Knowledge Management Process Status via the Use of Current Technology

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Abstract: Technologies are now used to support knowledge management (KM) process in many ways. Considering technologies used can help identify the current KM activities performed. KM is important for the organization to perform effectively and efficiency. Efficiently and completely to perform KM activities can be increased by acquiring Information Systems (IS) and Information Technologies (IT). This paper aims to examine the nature of KM process currently performed in Thailand by considering IS and applications used. The enhancement of IS and IT that can help increasing the efficiency of KM process should be identified. Structured questions were developed based on the activities performed in each KM process. Triangular investigation was used to analyze the answer. All organizations perform every KM process. Activities considered to be part of KM process are limited to the management identification, so they are not variety. The problems and concerns were used to identified how to improve KM technologies. Effective and easy-to-use functions based on employee requirements of knowledge management systems (KMS) are required. Information Systems should be seriously developed to align with the business procedures for collecting quality data and be knowledge representation itself. Management and working environment should arrange to support KM process.

1 INTRODUCTION

Knowledge management (KM) still plays an important role even though not many people mentioned much about it nowadays. Knowledge appears in every process in many types and forms. Knowledge can be identified as explicit knowledge if it can be represented and shared to other, which may be in form of books, pictures, or programs and vice versa. Knowledge, which cannot be represented and shared, is identified as tacit knowledge (Hansen et al., 1999; Singh, 2013). It was kept inside people and was called experience. Knowledge appears in every working process. It must be worth to try keeping knowledge as much as we can by starting at identifying the knowledge used and needed to perform the activities or to solve problems faced. After that some of identified knowledge can be represented and kept. The ones which cannot be represented or kept must be transferred to other people via several practicing methods, such as hands-on or mentoring, so that knowledge should not be lost (Bencsik, 2014; Haas et al., 2015; Handzic, 2004).

As many organizations have invested a large portion in both Information Technology (IT) or Information Systems (IS). Many IT are now brought to use in specific working activities separately. There are some attempts to integrate these IT, especially data resided in them, to increase organization's efficiency. Components of IS are hardware, software, networks and telecommunications, databases and data warehouse, and human resources and procedures. IS gather procedures, which can be considered as a piece of business knowledge, and data for business processes. Knowledge can be found in IT and IS. At the same time, IT and IS can supports performing KM activities. KM can be driven by technologies, if there are technologies that are suitable and fit with the activities and objectives of each process. Many technologies have been used in

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organizations and they are considered to support the KM activities, or some of them are used to keep knowledge of the organizations based on the KM definition (Aljuwaiber, 2016; Doane, 2010; Handzic, 2004; Mohannak, 2014; Saqib et al., 2017; Singh, 2013; Sultan, 2013). It should be interesting to consider the status of KM via the technologies used. Also, it should be interesting to develop and to enhance the technologies and functions to promote the benefits of KM, which should help collecting knowledge from experts and prevent knowledge loss. This research focuses on identifying technologies which support KM activities and suggesting to enhance current technologies and to design new technologies or functions to increase the impact of KM on the organization's performance. Specifically on the programs, applications, or tools used in working daily operations, these can embedded some knowledge or be identified as knowledge, which can used to identify the knowledge management status also. So Information Systems that support any business processes can be considered as Knowledge Management.

2 FUNDAMENTALS

2.1 Knowledge Management Process

Several researchers identified KM process models (Becerra-Fernandez & Sabherwal, 2015; Botha et al., 2008; Dalkir, 2011). These models were stated the relationship among learning activities, learning behavior, and learning environment (Raziq et al., 2020). All models explained KM processes differently based on the focus of the researches. In this research, the KM model used is from (Becerra-Fernandez & Sabherwal, 2015). This model identified the activities in each main process closed to the real activities happened in working environment. Moreover, this model matches with the concept of system analysis and design when designing and selecting IS and IT that fit to support KM processes. With the concept of green ICT that tries to reuse or to modify the currently used programs or applications, this idea is easy to support the objective of this research because IS and IT that can be reused and modified must support the related activities and processes effectively.

