Enterprise Content Management System (ECMS) was introduced in the early 2000s. Having been researched for a period of 25 years, most prior studies on ECMS focus on a bottom-up approach with the intention of achieving immediate benefits such as cost-reduction, meaningful knowledge work and re-use of previous content. A top-down approach that aims to improve decision-making, resource allocation and competitive intelligence are ignored due to a lack of awareness about the importance of such benefits. Therefore, this research will explore the relationship between ECMS and how it can facilitate decision-making processes. Grounded on previous literature, the contributions of this paper are as follows: first, the paper provides insight into the research from the perspective of ECMS; second, the paper proposes a research model for further exploration of the topic; finally, implications and future directions for research is outlined.

Keywords: Enterprise Content Management, Content Management, Information Management, Decision Support System, and Information System Management

INTRODUCTION

Organisations nowadays face an uphill battle in managing their organisational repository. This repository contains two types of information assets, namely structured and unstructured content. Huge volumes of digital content, such as emails, reports, electronic forms, electronic documents, videos and images, that have been created may go beyond the control of the organisation's repository. More intriguingly, 80% of this content is in unstructured form (Marlin, 2005, O'Callaghan and Smits, 2005, MacMillan and Huff, 2009, Mannix, 2010). International Data Corporation (IDC) reported that there has been a significant increase in unstructured data from 67% (2013) to 74% (2015). Consequently, Burnett et al. (2006) estimated that employees spend up to 30% of their time searching for relevant information within the organisational repository. The need to manage organisational content has led to a significant uptake of Enterprise Content Management System (ECMS) by organisations in recent years (Salamntu and Seymour, 2014, Paivarinta and Munkvold, 2005, Rickenberg et al., 2012). A market study conducted by Gartner Incorporation from 2009 to 2014 confirms this trend. The study shows that investment in ECMS technologies, especially on content services providers has gradually to USD 6.8 billion in 2018 (Woodbridge, Sillanpaa, & Severson, 2019).

However, prior research indicates that many organisations are struggling to achieve managerial and strategic benefits from the use of ECMS (Salamntu and Seymour, 2014, Paivarinta and Munkvold, 2005, Munkvold et al., 2006, Arshad et al., 2012, Vom Brocke et al., 2008, Alalwan, 2012). In reality, most organisations prefer a bottom-up approach that leads to immediate benefits such as cost reduction, work simplification, ability to re-use previous content and improved searching functions (Smith and

McKeen, 2003). A top-down vision that includes improved decision-making, better resource utilisation and competitive intelligence is not adopted due to organisations lacking awareness of the business value of this approach (Smith and McKeen, 2003). In addition, practitioners usually focus more on the technological aspect of ECMS itself, instead of focusing on how to use the technology once it is implemented (Vom Brocke et al., 2011, Paivarinta and Munkvold, 2005, Tyrväinen et al., 2006).

Responding to this issue, Arshad et al. (2012) produced an ECMS-user framework that shows how ECMS can facilitate information sharing in different types of organisations. However, research on the use of ECMS in facilitating decision-making is limited. Alalwan (2012) and Zardini et al. (2010) proved that ECMS may have the capability of a Decision Support System (DSS) and yet there is no specific mention how business and IT managers can use ECMS to facilitate or improve decision-making processes. Besides, there is a need to simplify the technical difficulties in communicating the technological term of Information Technology (IT) to other non-IT personnel in the organization (Daza, & Hargiss, 2020) in the attempt to improve the decision-making process. On the other hand, the knowledge on the decision-making process to adopt ECMS in relation to high-end technology such as context-aware knowledge-based system (Belkadi, et. al., 2020) is also scarce. Organisation is still learning on how to effectively integrate and implement ECMS to support their decision-making process. The usage of ECMS for decision making may contributed to several benefits, such as operational, managerial, and strategic benefits (Mohamad Rosman & Abdul Aziz, 2018). However, as mention by the authors, these benefits diversify, suggesting that these achievements of benefits are influenced by certain elements or factors. Organisational decision-making is also identified as one of the scarce topics within the context of ECMS. Therefore, exploring how organisations can use ECMS to facilitate decision-making processes may help to add new knowledge to this field.

