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The 5Ws of Enterprise Content Management (ECM) Research: Is it Worth?

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Abstract

Digital contents are incrementing at an exceptional pace. The world has never been the same again since the explosion of Internet gateway. People accessing and creating information at every corner of the world. The jobs that usually reserved to technical person called 'webmaster' are no longer own that privileged. Anyone at any part of the world may create new content with just a single click. Thus, it is no wonder people are talking about 'content chaos'. In this new era, organization are having difficulty to manage their digital contents and it is caused by the structure of the content itself. Researchers agreed that eighty percent of organization digital contents are unstructured. Having an un-structured data cause employee to wasted thirty percent of their time looking for appropriate information, current version of a documents or utilizing data to support strategic decision. These inabilities of organization to efficiently manage their digital content has led to the exploration of new field in Information System (IS) research. Enterprise Content Management (ECM) is the strategies, tools, process and skills that enable organization to manage their digital contents throughout its entire lifecycle. Founded in 1990, the field has spanned over a period of 25 years. With the new challenges of cloud computing and big data, academics and practitioners argue about the relevancies of this field to sustain it existence for further studies. Is ECM a worthy discipline for further research? By answering this question, this paper aims to revitalizing and introduce new ideas to the ECM researchers and analysing the current state of ECM literature. To guide our review, we structure the article based on 5Ws questions (what, when, why, who, and where). In doing so, the paper introduced a modified ECM research framework. A structured literature search approach was conducted, and comprehensive analysis of ECM was presented. An implication for further study was outlined to guide new researchers and practitioners and cultivated the interest into the field. The paper is concluded by drawing our contributions and future work.

Keywords: *Enterprise Content Management, Enterprise Content Management System, Content Management, Web Content Management, Enterprise Application, Enterprise System.*

INTRODUCTION

The Internet provide a new pathway of opportunities and challenges. The world have seen the number of web pages increase from 1,000 pages in 2001 Ektron Inc (2001) into a new milestones of 1 billion pages in 2014 (Netcraft, 2014). The Internet are no longer exclusively belong to the webmaster.

Content management system (CMS) allowed almost anyone without the extensive Information Technology (IT) knowledge to produce content over the Internet. More and more contents are produced, an each day we are moving closer towards content chaos. It is a phenomenon which contents goes beyond the control and deprive us of relevant information. Digital contents, such as web content, graphics, text, video, audio, 3D data, and many more reside in the Internet gateway making retrieval and management of those content a complete nightmare. IBM reported that over 2.5 quintillion bytes of data have been created in the last 2 years (IBM, 2013) and 80% of those data are unstructured. Having an unstructured data caused the repository to be overload and inefficient.

Slowly, this problem become much worst as organizations were very much depending onto digital contents. Organization had to share information over the Internet with two consideration in mind: (1) cost effective, and (2) secure (Kunstová, 2010). The lack of workflow management supporting the management of digital content (N. L. Junco & Bailie, 2004) caused organization information asset to be underutilize and uncontrollable. The need to control and manage digital content has contributed to new field of Information System (IS) called Enterprise Content Management (ECM). ECM was coined by Association for Information and Image Management (AIIM) on 2001. Researchers suggested that ECM started with the concept of document imaging or document management in 1980s *(Kunstová, 2010; Jan Vom Brocke, Simons, & Cleven, 2010).* Relatively a new field of study, research in ECM was still consider in its infancy stage, particularly lacking theoretical base and empirical data. Having spanned a period of 25 years, some researcher and practitioners argue about the benefits of ECM and its capability to sustain it existence (Noreen Izza Arshad, Rachelle Bosua, & Simon K Milton, 2012; Mancini, 2014; Munkvold, Päivärinta, Hodne, & Stangeland, 2006; Paivarinta & Munkvold, 2005; Salamntu & Seymour, 2014). Therefore, this paper attempted to provide a comprehensive overview of the current state of ECM in an attempt to determine the value ad relevancies of the field for further research. In doing so, we hope to revitalize the interest into ECM research and guide new researcher into aspect of ECM that require much attention. To guide our review, we utilize the classis information gathering technique, the 5Ws to get insight into ECM literature. The paper attempted to answer the following questions:

1. What is Enterprise Content Management?
2. When was Enterprise Content Management initiated?
3. Why organizations need Enterprise Content Management?
4. Who should involve in Enterprise Content Management?
5. Where should Enterprise Content Management research stand?

In order to answer the first question, we briefly explained the definition of ECM and the motivation towards ECM. For the second question, the paper explained the evolution of ECM from its inception until present day. To answer the third question and fourth questions, we performed a structure literature search based on Webster and Watson (2002). To guide our review a modified ECM research framework was developed based on existing ECM framework (Paivarinta & Munkvold, 2005; Rickenberg, Neumann, Hohler, & Breitner, 2012; Tyrväinen, Päivärinta, Salminen, & Iivari, 2006). Lastly, we dig into the issues of big data and cloud computing as an indicator for comparison with ECM. Therefore, the contribution of this paper as follows: First, we comprehensively reintroduce the field of ECM to new researchers. To date, there are lack of research that provide comprehensive overview of the ECM. Second, we provide the current state of ECM to as a guidance for further research. Third, we introduce modified ECM research framework to revitalizing the interest into ECM research. Fourth, we compare the field of ECM to other emerging topics, big data and cloud computing to view the value that ECM bring into organizations.

The paper is organized as follows: We briefly explain the field of ECM and evolution of ECM. Then, a structure literature search was done to view the current state of ECM. To guide and revitalize ECM research, we introduce a modified ECM research framework. A comprehensive review of ECM was presented. Subsequently an analysis of ECM value for organization was presented. To guide further study,

an implication for research were drawn. The paper is concluded by drawing the contributions and limitations of the study.

