PROPOSING A KNOWLEDGE MANAGEMENT SYSTEM (KMS) ARCHITECTURE TO PROMOTE KNOWLEDGE SHARING AMONG EMPLOYEES

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Complete Research

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Abstract

Knowledge is a strategic resource for knowledge intensive organizations like commercial banks. However, the use of knowledge as resource depends on an organization's ability to select, capture, store, disseminate and apply its knowledge resources. This organizational capability is created if the organization undertakes explicit initiatives to establish and sustain a KMS as one of its core business functions. An empirical investigation of the Commercial Bank of Ethiopia (CBE) shows that there is no explicit initiative or responsible unit to manage its knowledge resources. This study uses a design science research method to investigate the problems KM in CBE and propose KMS architecture which is believed, when implemented, to solve current problems. The main theoretical contribution of the study is that it demonstrates how to design a KMS architecture using system analysis and ontology methods. The paper has also implication for practice as it suggests solutions for observed problems and ways to increase CBE's capability to use its knowledge resources.

Keywords: Knowledge management system, Knowledge sharing, Banking, Organization performance.

1 Introduction

As the world economies became more globalized and the use of IT in organizations became ubiquitous the value of knowledge as a strategic resource became more apparent (Gupta et al, 2008). This requires an explicit initiative to capture, store, and share and apply existing knowledge resources to promote learning and innovation. All these activities are conceptualized as knowledge management system (KMS) (Gupta et al, 2008; Ali and Ahmad, 2006). KMS improves the overall organizational performance by reducing mistakes, avoiding reinvention, promoting learning and innovation. Organizations which explicitly incorporate KMS in their structure demonstrate increased capability to manage and use knowledge as a vital resource to achieve their business objectives (Yan, 2010).

Banking is a complex business with a wide range of services to different group of customers (Al-Ain and Al-Ain, 2009). Almost all bank activities are highly dependent on the effective use of information and knowledge resources. Commercial Bank of Ethiopia (CBE) has developed strong practices to promote knowledge sharing among its employees through mentoring, on-job training and codification. However these methods are not adequate to effectively manage and derive value from existing knowledge resources. The CBE's knowledge is scattered in different sources which is difficult to

locate and integrate. It also hampers the smooth flow of knowledge among its employees. CBE has a good ICT infrastructure which is installed to improve the transaction data processing activities. The infrastructure could be used to enhance CBE's knowledge management activities. However, this is not practiced due to lack of awareness and skills to integrate existing ICT infrastructure for knowledge management. Solutions invented in one organization are not directly replicable to other organization due to the different organizational knowledge management practices. KMS only becomes effective if it is designed to fit with existing organizational practices (McDermott and O'Dell, 2001). This research will answer the following specific research questions.

- *What are the main knowledge management problems in CBE?*
- *What knowledge management architecture can address existing knowledge management problems?*
- *What technologies do we need to implement proposed KMS architecture?*

The main objective of this paper is to develop a KMS architecture that can solve existing knowledge management problems in CBE. Although implementing effective KMS is a complex process, this study contributes how to solve KM problems from technological point of view.

2 Literature Review

2.1 Knowledge management

Knowledge has become one of the strategic resources for present day organizations due to turbulent and fast changing business environment (Grant, 1996, Gold et al., 2001). Knowledge is an organization resource that is used to recognize the value of new information, assimilate it, and apply it to create new knowledge and capabilities (Gold et al., 2001). Knowledge becomes an organization resource when it is systematically managed to be used in the business process. This requires a system that facilitates easy access and integration to existing knowledge resources (Alavi & Leidner, 2001; Grant, 1996) and a social capital among employees that supports openness and collaboration in joint problem solving (Gold et al., 2001). In knowledge based organization, individual expertise is sufficient to be effective in the task. One has to have the skill to collaborate with other colleagues.