The rest of this paper is organised as follows. In the next section, we provide a brief literature review of research concerning ECMS. After this, we describe the relationship between the use of ECMS and decision-making processes. Next, we explain the role of business processes in mediating the relationship between the use of ECMS and decision-making processes. Then, Organisational Information Processing Theory (OIPT) is used to explain the theoretical background of the study. Next, a research model is proposed. We then discuss possible areas for further exploration of the topic. Finally, we conclude the paper and outline a number of limitations of our study.

LITERATURE REVIEW

Nowadays, organisations view content as an asset that can drive them towards increased profit and productivity (McGovern, 2004). Content includes any type of unstructured digital information. It includes things such as images, graphics, videos, sounds, documents or records, and it is likely to be stored and managed in an electronic format (Williams, 2000). The rapid growth of digital content production signals the need for appropriate content management. Content management technologies are able to help organisations improve the speed of content creation and consistently update the material (Vom Brocke et al., 2010a). Kostur (2006) suggests that the primary goal of content management is to make content systematically available and in a consistent format, wherever it appears.

In order to gain a greater understanding of the field of ECM for further research, a structured and systematic literature search (Webster and Watson, 2002) approach was adopted. The earliest work in ECMS research concerns developing and deploying ECMS in organisations (Tyrvainen et al., 2006). For example, Nordheim and Paivarinta (2006) investigated the development and deployment of enterprise-wide ECMs application at a Norwegian company, Statoil. The authors suggested that ECMS may have the capabilities of an enterprise system application due to the complexity of the implementation process. In general, the first generation of ECM researchers considered technology as the main driver of organisational ECMS adoption. Organisations implement ECMS to gain immediate return from their investment. As mentioned by Smith and McKeen (2003), a bottom-up approach that focuses on immediate cost-reduction, improved access to information and work process simplification is the main driver of ECMS initiatives. A top-down approach that focuses on improvement of decision-making, better utilization of information and competitive intelligence is not considered the main driver for ECMS initiatives (Smith and McKeen, 2003, Alalwan and Weistroffer, 2012). Many managers prefer to be on silos or focussing on sub-unit approach (Deloitte, 2012). Top-down approach offers the following advantages: (1) support global initiatives, (2) speed up decision making process, (3) human

capital development, (4) reduce burden on the top management, and (5) sustainable business model. Apparently, organization have realised the important of making the data available to the whole organization especially on the business unit level. In addition, Mohamad Rosman, Abdul Aziz, and Mohd Salleh (2018) proposed that organization should view ECMS from different perspective, such as technological, organizational, and environmental perspective. Different view on these perspectives may encourage or discourage potential interaction with ECMS.

The second generation of ECM researchers (Brocke et al., 2008, Alalwan, 2012, Arshad et al., 2012, Zardini et al., 2010, Grahlmann et al., 2009, McNally, 2010, Kunstová, 2010, Wiltzius et al., 2011) built on the previous work to investigate the non-operational benefits of ECMS. Some researchers argue that the managerial aspect of ECMS, such as improvement of decision-making and information sharing has received less focus compared to the operational aspects of ECMS (Alalwan et al., 2014, Zardini et al., 2010, Arshad et al., 2012). This argument is supported by the previous work of Smith and McKeen (2003), which argues that "*very few firms have yet developed the capability to aggregate, analyse, and use content to make informed decisions that will lead to action and generate business value*". A thorough analysis of ECMS literature has also shown that there is not much research relating to the decision-making capabilities of ECMS. Alalwan and Weistroffer (2011) emphasise that strategic long-term decision-making and competitive intelligence are not the primary considerations in ECM study.