ENTERPRISE CONTENT MANAGEMENT

Enterprise Content Management (ECM) has spanned a period of 25 years since its inception. Researchers consider ECM as emerging topic for research *(Jaffar Ahmad Alalwan, 2013; Paivarinta & Munkvold, 2005)* but due to infancy of the field, the scientific interest are still consider remarkably low (Tyrväinen et al., 2006) and lack of theoretical base *(Jan Vom Brocke, Derungs, Herbst, Novotny, & Simons, 2011).* There are several acceptable definition of ECM. AIIM define ECM as *"technologies used to capture, manage, store, preserve, and deliver content, and documents related to organizational processes. ECMS tools and strategies enable the management of an organization's unstructured information, wherever that information exists"(Association for Information and Image Management)*. Smith and McKeen (2003*)* define ECM as "*strategies, tool, process, and skill that organization must possess in managing its information assets such as documents, web pages, reports, and data (p. 648)".* Paivarinta and Munkvold (2005) define ECM as *"integrate the management of structured, semi-structured, and unstructured information, software code embedded in content presentations, and metadata together in solutions for content production, storage, publication, and utilization in organizations".* Researchers arguing that ECM definition are not final and still evolving (Rickenberg et al., 2012). Organization implement ECM to manage their digital contents. Organizations consider digital content as an asset that must be manage (McGovern, 2004). Improper management of digital content will turned asset into a liability (Blair, 2004).

ECM were not just a technology. It is a principle of efficient and effective management of digital content. It involves strategy, process, people, and the content itself. Achieving strategic fit between ECM dimensions strongly contributed to achievement of benefits and performance improvement. Nowadays, users are burden with ineffective content retrieval process. They waste time searching for relevant content and sometimes overwhelm with too many version of the same documents in organization repository (Kunstová, 2010). Accessing irrelevant information deprive organization and users from efficient business processes and making content useless (McKeever, 2003).

ECM were a combination of several technologies integrated into a single information system, known as ECM systems (ECMS). ECMS also capable to integrate with the enterprise system application such as Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) and Supply Chain Management (SCM). ECMS covers Document Management (DM), Web Content Management (WCM), Records Management (RM), Digital Asset Management (DAM), Document Imaging, Business Process Management (BPM), Workflow Management, Repositories, Storage, Backup/Recovery, Search/Retrieval, and Collaboration. In term of software selection, three important vendors as identified by Gartner Magic Quadrant are IBM, OpenText and EMC while Alfresco and Xerox are consider as visionaries vendors (Gartner, 2014). The ECM market is also very appealing and show an upward trend from 2009 to 2014 to worldwide market size of $5.4 billion. Among the popular ECM proprietary software are IBM ECM, OpenText Content Suite, Microsoft SharePoint, Documentum, and Alfresco. The following figure illustrates the components of Enterprise Content Management Systems (ECMS):

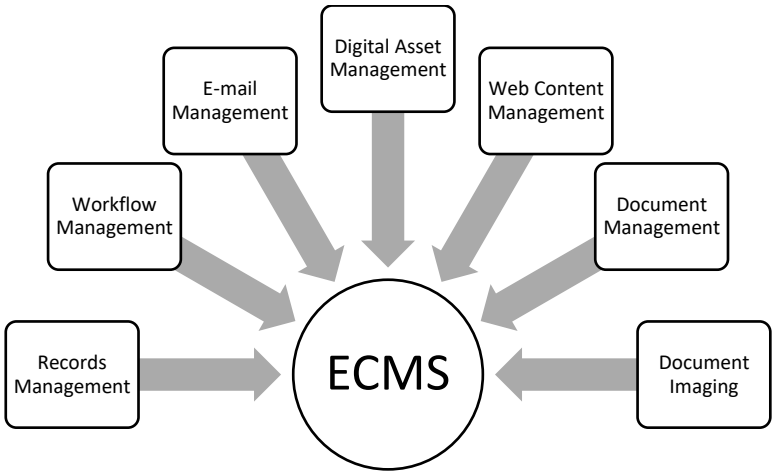

Fig. 1: The components of Enterprise Content Management System

EVOLUTION OF ENTERPRISE CONTENT MANAGEMENT (ECM)

There are a discrepancies in term of ECM origin. Munkvold et al. (2006) traced back the concept of ECM from 1990 with the introduction of Web Content Management (WCM) while Kunstová (2010) and *Jan Vom Brocke, Alexander Simons, et al. (2010)* argue that ECM evolution start with document imaging or document management in 1980s. Paivarinta and Munkvold (2005) identify ECM origins from the concept of traditional information system such as Information Resource Management (IRM), Electronic Document Management (EDM) and Knowledge Management (KM). Study into literature shown that the trace of ECM can be found in 1980s with the Document Management (DM). This in line with the ideas proposed by Kunstová (2010) and *Jan Vom Brocke, Alexander Simons, et al. (2010)*. Raynes (2002) definition of Document Management:

[…] a computerized system that facilitate the creation, capture, organization, storage, retrieval, manipulation, and control circulation of documents in electronic format (p. 303).

Raynes suggests that document management encompasses several aspects rather than focusing on information system. Organizations were having problem with the high production cost and rapid growth of Information Technology (IT) with the introduction of personal computer. The dependencies on the new technology for sharing information, saving space through digitization, and improve communication forced organizations to turn into document management solutions. DM works as an intermediary between software and people who using the information system. The rapid growth of digital content has led into information overload syndrome. Organizations were having problem to manage their digital information asset. This led to emergence of new application such as Web Content Management (WCM), Digital Asset Management (DAM), and E-mail Management (Kunstová, 2010). WCM for instance was introduced in early 1990s. McKeever (2003) define WCM as:

[…] the activities involved in the creation and deployment of digital content to web based audiences, […] customers, suppliers, partners and staff accessing Web content via extranet, Internet, or Intranet. […] consists of the software tool(s) used to provide automated support of WCM activities (p. 688).

Web content management is an organization effort to handle the challenge in managing corporate web pages. Early web sites were static, poor content and lack of interactivity. WCM imposes a new dimension into the organization corporate web making it more interactive and allowing collaborative work among the users. WCM also encourage delegation of content creation, content re-usage and content retrieval. WCM help organization to be competitive and at the same time reduce their operating cost. Digital Asset Management (DAM) meanwhile covers the lifecycle of digital contents (text, graphic, audio, video, etc.) throughout its entire lifecycle (creation, manipulation, distribution, retrieval). The concept was developed when organizations realize that they were wasting time dealing with complexity

of file management. E-mail management also become important as most of organization processes is communicated through the Internet. Digital receipt, invoices, and confidential documents were shared among people within and outside of organization. Lotus Notes become one of de-facto software for mail management and widely use worldwide. All applications were a separate entity thus organization were facing issues of security and redundancy of information. Therefore, in the early 2000 most of the individual application (Document Management, Web Content Management, Digital Asset Management, E-Mail Management, etc.) were integrated into one, large system to improve its functionality and usability, known as Enterprise Content Management System (ECMS).