Knowledge management is a multidisciplinary concept which is used in different disciplines with different definitions (Gupta et al., 2008). We define KM as a process that deals with knowledge creation, storage, dissemination and application to improve the overall organizational performance (see Alavi and Leidner, 2001; Gupta et al 2008; Hsia et al. 2006). Nonaka (1994) also developed SECI KM process model based knowledge conversion from tacit to explicit and back to tacit knowledge. Both process models have common implication and shows how knowledge is created, shared and applied in the organization. Whether an organization has an explicit KM strategy or not, its employees practice all KM activities. However, the presence of an explicit KM strategy will enhance organizational capability to use knowledge as a resource (Halawi, Aronson and McCarthy, 2005).
KM processes are viewed as cyclic process rather than as a linear process (Hsia et al., 2006). As existing knowledge is applied, it also leads to new knowledge creation. Knowledge creation refers to creating new knowledge that does not exist before (Alavi and Leidner, 2001). New knowledge is created when knowledge in different sources are integrated (Grant, 1996). When individuals interact for knowledge sharing, knowledge is amplified and new knowledge is also created (Nonaka, 1994). Knowledge storage refers to capturing, validating, structuring and retention of organizational knowledge (Alavi and Leidner 2001). Knowledge sharing is the process of presenting knowledge understandable by knowledge seekers (Hendriks, 1999). It requires a two way interaction among the knowledge owners and knowledge seekers (Nonaka, 1994). The presence of communication channel creates flexibility to transfer knowledge from its source to the target users (Al-Ma'aitah, 2008). Knowledge application is a process of knowledge retrieval and application in problem solving

activities (Hsia et al., 2006). Knowledge can be applied in three ways as directives, organizational routines and self-contained task teams (see Grant, 1996). For example when existing knowledge is structured and stored as procedure manual (or organization routine), it facilitates learning and execution of tasks by non-experts.

2.2 Knowledge management systems

Knowledge management systems (KMS) are a collection of information systems that are integrated to enhance organizational knowledge management activities (Alavi and Leidner, 2001; Hsia et al., 2006). The technologies that support different functions of KM and to build a KMS are readily available on the shelf (see Van Beveren, 2002; Gupta et al., 2008). Some of the common tools that are used to implement KMS are data mining and knowledge discovery for knowledge creation, databases and data warehouse for knowledge storage, communication tools like groupware and Intranet for knowledge sharing and knowledge retrieval tools for knowledge application (see Ontrup and Ritter, 2008; Gupta et al., 2008; McDermott and O'Dell, 2001).

2.3 KMS architecture

Different organizations implemented different KMS to improve their organizational knowledge management practices (see Ali & Ahmed, 2006; Sureephong et al., 2007; Gorton et al., 2010). However, there is no one best practice design approach for KMS implementation in all organizations that can be adopted for CBE (see Jennex, 2008; Vat, 2008; Ali and Ahmed, 2006; Alavi and Leidner 2001). Ali & Ahmed (2006) undertook a study on KM practices in commercial banks. They proposed a Banking Knowledge Management Model (BKMM) that serves as guide to develop KMS for commercial banks. They identified environment, people and technology as critical factor for success KMS implementation in commercial banks. The environment factor describes how knowledge is used to organizational competitive advantage. The people factor describes variables that create a positive attitude to engage in voluntary knowledge sharing activities. Technology factor describes the necessary KMS tools that facilitate personal interaction among people as well as knowledge storage for later retrieval. Alavi and Leidner (2001) proposed KMS architecture based a knowledge process theory that supports knowledge creation, knowledge storage, knowledge transfer, and knowledge application. Jennex (2008) indicated different KM models and architecture by reviewing different literature. In her review, Borghoff and Pareschi (1998) proposed KMS architecture with four components -repositories and libraries, knowledge-worker communities, knowledge cartography or mapping, and knowledge flows. Binney (2001) identified KMS architecture based on user perspectives and include transactional KM, analytical KM, asset management KM, process based KM, developmental KM, and innovation and creation KM. Vat (2008) proposed a KMS model that has three components, namely the individual learning component that promotes self learning by creating a learning environment, organization learning component that facilitates conversion of individual knowledge into organization knowledge such as centralized knowledge repository and the Intellectual Property Management (IPM) component such incentives and organization culture that creates positive attitude to share knowledge. He proposed three layer KMS architecture which include the presentation layer, process layer and knowledge storage layer. The presentation layer is designed with SECI model (Nonaka, 1994) and the process layer contains the necessary KM process that access the knowledge storage and present formatted output on presentation layer to satisfy potential end users.