Moving from a focus on operational and non-operational benefits of ECMS, several ECMS researchers shifted the focus towards other possible benefits achievement (Katuu, 2016; Mohamad Rosman and Abdul Aziz, 2018; Harr, vom Brocke, & Urbach, 2019; Abdurrahaman, Owusu, & Bakare, 2020). For example, Mohamad Rosman and Abdul Aziz (2018) developed an ECMS benefits framework consist of operational, managerial, and strategic benefits. Adopting the work of Shang and Seddon (2002), the improvement of the organisational decision-making process is one of the benefits that contribute to the strategic benefits of the organisation. Moreover, there is a need to identify the information quality dimension of ECMS (Laumer, Maier, & Weitzel, 2017) as a predeterminant of the organizational decision-making process. On the other hand, Salamntu (2016) investigate the achievement of ECMS benefits in the context of public sector organisations. The author concludes that one significant factor to achieve benefit is user engagement. The user of the ECMS needs to have interaction with the implementation of ECMS to realise the benefit from its implementation. On top of that, decision-making capabilities are one of the important factors grouped under the umbrella term of 'productivity improvement'. ECMS enables quicker access to information for decision making to be conducted, as well as improving how management reached the consensus of their decision. However, aside from this small number of studies, the study on organisational decision-making capabilities is limited within the domain of ECMS, except for the work of Alalwan (2012), Alalwan and Weistroffer (2011), and Alalwan, Thomas, and Weistroffer (2014). Therefore, investigating the decision-making capabilities of ECMS may add new knowledge to the literature.

ECMS USE TO FACILITATES DECISION-MAKING PROCESS

Organisations use ECMS for specific purposes. While operational benefits have long been the main priority, the need to sustain a competitive advantage encourages organisations to improve their decision-making capabilities. However, an extensive literature search from the perspective of ECMS did not locate any study that guides business and IT managers on how to use ECMS to facilitate decision-making. All previous studies were concerned with establishing ECMS as an application that has decision support capabilities (Alalwan et al., 2014, Zardini et al., 2010) and how to make decisions regarding the outsourcing of ECMS applications (Yi and Xu, 2013). Understanding how to use ECMS to facilitate decision-making is important because: (1) it could help business and IT managers to make prompt and accurate decisions; (2) it would improve the quantity and quality of information for decision-making purposes; and (3) it enhances organisations' competitive advantage by improving their analytic capabilities.

Even though there is no specific previous study related to decision-making from an ECMS perspective that might help to explain how ECMS may be used to facilitate decision-making processes, the work of Arshad et al. (2012) may serve as a guide for further exploration of the relationship between

ECMS-use and decision-making processes. Arshad et al. (2012) proposes four types of ECMS-use for sharing of business-related information: minimal-use, standard adoption-use, customised-use and leveraged-use. However, this framework is designed for sharing of business processes. Since decision-making precedes information sharing, and organisations can only make or perform decisions with the sharing of related business processes, this study argues that a new ECMS-use framework is needed to assist business and IT managers in using ECMS for decision-making purposes.

The use of ECMS helps organisations improve decision-making capabilities by improving the speed of problem identification, decision quality, speed of decision-making and the speed of identifying problems (Alalwan et al., 2014). However, previous studies of ECMS did not identify how to use ECMS appropriately to facilitate decision-making processes. Therefore, this study will look to general Information System (IS) literature for further support. In their research, Lassila and Brancheau (1999) highlight that there is a compelling need to manage the relationship between technology implementation and the change it brings to the organisation, particularly as software packages are considered a medium for redesigning business processes. The authors argue that prior research has conceptualised information technology utilisation rather narrowly (Lassila and Brancheau, 1999).