LITERATURE SEARCH PROCESS

In order to gain greater understanding of the field of ECM for further research, Webster and Watson (2002) structured and systematic literature search approach was adopted. Webster and Watson (2002) recommended that: (1) literature search should start with leading journals, (2) perform backward search to consider relevant literature, and (3) forward search to determine articles citing the publication. Therefore, we performed a three phase analysis for our structured literature search. Fig. 1 show the literature search process:

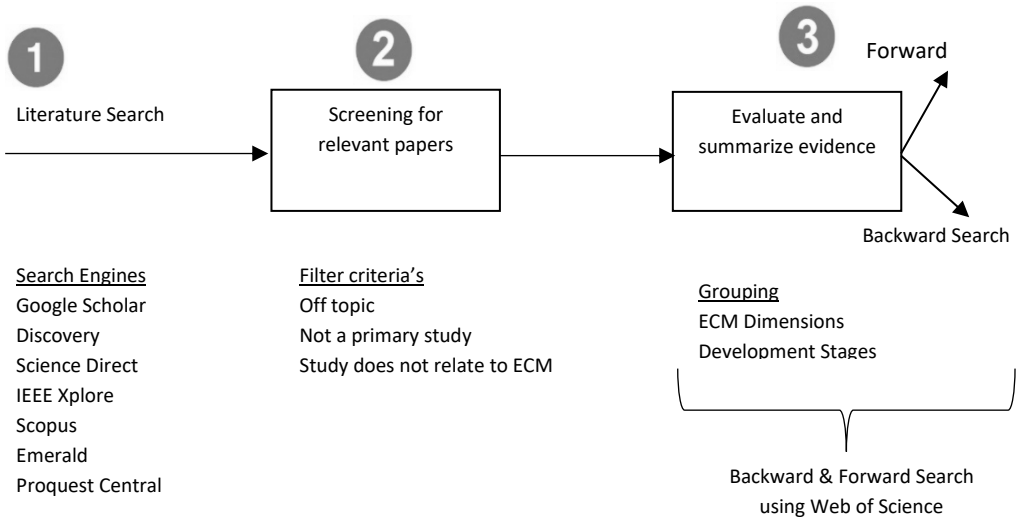

Fig. 2: Literature search process

The first phase consists of searching the literature for relevant ECM research papers. We used the following tools: Google Scholar, Science Direct, IEEE Xplore, Emerald, Proquest Central, Scopus and institutional repository of large academic library in Australia (Discovery). The keywords use is *'enterprise content management'* and *'enterprise content management system'*. Publications search are limited to research papers, books, and thesis (master and PhD). Some exclusion criteria are excluding patent and citations (Google Scholar), excluding non-research and bias publications (general review, technical papers, vendor reports, white papers) and keywords occurrences within the articles (online databases and journals). The search also excludes any publications that do not written in English. Total hits were recorded and exported into referencing software, EndNote X7. A total of 1148 publications were identified. In an attempt to remove duplications, this study employed creative solutions. We utilize the capability of referencing software, EndNote X7 to remove duplications of publications. Using EndNote 'Find Duplicates' functions an obvious duplication were removed, and the results were trimmed into 563 hits. We manually checked each citation to remove others duplication and bad citations. We also manually filter the articles to remove topic that was not relevant to ECM based on title and abstract.

Finally, 171 papers were selected to be filter in the second phase. Fig. 2 show the process of filtering the publications:

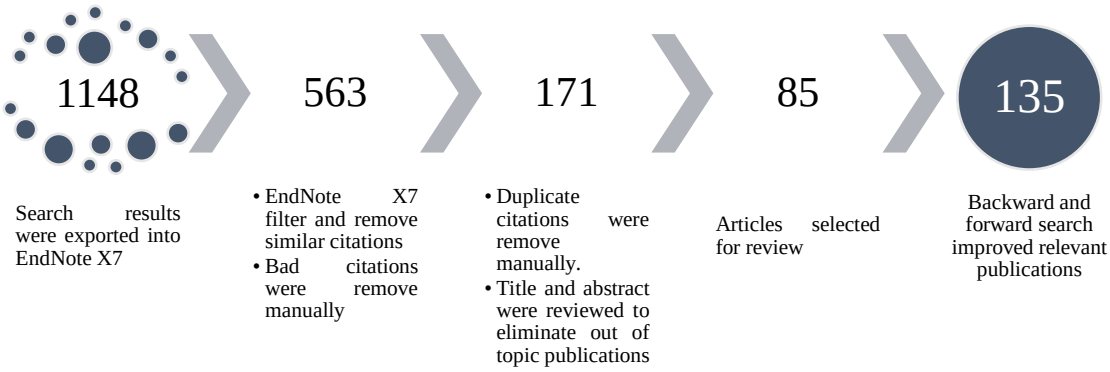

Fig. 3: Criteria for filtering search results

For the second phase the publications were screened. Based onto the screening criteria many publications were excluded from the literature review due to: (1) study does not relate to ECM, (2) poor quality, and (3) publication without contribution to academic and practitioners. A total of 85 publications were identified relevant for this study. The third stage involves evaluation and summarization of publications. A backward and forward search was done using Thomson Reuters Web of Science v5.17 to the selected papers and a final total of 135 papers were selected for the reviewing process. The paper were read diligently and summarize into specific themes using open and axial coding (Corbin & Strauss, 1990). To guide our literature review, we adopted and modified a well-established ECM research framework (Paivarinta & Munkvold, 2005; Rickenberg et al., 2012; Tyrväinen et al., 2006). The following section describes our modified ECM framework alongside its working definition.