2.2 Knowledge Management Systems (KMS)

According to the KM process as (Becerra-Fernandez & Sabherwal, 2015) defined, there are four main processes in the model. Each main process in the model identified subprocesses containing activities or methods used to deal with knowledge.

Knowledge discovery process identifies knowledge both tacit knowledge and explicit knowledge. The important support activities are socialization and combination. For socialization, people gathered, discussed, and exchanged data, information, and knowledge, so that identified knowledge can be caught or notified, while the knowledge which are results from socialization activities can be generated during the activities (Hansen et al., 1999). Moreover, data can be structured data or unstructured data. Information and knowledge can be presented in several formats and types. KMS should have functions and features that support socialization activities, so KMS should provide, for example, knowledge bases which include knowledge search, KM, and knowledge index, video conference, message exchange which may include mail, and chat, knowledge sharing, image processing, data management, etc. For combination, mainly people bring a lot of knowledge for analyzing data and applying knowledge to get some implications. Sometimes, with the analysis results, knowledge from many disciplines are needed. The synthesis results can be formed another new knowledge. Also, to solve or respond to a new business environment, real problems are broken into smaller pieces. Each piece requires data, models, and knowledge that are both tacit and explicit knowledge. After finding solutions of these smaller pieces of problems, then these solutions would be shared to combine with others to get the real business solution the organization have faced. KMS functions that should have to support these activities are message exchanging, file sharing, knowledge sharing, knowledge expertise searching, data management, knowledge base and management (Archer-Brown & Kietzmann, 2018; Botha et al., 2008; Rendon & Krajangwong, 2017).

Knowledge capture process keeps or represents knowledge to be recalled and used in the future. Knowledge can be captured inside people or outside people. There are two main activities for knowledge capture process, internalization and externalization. To gain knowledge that captured outside people, or explicit knowledge, people can learn knowledge by attending courses, reading books, watch videos or having experts to mentor. The process is called

internalizations, which transfer the explicit knowledge to be tacit knowledge resided within people. Sometimes tacit knowledge can be transferred to others via discussions or demonstrations (Hansen et al., 1999). For knowledge that captured outside people, people firstly think of books, or documentaries which contain a lot of explicit knowledge. However, sometimes knowledge can be kept in form of pictures, things, songs, programs, applications, or even IS specially developed. The KMS' functions that can be used to support capturing knowledge outside people are knowledge catalog and index, document management systems, database systems, library search, image processing and searching. Along with these functions, people must have communication skills, logical skills, presentation skills. The KMS functions required to support the internalization process are e-learning platform, video conference, expert searching, message exchanging, knowledge sharing, content management, document management systems, or knowledge searching (Malison & Thammakoranonta, 2018; Rendon & Krajangwong, 2017; Thammakoranonta & Keandoungchun, 2017).

Knowledge sharing process brings tacit and explicit knowledge to use and transfer to other people. Based on types of knowledge, mostly tacit knowledge can be transferred using socialization activities. For explicit knowledge, people can search, read, watch, learn, and act following instruction depending on the forms captured. KMS functions that should support these activities are document management systems, search engines, content management systems, knowledge sharing, message exchanging, video conference, index, e-learning systems, content or knowledge categories, decision support systems, expert systems, expert searching, or catalog or content management (Malison & Thammakoranonta, 2018; Rendon & Krajangwong, 2017; Thammakoranonta & Keandoungchun, 2017).

Knowledge application process focuses on bringing knowledge to really use for supporting decision making or performing tasks to complete the mission received. Knowledge can be used in 2 ways, by giving directions as a guideline and by making routine processes. The KMS functions which can support the direction activities are knowledge searching, expert searching, project management systems, message exchanging, video conference, document management systems (Botha et al., 2008; Rendon & Krajangwong, 2017).