Therefore, this research attempts to explore the relationship between the use of ECMS and improvement of decision-making capabilities within an organisation. In this study, the term 'ECMS use' is conceptualised as the use of application (ECMS) in completing business processes related to decision-making activity. This activity includes development of new products, feasibility analysis, inventory control, managing staff turnover and sales and promotional matters. Organisations use ECMS for specific objectives or impact (Grahlmann et al., 2010, Paivarinta and Munkvold, 2005). The following table shows the possible motives for using ECMS, adapted from previous studies of Paivarinta and Munkvold (2005), Grahlmann et al. (2010) and Smith and McKeen (2003). The motives are categorised based on the Shang and Seddon (2002) benefits framework:

TABLE 1. List of possible motives that encourage organisations to use ECMS (adapted from Paivarinta and Munkvold (2005), Grahlmann et al. (2010), and Smith and McKeen (2003))

Category	Motive
IT Infrastructure	Improved internal and external collaboration
Managerial	Development of new products
Operational	Reliability and quality of information content
	Direct cost savings
	Meeting governance requirements and compliance
	Improved sharing of information
	Flexible knowledge work
	Organizational memory
	Support of business growth
Organizational	Building business innovation
Strategic	Improved internal and external collaboration
	Development of new products

Table 1 shows a list of possible motives that encourage organisations to use ECMS. As suggested by previous studies, most of the motives concern bottom-up benefits that have an immediate effect, such as direct cost savings as well as improved collaboration and sharing of business-related information (Smith and McKeen, 2003, Paivarinta and Munkvold, 2005, Grahlmann et al., 2010, Alalwan and Weistroffer, 2012, Arshad et al., 2012). However, organisations are doing more nowadays to take advantages from analysing their organisational repository to support decision-making processes (Alalwan et al., 2014, Zardini et al., 2010). Previous studies suggest that the use of ECMS improves decision-making processes in the following ways: (1) ECMS increases the quantity and quality of information to assist decision-makers; (2) ECMS enables the sharing of business processes and prevents duplication of similar documents; and (3) the use of ECMS speeds up time required to identify problems and provides the decision-maker with more alternatives to improve the quality of decision-making.

Therefore, this study posits that the effective use of ECMS will enable and lead to the improvement of decision-making capabilities. However, previous researchers suggest that any research on ECMS should consider the role of the business process in mediating the impact of ECMS use (Vom Brocke et al., 2010b, Grahlmann et al., 2010, Reimer, 2002, O'Callaghan and Smits, 2005, Vom Brocke

et al., 2008, Paivarinta and Munkvold, 2005). As claimed by Vom Brocke et al. (2010b), consideration of business process structure is a crucial step for successful use of ECMS. Understanding the influence of the business process is the foundation for assessing both organisational content and its functionalities. Subsequently, Grahlmann et al. (2010) discovered that the use of ECMS (i.e. functionalities) can be influenced by different types (conceptualisation) of the business process. This newly found relationship between these two constructs had thus far only been described in the literature and had not been addressed through empirical evidence. For that reason, this study will look upon the role of business process in mediating the impact of ECMS-use in facilitating decision-making of organisations. The following section describes the conceptualisation of business process and its possible role in mediating the impact of ECMS-use and the improvement of decision-making capabilities.

ECMS AND NATURE OF ECMS-SUPPORTED BUSINESS PROCESS

Consideration of business processes is considered one of the crucial success factors for ECMS-use (Vom Brocke et al., 2010b). Reimer (2002) suggests that business process can change organisational structure in three ways: (1) business process built around physical information handling; (2) same business process; and (3) simplified business process. Previous researchers suggest that organisations need to align business process with the nature of the organisation (Vom Brocke et al., 2010b, Paivarinta and Munkvold, 2005, Grahlmann et al., 2010). Grahlmann et al. (2010) found that the nature of the supported ECMS process might have a mediating impact between ECMS functionalities and potential impacts of ECMS and left the question for potential future study. Other researchers also acknowledge the importance of organisations' business processes as a starting point for ECMS implementation and adoption (Grahlmann et al., 2010, Vom Brocke et al., 2010b, Arshad et al., 2012).