MODIFIED ECM RESEARCH FRAMEWORK

In an attempt to guide our review, we adopted three (3) well-established frameworks in ECM. Paivarinta and Munkvold (2005) introduce major ECM issue framework consists of Enterprise Model, Objectives/Impacts, Content Model, Infrastructure, Administration and Change Management. The framework posits that ECM system should support the objective and desired enterprise model (process-based, team-based or project-based, etc.). Tyrväinen et al. (2006) introduce ECM research framework consisting of four perspectives: content, technology, enterprise, and process. Rickenberg et al. (2012) introduced extended ECM research framework to stimulate the research on ECM. We review the model extensively and using latent coding (Neuman, 2014) to identify specified research themes: content, technology, process, strategy, and people. The proposed modified ECM research framework consists of two (2) ring; outer ring (dimensions) and inner ring (research). The followings are the working definition for the framework:

Dimensions: This study identify five themes (dimensions) for ECM research:

The content dimension deal with managing organization contents in various forms (unstructured, semi-structured and structured), contents lifecycle (creation, usage, storage, archival, disposal), metadata, and corporate taxonomy. Technology dimension deal with technologies issues and challenges such as integration, design, hardware, software, customization, personalization, standards, policies, and security. Process dimension involves ECM implementation steps, ECM development, ECM adoption, and ECM lifecycle. Strategy dimension deal with ECM strategic capabilities such as incorporating decision making, use of ECM systems, justifying investment into ECM technologies, stakeholder identification and facilitating information sharing. People dimension deal with administration and management of ECM

systems such as assigning resources, communications among stakeholder, stakeholder involvement, training, change management, project champion, new work roles and competencies development.

ECM Research: ECM research refers to type of research that have been done in the fields of ECM. This construct were adopted from Paivarinta and Munkvold (2005) and Tyrväinen et al. (2006). Method concern with the research design (i.e. empirical (quantitative, qualitative), design science, descriptive, and conceptual). Context deals with geographical and demographic areas of the publications and respondents. Theoretical is define as research that based from solid theoretical foundation. Three stages of project management were included into the framework. Pre-implementation is the initial process preparing for ECM systems implementation includes assessing organization readiness, justifying ECM investment, factor influencing ECM acceptance, content management, etc. Implementation refers to process, strategies, or technology use to guide the implementation of ECM. Post – implementation is the process of Identifying issues, problems, and benefits of ECM systems utilization.

The following Fig. 3 illustrates our modified ECM research framework:

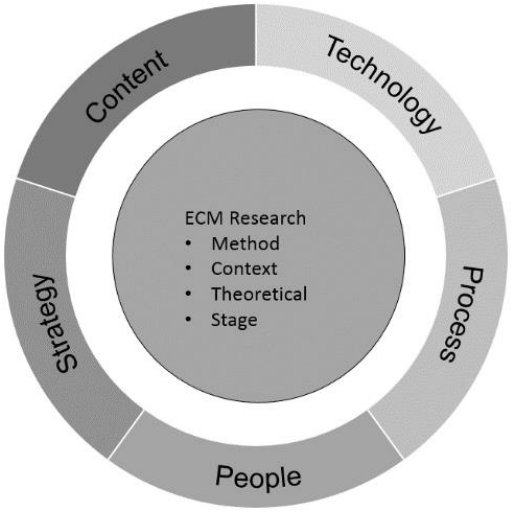

Fig. 4: Modified ECM Research Framework

COMPREHENSIVE ANALYSIS OF ECM LITERATURE

CONTENT DIMENSIONS

Managing content, particularly in digital forms has become one of organization challenges. Despite that facts, academic and practitioners are still focusing onto the technological aspect instead of focusing onto the content that supposed to be manage by the systems (Kostur, 2006). J. Alalwan and Weistroffer (2011) suggested that strategic management of organization content are crucial for decision making process. Access to quality information allow organization to make better decision, therefore content should be manage in a manner that allow speedy data retrieval and analytical. Barnes, Goodwin, and Vidgen (2001) meanwhile develop a framework for web content management that include a content lifecycle. Organizations content, in whatever forms should be considered as an iterative process; following a lifecycle create, review, store, publish/exchange, archive, and destroy. Barnes emphasize that ownership of contents are important as demonstrate in his case study.

Bechini and Vetrano (2013) conduct a study on management of oceanographic data by utilizing the capabilities of ECM. In this study they concern onto the process of managing content from collection until it was stored into the repository. The complexity of data give a challenges in data collection and management, such as heterogeneity of data from it sources. The use of ECM help to prevent a more complex solutions. Therefore having a sound content procedure/model and metadata could help to overcome this problem.

N. L. Junco and Bailie (2004) emphasize that organizations need a proper content management system to cater for market expansion especially dealing with new product line. Their research concerns on how to effectively manage content and determine appropriate systems to manage those content. Content should be view as source of profit and productivity rather than cost.

Smith and McKeen (2003) introduce content stewardship that consist of four activities: capture, organize, process and maintain. They argue that understanding the elements of content stewardship can certainly improve organization performance. During stage of capture, content were kept into organization repository. Organization must decide type of data that they wish to keep to improve quality of content. Then there is a mere need to organize the content through classifying and indexing. This activity provide a faster access to the content. The data in the repository were then process into meaningful data to help improve strategic decision making. Finally those content must be maintain according to organization policy.

TECHNOLOGY DIMENSIONS

The majority of papers in the literature mostly mentions on technicality (technology) dimensions of ECM. Mohd Salleh, Mohamad Rosman, Raja Yaacob, and Yusoff (2011) work on development of web-based application on managing school discipline records through integration of digital content and Electronic Record Management (ERM). They argue that content management can make use the concept of ERM in managing digital content.

Trieu C Chieu, Nguyen, and Zeng (2007) work on a secure searching mechanism for private documents in ECM and found out that utilizing document information and user information in search query will produce an effective, secure and high-performance result.

Aziz, Arenas, Cortese, Crispo, and Causetti (2010) propose a secure and scalable content management system for managing multimedia data of publishing industry. The solution provide a better resource control and effectively matched users' past behavior while using the system to resources policies. Boukar and Muslu (2013) work on content management system to improve the performances of administration and academic staff. They argue that content management system allowing integration of information and knowledge, and at the same time improve decision making process. Organization need to identify the challenges of managing, modifying, updating, and re-use large volume of contents.