Moreover, if the activities generated from the knowledge are settled and can be performed regularly and usually, this means that the knowledge are applied via rules or working processes. With this kind of knowledge applications' activities and environment, KMS functions that can support are document management systems, expert systems, decision support systems, transaction processing systems, tracking systems, message exchanging (Dalkir, 2011; Kokina & Davenport, 2017; Roy & Mitra, 2018).

Every organization use a lot of programs, functions of applications, and technologies. According to all functions and technologies considered as parts of KMS, the currently used technologies in each organization can help identifying the status of KM process. The acquisitions of these technologies and the problems found can help suggesting the way to develop the KMSs and to enhance the ability of the KMSs.

3 RESEARCH METHODOLOGIES

This research used the structured interview approach to collect the data regarding KMSs usage and current problems occurred from the KM experts in organizations. Homogeneous purposive sampling technique were used to select organizations (Etikan et al., 2016). Therefore, this research selected organizations, which perform KM activities and use KM tools or systems for five years or more. Organizations were selected from various industries, which are banking, telecommunication, petroleum and energy, and Internet, software and IT services.

The interview questions were developed primarily based on KM processes by (Becerra-Fernandez & Sabherwal, 2015). The set of questions was revised several times before actual interview by IS professors and practitioners to make sure about the validity, concise and precise of the interview questions. All interview questions were also piloted with three IS practitioners to refine the interview questions. Also, before the real interview, rehearsal sessions with three IS practitioners were performed before the actual interview.

4 RESEARCH FINDINGS: CURRENT STATUS OF KNOWLEDGE MANAGEMENT PROCESS

Six organizations were contacted and asked for interviewing about the current technologies used in their knowledge processes along with related problems when using these technologies. These organizations have facilitated and promoted KM for a while using programs and applications which are in-house developed, commercial licensing, and freeware. From six organizations, KM experts, who have been working in KM area for more than five years, were interviewed. Those experts have strong background knowledge about KM and have experiences with KM tools and systems.

The answers were collected and used the content analysis with investigator triangulation method to analyze the answers (Archibald, 2016; Carter et al., 2014). Two of the researchers had working experiences in the field of KM and System Analysis, while another researcher earned a degree in IS Management. The copied documents collected from interviewed organizations were sent to each investigator, along with the audio files recording during each interview. Each investigator separately analyzed the answers and sent back their findings. Most findings found were consistent. The differences were asked for more discussion to find the conclusion. Moreover, because most organizations used software packages, software manuals were studied further to understand functionalities of the software to identify existing KMSs' functionalities that organizations have utilized and able to map those functions with functions defined to support each KM process.

For knowledge discovery process, all organizations have just collected the knowledge when needed. They were not mentioned about how large the collected knowledge covered the knowledge used to perform works and new knowledge created. Sometimes tacit knowledge has been generated during performing combination activities for solving the existing problems or making decisions. Searching for some knowledge to support the new ideas is very important. However, the technologies used must provide enough space, good search engine, good index, concurrently showing many sets of knowledge at the same time, and highlight and note-taking feature. The technologies currently used are not supported these requirements suitably. All organizations cannot support varieties of format representing knowledge. There is no standard file management, no tools for highlighting knowledge. Also, the collected knowledge is not completed, yet duplicated, and not up-to-date. Image search is needed to be developed. The file management must be reconsidered by setting standard for file names, including authority to access the knowledge collected. Another main activity is exchanging ideas and knowledges or brain-storming. Organizations can perform this activity by chatting. Few organizations did not have formal technology to support this activity, but most organizations have formal technologies to support the decision. Based on chat technologies used currently in organizations, flows of messages discussed are sequential; it is hard to follow when there are a lot of messages. Misleading content and misunderstanding content always happened. The most important things are unwilling to express opinions and the quality of communication. No effective tool for collecting the ideas or concepts discussed in chat, so the conclusion or report is not formally stated.