In all the literature reviewed, KMS implementation is not only a technical solution but also requires enabling business context. Although both technical and social factors are equally important to increase organizational capability to effectively use knowledge resources, this research tries to address existing KM problems in CBE by creating KMS architecture that supports the basic KM activities (create, store, share and apply) with the purpose of increasing organizational performance.

3 Research Method

There are different procedures to develop a knowledge management system (Kim, Suh & Hwang, 2003) but there is no explicit method published to develop KMS architecture. We synthesizes our own methods from previous works of other researchers (Rhem, 2006; Kim, Suh & Hwang, 2003; Al-Hawamdeh, 2002). We use the following procedures in our research (1) understanding of existing business context, (2) identifying business process to be supported through KMS (3) developing KMS goals, (4) identification of knowledge management tools, and (5) classification of KMS tools to different KM activities to build the KMS architecture.

In the first stage, the researcher collected data relevant to understand the Bank's business environment and credit management business process. This stage provides a rich description of the business environment that helps to develop an artifact which has high utility to solve the problem. The researcher identified social and technological challenges that hinder KM activities to create a knowledge sharing culture in CBE. In the third stage, the researcher developed goals of the new KMS architecture as a solution to the problems identified in stage two. The goals are crafted to address the current KM problems and user requirements. In the fourth stage, KMS architecture was proposed as an artifact to solve the identified problems in stage two. Relevant KMS tools for credit management were also identified based the KMS goals and reviewing previous literature on KMS implementation for commercial banks. The identified KMS tools were configured with three-tier system architecture theory (Eftekhari et al., 2011). This architecture is built using components that provide different services. Its main goal is portability, reusability and modifiability (Eftekhari et al., 2011). This architecture fits well to KMS design. Most KMS are built by integrating already existed KMS tools that are created to solve different information management problems (Gupta et al., 2008; Alavi & Leidner, 2001). System flow chart was also used to present the different views of the proposed KMS architecture.

4 Developing KMS Architecture

4.1 Understanding business context

With the world's globalized economy and volatile financial market, credit risk management has become the main focus in banking business (Bekhet and Eletter, 2012). Credit service is a highly risky business of banking as it is forecasted for the future. Its success highly depends on access to reliable information and knowledge. It requires integration and processing of different information type that represents customer characteristics, market performance, financial performance, product type and expected risks. Manual credit analysis is cumbersome and limits credit analysis creativity to interpret the different views of information. Credit analysis also uses different models to analyze the data and selection of an appropriate model that is applicable to a specific context is also another challenge. Integration of KMS in credit analysis task will improve employees and organizational performance.

4.2 Credit business process

CBE provides different types of credit products which include overdraft, merchandize loan facility, pre-shipment export credit facility, revolving export credit facility, special truck loan financing, short term loan, medium and long term loans, agricultural input loan, agricultural investment loan, coffee farming term loan and micro–finance institution's loan. CBE has established eleven credit processing centers in different districts so as to provide the service as close as possible to customer sites. Credit management in CBE is conceptualized as a process of six main activities: on the job learning,

customer support, new product development, credit appraisal, credit approval and credit disbursement and collection.

On the job learning. Every employee working in the credit management is expected to internalize CBE's knowledge. Employees are not allowed to work outside CBE's procedure. On the job learning is done formally by through development of standard procedure manual, on the job training and mentoring. Employees are also expected to learn informally by interacting with their seniors and colleagues. This business function is supported by knowledge sharing function of KM activities.

Customer support. Customers do not know CBE's credit policy. CBE has Credit Advisors whose main role is to advise existing and potential customers on credit needs, types of credit products, eligibility criteria, business management and proper book recording (CBE, 2007). The Credit advisors also guide customers to prepare project proposals that meet CBE's requirements. Customer brings new requests that motivate CBE to introduce new products and services. This business function is supported by knowledge application and knowledge creation function.