Kunkelmann and Brunelli (2002) meanwhile work on integrating automatic indexing and retrieval system into content management system. They argue that having a real-time access to content was crucial especially to those organization working in the domain of news and current affair. Having an automatic indexing and retrieval of metadata can significantly reduce the burden of cataloguing staff.

Munkvold et al. (2006) study on ECM implementation at large Norwegian oil company (Statoil) that develop enterprise-wide platform based on product acquired by commercial vendor. They argue that there is a need to investigate the commercial and open source ECM software acquisition from the viewpoint of customer. There also a need to integrate ECM with other solutions (portals, e-collaboration, web sources, business intelligence, etc.).

Joha and Janssen (2010) work on the implementation of content management shared services in public sector, that require decision making approach and the need to balance management, technology, and content dimension, which influence the potential benefits of content management.

J Souer (2012) in his thesis develop a Web Engineering Method (WEM) to assist users in developing CMS-based web application. He suggested that future research should look into the issues of personalization of content over different platform. Jurriaan Souer, Joor, Helms, and Brinkkemper (2011) also work on identifying software commonalities in order to improve the implementation of content management system and products.

J. Rats and G. Ernestsons (2013) work on evaluating and comparing ECM system suitability for large document database. Authors propose four level/layer architecture of ECM system, consist of user interface layer, business function/middleware layer, NoSQL document-oriented DBMS layer, and infrastructure layer. There is a need for a platform shift for ECM system and many researchers talk about the need to reengineer the architecture of ECMS and utilizing new data set (voice message, text message, videos, email, etc.). The authors also argue that ECMS could gain benefits by implementing cloud computing architecture.

de Carvalho (2008) introduce NSI^2, an open source ECM solutions software. The author argue that few organizations can afford high implementation and customizable cost for implementing ECM. Investment cost (software license, hardware, software, Internet, support service, etc.) must be considered in ROI (return of investment) calculations.

PROCESS DIMENSIONS

For the process dimension, Zykov (2006) presented a problem oriented approach for the implementation and adoption of ECM by considering content management in web portal and embracing heterogeneous enterprise information system. He introduced ECM construction methodology with lifecycle support. His methods, models and tools has been widely used for development of portal and he argue that the approach can help organization to reduce cost and offer advanced personalization and reduce risk of metadata damage.

Jan Vom Brocke, Alexander Simons, et al. (2010) introduced ECM-blueprinting, crucial for ECM rollout or implementation. Authors suggest that ECM and BPM are strongly related field of research. ECMS implementation will affect organization business process structure. ECM adoption success depend on thorough analysis of contents, yet the key challenge is are organization rather than technological.

Nordheim and Päivärinta (2004) work on ECM customization and implementation issues. They argue about the lack of research on content management implementation in organization. They presented a framework for customization of ECM. Their findings show that most organizations (sixty percent) mention degree of customization for their ECM. The authors also mentions challenges to customization; integration, user-interface, functionality, organization adoption to system and vendor customization issues. They argue that research ignored organizational viewpoint, focusing on operational and technicalities of ECM. Knowledge on organization existing business and IT infrastructure was crucial for ECM success.

In a similar work, Nordheim and Paivarinta (2006) study the issues emerged during ECM implementation by utilizing Van de Ven and Poole (1995) four motors; teleological, evolutionary, life-cycle, and dialectical. They argue that ECM implementation should compliments all four motors. They also identify differences between strategic development approach and evolutionary approach. Scheepers (2006) also work on customization issue by developing a framework for Enterprise Information Portal (EIP) based on marketing fundamentals. The framework can be applied during process of strategy formulation and applied an appropriate implementation strategy.

STRATEGY DIMENSIONS

The strategy dimension is becoming prominent in the field of ECM. Many researchers has started to view the dimension thought managerial, organizational, and long-term benefits perspective. J. A. Alalwan, Thomas, and Weistroffer (2014) suggest that organization need to focus on strategic decision support capabilities of ECM system. Its help organization to produce better decision, improve the speed and quality of decision making, and provide management with better resources to assist decision making.

Noreen Izza Arshad, Rachelle Bosua, et al. (2012) argue that there are no sufficient research regarding how ECMS support information sharing within organization. She proposes an ECMS-use

framework consist of minimal-use, standard adoption-use, customized-use, and leveraged-use. She argue that ECMS was underutilized and it was not aligned with the organization standard business practices.

Smith and McKeen (2003) proposed a content stewardship practices to govern the management of organizations content throughout its entire lifecycle and it could significantly affect organization performance. Their study revolve developing a good information practices for the implementation of ECM. They argue that most of organization only focus onto short term benefits (work process simplification, ease of navigation, branding, reduce cost of material, time saving, improve access to material and accuracy) and neglecting long term benefits (competitive intelligent, decision making, content utilization).

Kunstová (2010) investigate the barrier and benefits of investment into ECM. It's found out that knowing this critical success factors was crucial for successful implementation and adoption of ECM. It is also possible that some organizations reluctant to implement ECM because of implementation failure in another organization has discourage them. Among the benefits expected by organizations are improvement of productivity, removal of non-efficient activities, improvement of business continuity, and cost reduction.

Andersen (2007) also work on investigating key issues that lead into organization persistent interest in ECM. The author suggested that as ECMS evolve over time, the product will be less user friendly, less responsive, less customizable, and complex to be use. Organizations are in need of ECM courtesy of meeting government compliance and improve content quality, accuracy, and consistency. It is also eliminating the need of technical knowledge. The author also argues the importance roles of technical communicators in shaping the ECM systems and technologies. Researchers were suggested to study whether organizations were having benefits as promises by the vendors.

Munkvold et al. (2006) emphasize the need to investigate and justifying potential investment into ECM program to enterprise-wide organizations. They argued about lack of research and focus onto the concept of ECM through the lens of how organization utilizing the content management technology. Their study also points out that only few companies have a comprehensive ECM strategy. The authors identify problems, challenges, and development initiative, grouping them into four common categories; rationale, management of content, management of infrastructure, and change management. They also emphasize the important of change management and establishment of best practices for ECM evaluation.