The nature of ECMS-supported business process is defined as a set of logically related tasks performed to achieve a defined business outcome (Davenport and Short, 1990). Examples of business processes are developing a new product, creating marketing plans, producing invoices, writing proposals, and ordering products from suppliers (Davenport and Short, 1990). There are many different ways of classifying business process. For example, Grahlmann et al. (2010) classified business process into 3 categories based on characterisation schemes described as (Mani et al., 2007); process analysability, process variety and process modularity. However, there are some limitations. First, the authors acknowledge that no organisation with low process modularity could be studied. Second, the case studies were done in a small commercial organisation in the Netherlands, so it does not guarantee the same impact in large organisations. Since the previous study within the context of ECMS research did not mention any specific guidelines for studying the types of business process, this study proposes that the Daft and Lengel (1986) Organisational Information Processing Theory (OIPT) be used to fill the gap in the literature. Based on the technology model of Perrow (1967), Daft and Lengel conceptualise organisational information requirements into two categories; process analysability and process variety. The following section briefly explains the proposed model in Figure 2.

ORGANISATIONAL INFORMATION PROCESSING THEORY (OIPT)

OIPT theory posits that organisations process information to reduce task uncertainty and task equivocality. These elements have an important impact on the organisation's information processing mechanism. Organisations need to control the flow of information within and between departments and that alone has become the main reason for the implementation of information systems. OIPT emphasises that organisational success can be achieved by reducing task uncertainty and equivocality.

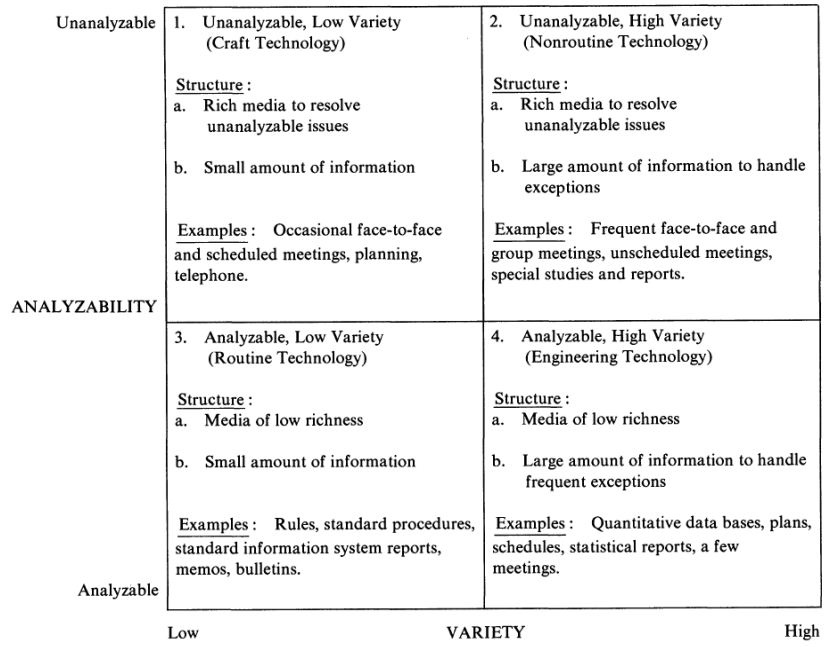

FIGURE 2. Process Analysability and Process Variety of Daft and Lengel (1986, p. 563). Republished with permission.

For the purpose of this research, OIPT is used to (1) propose a business process model to investigate the influence of nature of ECMS-supported process; and (2) focus on how the OIPT can guide the implementation of ECMS and enable improvement of an organisation's decision-making capabilities. Figure 1 shows the proposed business process model. Relating to this model, it explains four quadrants of the business process:

1. Unanalysable, low variety – business processes are not analysable, but few problems arise.
2. Unanalysable, high variety – high uncertainty because of frequent unanalysable problems
3. Analysable, low variety – routine activities governed by standard rules and regulation.
4. Analysable, high variety – business processes are analysable so that it can be studied and solved.