For knowledge capture process, the current externalization activities have focused mainly on collecting and managing the documents created during working processes. Some organizations collect and manage the video during the training sessions for their employees to access in the future. Discussing about their job assignments can be used to capture sets of explicit knowledge, especially when performing in formal meetings. However, there are no evidence or proof about the coverage of knowledge topic they collected and the goodness of KM. All organizations consider training which is a part of human resource development activities as internalization subprocess. Employees who attended these training courses cannot identified or measured how much they can learn or absorbed knowledge. These training courses are identified in human resource development plan mainly based on policies and directions from management or supervisors, same as training budget. The limitation to create the internal knowledge also depends on working positions or assignments. Only some parts of business processes and employees can be considered as knowledge and knowledge persons. The other employees who are not allowed to join the training courses are not considered to be knowledge employees.

For knowledge sharing process, organizations mainly share best practices which represented knowledge outside people in forms of documentations and videos. Sets of explicit knowledge have been passed to other via

technologies mainly for collecting and preparing to access. Employees who want to learn must search and screen knowledge by themselves until they find the one they want. Due to only best practices have been collected and shared, a lot of knowledge may be lost or forgotten. Failures along the trial-and-error periods have not been considered to be organization knowledge. Knowledge can be shared via socialization activities, so employees have shared and exchanged both tacit and explicit knowledge using communication technologies, such as line and in-house developed applications. Organizations have shared knowledge via formally channels, such as in meetings and emails, and informally channels, such as casual group talks during lunch or coffee breaks and private discussions with friends. However, no organization have mentioned about how they have kept these conversations and their discussed results as knowledge for learning in the future. Only the results in the meeting rooms have been reported and kept as the references. The discussion ideas for making the decision during the meeting have not been noted.

For knowledge application process, organizations still have focused on collecting knowledge needed for doing jobs. Knowledges may be found in formal work forms, articles or documents describing working procedures and models. No comments stated about how to direct employees to get jobs done. They have let employees search and learnt by themselves, so the technologies supporting mainly have emphasized on searching and managing documents. Organizations have focused on collecting regular reports produced during performing their business transactions. Process for generating required reports can be shown that employees performing activities needed to follow steps and procedures previously designed. The reports collected may not be completed due to only the formal reports are counted. Other supported activities which might not be reported or shared with others in the organization are not kept.

Considering with the operationalization of the maturity of transdisciplinary KM (Serna, 2015), the responses from KM experts about activities, technologies used, and problems can identify that characteristics of resource management aspect is in action level. Employees have kept their own data, information, and knowledge with themselves in the format which they preferred, especially explicit knowledge. Only some pieces of knowledge, procedures, data are identified interesting, useful, and important by management or other employees to finish their jobs assigned. The data, information, and knowledge are then not complete, inconsistent, and not in the same format, leading to be hard to search and to use. Within a department, tacit knowledge, which is related to responsible tasks, can be shared or discussed via socialization activities. Characteristics of analytical administration aspect is predisposed due to the standard name or definition of knowledge are not consistent. The explicit knowledge kept are incomplete and in different formats. Tacit knowledge kept in each employee can be used and applied differently even performing same tasks. Only some organizations mentioned about process of generating routine reports for high-level management, but do not paid attention in every process. Considering in significant administration aspect, most employees have used and interpreted their own data, information, and knowledge kept mainly. Sometimes there have been some discussions or meetings formally and informally about tasks or jobs, that integrated several pieces of knowledge together. Knowledge discussed formally have not been noted or records every time. The knowledge kept are not integrated. Knowledge are shared within the same department. These characteristics lead to predisposed level. For active management aspect, the responses from KM experts lead to the action level. Actions are based on agree interpretations among related employees via meetings and discussions. The results and problems are sometimes shared to other people in the same department for improving their operations. This finding gets along with the previous results presented in (Thammakoranonta, 2018).