PEOPLE DIMENSIONS

The people dimension was rarely mention in the literature. Scott (2011) underlines that users' perception determines the acceptance of new technology. The study highlights the importance of cognitive engagement in technology acceptance. The Technology Acceptance Model (TAM) and computer self-efficacy are the main construct in the study.

Scheepers (2006) argued that mixing and segmenting can help reduce users' diverse content needs. Implementation and formulation of portal should involve the feedback from the target market. Frequent communication with key users were crucial part of the implementation success to identify emerging needs. Study of how users use portal must also be done thoroughly.

Nordheim and Päivärinta (2004) emphasize that customization of ECM system can contribute to ECM adoption. There is a need for simplification and personalization especially in term of user-interfaces. They argue there is a need to further study the actual impact of ECM customization to organizational performances (rather than relying on vendor and consultancy-biased literature) from the viewpoint of organization. Therefore, the study can help organizations anticipate challenges for future ECM solutions.

Munkvold et al. (2006) raise the issue of personalization and administrative infrastructure. ECM implementation provide organization with a new challenge; a new routine that users can perceived as

meaningful, a new dimension of training and support, and how to motivate, persuade users towards making the changes to their routines.

CONCLUSION

In this paper, a structured literature search approach was conducted, and comprehensive analysis of ECM was presented. We developed a modified framework of ECM research for future exploration of the field. The contributions of this paper are as follows: First, we provide an insight into the emerging topic of enterprise content management. Second, we propose a modified research framework for further exploration of the field of ECM. Third, we outline several research topics and gaps within the context of ECM.

However, our research is not without limitation. First, even though we have performed an extensive literature search on ECM, however there is a possibility that our searches can be expanded, especially by looking into different perspective such as cloud computing and big data. Second, this study can be further improved through empirical data collection especially on the few gaps and issues that we have outline in this study.

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APPENDIX I

Table 1: List of ECM publications

	DIMENSIONS					Method	Type
	Content	Technology	Process	Strategy	People		
J. Alalwan (2012)				X		Survey	Thesis
J. Alalwan and Weistroffer (2011)	X			X		Conceptual	Proceeding
Jaffar Ahmad Alalwan (2013)				X		Conceptual	Journal
J. A. Alalwan (2013)		X				Conceptual	Book Chapter
J. A. Alalwan et al. (2014)				X		Survey	Journal
Allotey and Ojeabulu (2011)				X		Case study	Thesis
Andersen (2011)			X	X		Case study	Journal
Ankoud and Hmimida (2013)			X			Case study	Proceeding
Arshad, Bosua, and Milton (2010)				X		Conceptual	Proceeding
Noreen Izza Arshad, Rachelle Bosua, et al. (2012)				X		Case study	Proceeding
N. I. Arshad, R. Bosua, and S. K. Milton (2012)				X		Case study	Proceeding
Arshad, Mehat, and Ariff (2014)				X		Case study	Proceeding
Arshad, Mehat, and Imran (2014)				X		Case study	Proceeding
Noreen Izza Arshad, Simon K Milton, and Rachelle Bosua (2012)				X		Case study	Proceeding
N. I. Arshad, S. K. Milton, and R. Bosua (2012)				X		Case study	Proceeding
Arshad, Milton, Bosua, and Mehat (2014)				X		Case study	Proceeding
Arshad, Milton, and Bosua (2013)				X		Case study	Proceeding
Aziz et al. (2010)		X				Design Science	Proceeding
Bandorf, Yoshizawa, Takada, and Merbeth (2004)		X				Descriptive	Journal
Barnes et al. (2001)	X					Case study	Proceeding
Bawazir and BenSeddeek (2007)		X				Conceptual	Proceeding
Bechini and Vetrano (2013)	X	X				Design Science	Journal
Befa, Kontopoulos, Bassiliades, Berberidis, and Vlahavas (2010)		X				Conceptual	Book Chapter
Benevolo and Negri (2007)		X				Survey	Journal
Bianco and Michelino (2010)				X		Case study	Journal
Bordea, Kirrane, Buitelaar, and Pereira (2012)	X	X				Design Science	Proceeding
Boukar and Muslu (2013)		X				Design Science	Proceeding

	DIMENSIONS					Method	Type
	Content	Technology	Process	Strategy	People		
T. C. Chieu, Liangzhao, and Mohindra (2008)		X				Conceptual	Proceeding
Trieu C Chieu et al. (2007)		X				Conceptual	Proceeding
Trieu C Chieu and Zeng (2008)		X				Conceptual	Proceeding
D. K. Chiu, Hung, and Kwok (2010)	X	X				Conceptual	Journal
D. K. W. Chiu and Hung (2005)		X				Design Science	Proceeding
Chu, Chen, and Chen (2009)	X		X			Conceptual	Journal
Daoudi (2012)		X				Design Science	Proceeding
de Carvalho (2008)		X				Design Science	Book Chapter
Deines and Krechel (2010)		X				Design Science	Proceeding
DeLaura and Burrell (2002)			X			Conceptual	Proceeding
Dhouib and Ben Halima (2013)		X	X			Experimental	Proceeding
Easton and Easton (2014)		X	X			Design Science	Journal
Eschenfelder (2004)	X		X			Case study	Journal
Fisher and Sheth (2004)	X	X	X			Conceptual	Book Chapter
Fowell (2002)				X		Conceptual	Book Chapter
Fowler (2008)	X	X				Descriptive	Thesis
Fritz, Hinderink, and Altmann (2005)		X				Descriptive	Book Chapter
Galea (2007)	X	X				Case study	Journal
Gonzenbach, Russ, and vom Brocke (2014)		X		X		Conceptual	Book Chapter
Knut R Grahlmann et al. (2009)				X		Design Science	Journal
K. R. Grahlmann, Hilhorst, Van Amerongen, Helms, and Brinkkemper (2010)				X		Case study	Proceeding
Hashim, Noordin, and Saifuddin (2015)		X				Case study	Journal
Haug (2012)		X	X	X	X	Case study	Journal
Herbst, Simons, vom Brocke, and Derungs (2014)				X		Case study	Book Chapter
A. Herbst et al. (2014)	X	X	X	X	X	Case study	Proceeding
Iverson and Burkart (2007)	X			X		Conceptual	Journal
Joha and Janssen (2010)	X			X		Case study	Book Chapter
N. L. Junco and Bailie (2004)	X					Descriptive	Proceeding
N. Junco, Bailie, and Ledet (2005)		X				Descriptive	Proceeding
Katuu (2012)		X		X		Survey	Journal
Klegová and Rábová (2013)		X				Case study	Journal
Koidl, Conlan, and Wade (2009)		X		X		Survey	Proceeding
Korsvik (2010)	X			X		Case study	Thesis
Korsvik and Munkvold (2010)				X		Case study	Proceeding
Krechel, Hartbauer, and Maximini (2006)		X				Conceptual	Proceeding
Kumaran and Tao (2014)		X				Conceptual	Proceeding
Kunkelmann and Brunelli (2002)		X				Conceptual	Proceeding
Kunstová (2010)				X		Survey	Journal
Kwok and Chiu (2004)	X	X	X			Conceptual	Proceeding