In relation to the improvement of organisations' decision-making capabilities, each type of business process involves different degrees of dependency on the information. Processes with low analysability and low variety need access to a minimum or small amount of information, while processes with high analysability and high variety need access to large amounts of information to handle uncertainty and equivocality in decision-making processes. The use of ECMS ensures that the right amount of information with the right quality is available to decision-makers, helping them to make prompt and accurate decisions.

RESEARCH MODEL

As discussed above, the key concepts of the study have been identified and the following research model is proposed in Figure 3. Three constructs were identified: the use of ECMS, the nature of ECMS-supported business process and the improvement of organisations' decision-making capabilities. The model proposes that 'the use of ECMS' will enable organisations to 'improve decision-making capabilities'. The degree of improvement varies depending on the 'nature of ECMS-supported business processes'. The ways users use ECMS to handle different types of the business process will affect the degree of improvement in the decision-making process. The 'use of ECMS' will enable sharing of organisational resources and provide access to rich veins of information. The richness of informational resources helps decision-makers to reduce uncertainty and equivocality, which is the main threat to the quality and accuracy of decision-making. This study proposes three types of use: minimal-use, moderate-use, and extensive-use (adapted from (Arshad et al., 2012)). Minimal-use refers to using basic functionalities of ECMS and with adequate or minimal training provided to users. Moderate-use refers to using ECMS beyond basic capabilities, in which users modify their work processes to be supported

by ECMS. Extensive-use refers to ECMS-use that extends the capabilities of the application work processes, such as integrating with other systems to make strategic and operational decisions. The following paragraph explains four propositions that will be further tested in this study.

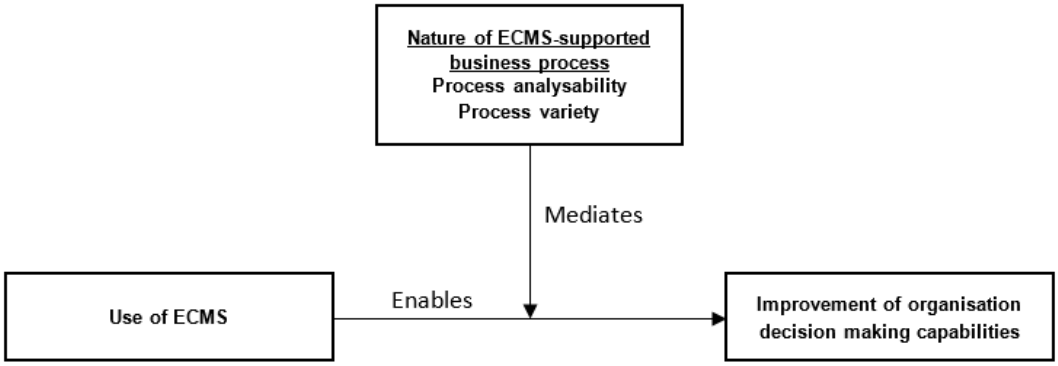

FIGURE 3. Proposed research model.

An analysable business process and of low variety refers to routine business processes that are governed by standard rules, regulations and policies (Daft and Lengel, 1986). The users are expected to use ECMS as 'what it is', little or no training is needed and a small amount of information is used to complete the task. Users know how to complete their tasks and unexpected events do not change how they complete their tasks. Users experience a low level of uncertainty and equivocality. When considering this type of business process, the research proposes:

Proposition 1: In dealing with analysable and low variety business processes, minimal use of ECMS will enable and lead to an improvement of organisational decision-making capabilities.

An analysable business process and of high variety refers to business processes that are analysable and can be studied and solved. However, the order of the activities is rarely the same and the process includes a few mandatory steps (Grahlmann et al., 2010). The uncertainty of the task is relatively high and must be assisted by a large amount of information to handle frequent exceptions (Daft and Lengel, 1986). When considering this type of business process, this research proposes:

Proposition 2: In dealing with an analysable and high variety of business processes, moderate use of ECMS will enable and lead to an improvement of organisational decision-making capabilities.