5 ENHANCING KNOWLEDGE MANAGEMENT PROCESS AND TECHNOLOGIES

The processes or functions composed in these currently used software and applications, especially for the in-house developed, should not support all activities in KM process. For freeware and purchased ones, the processes and functions contained may not be suitable with the organizations' behaviors and environment. Based on the comments received from KM experts, KM functions that need to enhance are functions that can support recording, uploading, modifying, and searching knowledge, and programs or applications that support collaboration among employees. To increase the efficiency of KM process, which might affect the organization's performance (Archer-Brown & Kietzmann, 2018; Kumar et al., 2017; Massingham & Al Holaibi, 2017; Rumanti et al., 2016; Storm & Stone, 2015), real KMS which

consist of functions that manage the users by setting rights to access and sharing data and knowledge, the collaborative systems, document management systems, artificial intelligence, machine learning, text and image processing, and voice analytics are required to implement and develop (Ittoo et al., 2016; Kokina & Davenport, 2017; Mäntymäki & Riemer, 2016; Markham et al., 2015; Milton & Lambe, 2016; Scheidt & Chung, 2019; Thammakoranonta & Keandoungchun, 2017).

There are some needs to improve the capability of hardware, and computer networks. KMS should be accessed from several platforms (Chen & Huang, 2010). Data management need to be reconsidered. The rights to access data and knowledge must be designed to support self-improvement and security based on regulations and standards (Malison & Thammakoranonta, 2018). Programs and IS can contain knowledge regarding to working procedures, working models, business rules, and business conditions, programs (Duarte Alonso, 2017; Ganguly et al., 2020; Massingham & Al Holaibi, 2017; Milton & Lambe, 2016; Rumanti et al., 2016). IS can be called KMS also. The most important issue is the development of IS that use to support business processes for collecting data and knowledge appearing at every activity. The data collected from these IS can be used to analyze in different ways in terms of data sciences, business intelligence, and knowledge discovery in databases. Results from these activities can be considered as parts of knowledge (Jnr & Majid, 2016; Khan & Vorley, 2017; Kneuper, 2017; Pauleen & Wang, 2017; Reijers et al., 2016; Shpakova et al., 2017; Yang et al., 2018). IS should have functions, features, and processes that support working activities or procedures and should be easy to use for users (Davis, 1993; DeLone & McLean, 2003; Foss et al., 2015; Lin & Lo, 2015). The more users use IS, the more data and knowledge are collected. In addition, organizations need to educate employees to understand more about knowledge and provide learning environment and policies to promote the participation in all KM activities (Casimir et al., 2012; Duarte Alonso, 2017; Malison & Thammakoranonta, 2018; Oluikpe, 2012; Rumanti et al., 2016). The KM strategies or policies which align with business strategies can enhance the KM process and increase organization performance (Özlen & Handzic, 2020).

6 CONCLUSIONS

KM process are aligned tightly within human resource management processes and activities, especially human resource development process. When performing the effective human resource activities, organizations can be considered performing KM process automatically due to the main sources of knowledge are humans. Considering ISO 9000 series or CMMI, the objectives are to collect knowledge about business procedures and data management. Performing based on these standards, processes, or regulations can lead to performing KM at the same time. This implies that all organizations have performed KM process for a long time even they have not performed completely; however, they have not concerned or noticed significantly. This might be because of the working environment, the support of management, and personality or attitude of employees.

According to the technologies used to support knowledge activities found currently, they showed that the KM process has not performed completely. There are some activities that needed more technologies for increasing efficiency to manage knowledge. Some technologies require more functions and information technologies to support performing correctly and completely. Even current hardware, software, and databases need to increase capability and capacity, or to upgrade. IS that support business processes are needed to focus seriously when acquired for making sure that data collected are qualified. IS can represent knowledge, procedure, and business rules. Good IS can support gaining more knowledge in the future. Along with technologies, the learning environment, and management support are required. There are researches studied about knowledge sharing within the working groups which are examples of integrating IT to obtain better outputs (Deng & Chi, 2015; Ibrahim & Huimin, 2017; Ozer & Vogel, 2015). It will be valuable to further study and observe the performance of the business when implementing IT and IS as a part of KMS.

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