	DIMENSIONS						
	Content	Technology	Process	Strategy	People	Method	Type
Laleci et al. (2010)		X				Design Science	Journal
Lie and Pardamean (2014)				X		Design Science	Journal
Llorente, Rodriguez, Delgado, and Torres-Padrosa (2013)		X				Design Science	Journal
Maican and Lixabdroiu (2014)		X		X		Case study	Journal
McKeever (2003)				X		Conceptual	Journal
McNally (2010)					X	Conceptual	Journal
McNay (2002)		X	X	X		Conceptual	Proceeding
Mega, Wagner, and Mitschang (2005)		X		X		Design Science	Proceeding
Mo, Xiao, and Su (2014)		X				Design Science	Journal
Moeller (2013)				X		Descriptive	Book Chapter
Mohd Salleh et al. (2011)		X				Design Science	Proceeding
Munkvold et al. (2006)		X		X	X	Case study	Journal
Naak, Hage, and Aimeur (2008)		X				Design Science	Proceeding
Naik and Shivalingaiah (2009)		X				Descriptive	Proceeding
Nath and Arora (2010)		X		X		Descriptive	Proceeding
Nilsen (2012)				X		Case study	Thesis
Nordheim and Päivärinta (2004)		X	X			Case study	Proceeding
Nordheim and Paivarinta (2006)			X	X		Case study	Journal
O'Callaghan and Smits (2005)	X		X	X		Design Science	Proceeding
Paivarinta and Munkvold (2005)	X	X	X	X	X	Case study	Proceeding
Peterman (2009)				X		Design Science	Thesis
Pfister and Schwabe (2014)	X	X			X	Design Science	Book Chapter
Pong, Whitfield, and Negreiros (2011)		X				Design Science	Book Chapter
Popov and Lalev (2012)		X				Descriptive	Proceeding
Provoost (2006)		X				Design Science	Thesis
J. Rats and G. Ernestsons (2013)		X		X		Design Science	Proceeding
Juris Rats and Gints Ernestsons (2013)		X				Design Science	Journal
Reimer (2002)		X		X		Descriptive	Journal
Ribeiro (2013)				X		Descriptive	Journal
Rockley, Kostur, and Manning (2003)	X	X	X	X	X	Descriptive	Book
Salamntu and Seymour (2014)				X		Conceptual	Proceeding
Scheepers (2006)			X	X		Case study	Journal
Schmiedel and vom Brocke (2014)				X		Case study	Book Chapter
Scott (2011)					X	Survey	Proceeding
Scott (2014)			X			Case study	Book Chapter
Simons, vom Brocke, Fleischer, and Becker (2014)			X			Design Science	Book Chapter
Simons, vom Brocke, Lässer, and Herbst (2014)	X			X	X	Case study	Book Chapter

	DIMENSIONS						
	Content	Technology	Process	Strategy	People	Method	Type
Smith and McKeen (2003)		X		X		Conceptual	Journal
J Souer (2012)		X				Design Science	Thesis
Jurriaan Souer et al. (2011)		X		X		Design Science	Journal
Sprehe (2005)				X		Case study	Journal
Suna (2002)	X			X		Survey	Thesis
Svärd (2014)				X		Case study	Thesis
Svärd (2013)				X		Case study	Journal
Thang Le, Rickenberg, Fill, and Breitner (2014)	X		X			Design Science	Proceeding
Totterdale (2008)		X				Case study	Journal
Trąbka (2014)		X				Descriptive	Journal
Tyagi, S. D. Sawarkar, and Lokhande (2012)		X		X		Design Science	Journal
Tyrväinen et al. (2006)	X	X	X	X	X	Conceptual	Journal
Vitari, Ravarini, and Rodhain (2007)		X		X		Conceptual	Journal
Jan Vom Brocke et al. (2011)	X		X	X		Case study	Proceeding
Jan Vom Brocke, Jörg, Alexander, and Stefan (2008)	X	X	X			Design Science	Proceeding
Jan Vom Brocke, Seidel, and Simons (2010)				X	X	Conceptual	Proceeding
Jan Vom Brocke and Simons (2008)	X	X	X			Design Science	Proceeding
Jan Vom Brocke, Alexander Simons, et al. (2010)		X	X			Design Science	Journal
Jan Vom Brocke, Simons, and Cleven (2008)	X		X			Design Science	Proceeding
Jan Vom Brocke, Simons, and Schenk (2008)			X			Design Science	Proceeding
J Vom Brocke, Simons, Sonnenberg, Agostini, and Zardini (2010)		X	X			Design Science	Book Chapter
Wagner (2014)				X		Case study	Thesis
Weeks (2013)				X		Case study	Proceeding
Wiltzius, Simons, Seidel, and vom Brocke (2014)	X	X	X	X	X	Case study	Book Chapter
Wolski, Simons, and Richardson (2013)		X		X		Descriptive	Journal
Wu and Yan (2008)		X		X		Conceptual	Book Chapter
Xie, Li, and Xia (2010)		X			X	Design Science	Proceeding
Yan, Lin, Zhang, and Yang (2014)		X				Conceptual	Proceeding
Yi and Xu (2013)				X		Case study	Journal
Zardini, Mola, Vom Brocke, and Rossignoli (2010)		X		X		Case study	Journal
Zykov (2006)		X				Design Science	Proceeding
Zykov (2009)		X				Design Science	Proceeding