A business process that is unanalysable and of low variety refers to business processes that are not analysable but for which few problems arise. Users are not bound by a specific process and may deviate the flow based on their experience and expertise. For example, the management of documents in a judicial system depends on professional interpretation by the users and is not bound by a specific workflow (Grahlmann et al., 2010). However, most of the time the business process is governed by prescribed rules to prevent too much deviation between each process. When considering this type of business process, this research proposes:

Proposition 3: In dealing with unanalysable and low variety business processes, moderate use of ECMS will enable and lead to an improvement of organisation decision-making capabilities.

A business process that is unanalysable and of high variety refers to business processes that are not analysable and involve high uncertainty. Users must rely on huge amounts of information to reduce uncertainty and equivocality. The business process does not follow any specific rules or policies and the process is often affected by external factors. When considering this type of business process, this research proposes:

Proposition 4: In dealing with an analysable and high variety of business processes, extensive use of ECMS will enable and lead to an improvement of organisational decision-making capabilities.

TOWARDS EMPIRICAL EVIDENCE

To validate our research-in-progress, the next step in this research is data collection. To confirm our propositions, a qualitative study will be conducted. The purpose of this study is to understand and

explain how business and IT managers can use ECMS to facilitate different types of business process. A multiple case study approach will be conducted in four organisations. This method is suitable because of the lack of knowledge of ECMS-use during post-implementation (Arshad, 2013). Multiple case studies are useful in explaining contemporary and complex phenomena (Yin, 2013) and are also capable of gaining a holistic view of ECMS-use.

The majority of the research of large organisations that use ECMS for decision-making will be selected using convenience/purposive sampling. Selecting organisations that have experience in using ECMS help to improve the validity of research as researchers suggest that most benefits (such as improvement of decision-making) are influenced by the duration or period of implementation (Shang and Seddon, 2002, Gattiker and Goodhue, 2005, Seddon et al., 2010). Moreover, this research will select organisations that utilise mature ECMS solutions, Microsoft SharePoint. The use of ECMS in completing business processes related to decision-making activity will be used as a unit of analysis.

The major instrument for this study is the interview. Semi-structured and open-ended interviews will be used for data collection. Six participants will be selected from each organisation, with a final total of 24 participants from all organisations. Participants will be selected based on convenience and snowballing methods. The participants will be drawn from managerial levels, such as IT managers, human resource managers and business managers. Each interview session will take between 30 and 60 minutes. Aside from interviews, observations and analysis of artefacts will also be conducted. Interview data will be transcribed and coded using Corbin and Strauss (1990) open, axial and selective coding. Each case study will be broken down into themes, and the association between them recorded. To ensure the validity and reliability of this study, we will follow the criteria for verifying interpretative research: credibility, dependability, transferability, and confirmability (Guba and Lincoln, 1989).

CONCLUSION

Enterprise Content Management System (ECMS) has become a mandatory solution, rather than an optional or alternative solution. Organisations' repositories are becoming crowded with huge volumes of structured and unstructured content. However, prior studies have shown that there is a lack of research on how ECMS can facilitate improved decision-making processes. Responding to this research gap, this research paper proposes a theoretical model to close the gap and provide a new understanding of how ECMS can support the decision-making process. The next step will be testing the research model in the field using multiple qualitative case studies.

Findings from this study will be beneficial to both academics and practitioners. The findings may enhance our understanding of managerial benefits (i.e. improvement of the decision-making process) that can be realised by the appropriate use of ECMS. Moreover, it may guide business and IT managers on how the effective use ECMS can improve their decision-making capabilities, reduce uncertainty, reduce equivocality and minimise risk in decision-making.

This study will be limited in several ways. First, we will only conceptualise how ECMS can enable the improvement of organisations' decision-making process. Further study must be conducted to consider the potential decision-making capabilities of ECMS. We recommend the work of Alalwan et al. (2014) as a guide for new researchers to investigate this area. Second, we will only consider two types of business process in this study. Further research may include process modularity (Grahlmann et al., 2010), and business process standardisation and integration (Arshad et al., 2012).

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