APPENDIX II

Table 2: List of publications by country

Country	Total Publications
USA	13
Netherlands	7
Liechtenstein	7
Norway	5
China	3
Malaysia	3
South Africa	3
Russia	2
Sweden	2
Czech Republic	2
German	2
Ireland	2
Italy	2
Australia	2
Nigeria	2
Macao	1
Indonesia	1
Spain	1
Denmark	1
Austria	1
Brazil	1
Unspecified	72

APPENDIX III

Table 3: List of Journals

Journal name	Total Publications
European Journal of Information Systems	3
Records Management Journal	2
Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis	1
Advances in Intelligent Systems and Computing	1
Australasian Journal of Information Systems	1
Bulletin of the Transilvania University of Brasov. Series V: Economic Sciences	1
Communications of the Association for Information Systems	1
Computer Technology and Application	1
Datenbank-Spektrum	1
Decision Support Systems	1
Ephemera: Theory & Politics in Organization	1
Expert Systems with Applications	1
FUJITSU Science Technology Journal	1
Government Information Quarterly	1
IEEE MultiMedia	1
Industrial Management & Data Systems	1
Information Systems	1
Information Systems and e-Business Management	1
International Journal of Computer Applications	1
International Journal of E-Entrepreneurship and Innovation (IJEEI)	1
International Journal of Information Management	1
International Journal of Innovation, Management and Technology	1
International Journal of Management & Information Systems (Online)	1
International Journal of Systems and Service-Oriented Engineering	1
International Journal of Web Information Systems	1
Issues in Information Systems	1
Journal of Computer Science	1

Journal of Decision Systems	1
Journal of Digital Asset Management	1
Journal of Enterprise Information Management	1
Knowledge-based systems	1
Library & information science research	1
Nonprofit Management and Leadership	1
Organizacija	1
Scandinavian Journal of Information Systems	1
Studia Ekonomiczne	1
Technical Communication Quarterly	1
Technical Report 2009-021	1
The Communications of the Association for Information Systems	1
The Electronic Journal Information Systems Evaluation	1
The Journal of High Technology Management Research	1
THETA: The Higher Education Technology Agenda	1

APPENDIX IV

Table 4: List of Conferences

Conference Name	Total Publications
2004 Proceedings of the 37th Annual Hawaii International Conference on System Sciences	2
2005 Proceedings of the 38th Annual Hawaii International Conference on System Sciences	2
2012 Pacific Asia Conference on Information Systems	2
2001 BLED	1
2002 28th Euromicro Conference	1
2002 IEEE International Proceedings Professional communication conference	1
2002 Proceedings of the Water Environment Federation	1
2004 International Professional Communication Conference	1
2005 European Conference on Information Systems	1
2005 IEEE International Professional Communication Conference Proceedings	1
Databank system in business, technologies and web	1
2006 Proceedings of the 8th International Workshop on Computer Science and Information Technologies	1
2007 IEEE International Conference on e-Business Engineering	1
2007 Proceedings of the IEEE GCC Conference and Exhibition	1
2008 21st IEEE International Symposium on Computer-Based Medical Systems	1
2008 Australasian Conference on Information Systems	1
2008 BLED	1
2008 European Conference on Information Systems	1
2008 Fifth IEEE Conference on Enterprise Computing, E-Commerce and E-Services	1
2008 IEEE Congress on Services Part II	1
2008 IEEE International Conference on Service Operations & Logistics & Informatics	1
2009 7th International CALIBER	1
2009 International Workshop on Dynamic and Adaptive Hypertext: Generic Frameworks, Approaches and Techniques	1
2009 Proceedings of 13th World Multi-Conference on Systemics, Cybernetics and Informatics	1
2010 18th European Conference on Information Systems	1
2010 21st Australasian Conference on Information Systems	1
2010 43rd Hawaii International Conference on System Sciences	1
2010 6th International Conference on Advanced Information Management and Service (IMS)	1
2010 Americas Conference on Information Systems	1
2010 IEEE International Conference on Software Engineering and Service Sciences (ICSESS)	1
2010 International Conference on Availability, Reliability, and Security	1

2010 Norsk konferanse for organisasjoners bruk av informasjonsteknologi (NOKOBIT)	1
2010 Proceedings of the IADIS International Conference Information Systems	1
2011 44th Hawaii International Conference on System Sciences (HICSS)	1
2011 European Conference on Information Systems	1
2011 IEEE Conference on Open Systems (ICOS)	1
2011 Proceedings of the Southern Association for Information Systems	1
2012 23rd Australasian Conference on Information Systems	1
2012 Conference on Language Resources (LREC)	1
2012 International Conference on Application of Information and Communication Technology and Statistics and Economy and Education	1
2012 International Conference on Computer & Information Science (ICCIS)	1
2012 International Conference on Interactive Mobile and Computer Aided Learning (IMCL)	1
2013 3rd International Symposium ISKO-Maghreb	1
2013 IEEE 22nd International Workshop on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE)	1
2013 International Conference on Electronics, Computer and Computation (ICECCO)	1
2013 International Conference on Research and Innovation in Information Systems (ICRIIS)	1
2013 Proceedings of Technology Management in the IT-Driven Services (PICMET)	1
2013 Second International Conference on Informatics and Applications (ICIA)	1
2014 22nd European Conference on Information Systems	1
2014 47th Hawaii International Conference on System Sciences (HICSS)	1
2014 EPJ Web of Conferences	1
2014 International Conference on Computer and Information Sciences (ICCOINS)	1
2014 International Conference on Information Science, Electronics and Electrical Engineering	1
2014 International Conference on Information Technology and Multimedia (ICIMU)	1
2014 Proceedings of Student-Faculty Research Day	1
2014 Third International Conference on Informatics Engineering and Information Science	1