New product development. When the credit advisor encounters new request which is not in the credit product list, he/she forwards the request to the Portfolio Directorate of CBE. The Portfolio Directorate has a committee that studies a request for new products about its profitability to CBE. The Portfolio Directorate also undertakes risk analysis about the new product. New product development allows CBE to create new knowledge by integrating customers' requests and external knowledge sources.

Credit Appraisal: The task of the Credit Analyst is to evaluate the customer loan application with Bank rules and procedures to select a credit application that can be successful in the business. It is a complex task that requires broader knowledge areas about marketing, cash flow management, business organization, product quality, and environmental impact and government laws. The credit analyst also uses different formulas and rules to convert a customer's proposal into information that supports decisions by credit committee. The credit analyst creates new knowledge by integrating knowledge from different sources to generate information that supports risk free credit decisions. This function is supported by knowledge creation and knowledge storage KM functions.

Credit Approval. This is done by a credit committee that contains the top management of the district, branch manager and the credit directorate head. They make decisions based on the credit analysis report submitted by the credit analyst. Their role is to check and verify the credit analysis report if it is properly done according to CBE's procedure. Credit loan decisions are risky decisions. They thoroughly discusses with each other until they understand the document before they approve the loan application. If the committee finds vague information, they ask the credit analyst for clarification. When the loan application is approved, the document is stored by the credit analyst as a reference for new credit analysis project. The KM process that supports credit approval business process is knowledge application and knowledge sharing.

Credit disbursement and collection: Credit Relationship Managers handle this task by storing and retrieving approved credit analysis report. The KM process that supports loan disbursement and loan collection business process is knowledge storage and application.

4.3 KMS problems

Despite the different efforts CBE undertook to promote knowledge sharing among its employees, the current practice is not satisfactory to maximize utilization of its knowledge resources. CBE is the oldest bank in the country with rich knowledge in banking business. The following problems were identified in the current KM practices.

1) Lack of centralized knowledge repository. CBE does not have organized document management system despite large number of documents it owns. The documents are found scattered with employees. This creates poor visibility to potential knowledge users and leads to knowledge reinvention.

2) In adequate knowledge about other knowledgeable experts. CBE has eleven credit processing centres scattered in different districts. Employees do not know well each other due to distance barriers. Employees identify potential experts if they have a chance to work together or by recommendation of other colleagues. Such approach is not sufficient for large organization like CBE which has more than 684branches in different geographical locations. Senior credit teams are found in the head office with less communication with credit team members in other districts.
3) Poor communication facilities. CBE does not have latest communication technologies that support knowledge sharing among credit teams in different districts. Knowledge sharing through personal interaction among branches is mostly managed by traditional telephone calls and sometime through e-mails.
4) Lack of knowledge about external knowledge sources. Employees use external knowledge sources to accomplish their tasks. For example credit analysts should know the current price of items in the customer project proposal. They have to know government laws about environmental protection and the requested project impact on the environment.

4.4 Goals of the KMS

These goals of KMS help to align the KMS objective with the overall business objectives. This alignment will help for future success and sustainability of KMS. If managers see the contribution of the KMS to their business, they are willing to allocate resources to acquire necessary manpower and technological resources. Based on analysis of business context and KM problems, the following KMS goals are identified:

1. To create integration and easy access to existing knowledge resources. It provides a formal definition and relationship to knowledge stored in the knowledge repository. This will also facilitate shared understanding among employees
2. To provide additional capability to extract new knowledge hidden in the data
3. To increase employees capability by creating a rich learning environment. A learning environment that provides different tools to access knowledge from different sources
4. To increase employees interaction by creating visibility to employees expertise

4.5 System modelling

4.5.1 Process modelling

The logical model of KMS architecture shows functions of the KMS from users perspectives (see Figure 1). Knowledge is extracted from existing internal and external documents, databases and experts. The knowledge engineer is responsible to select and store relevant knowledge in the knowledge repository using standard knowledge representation techniques such as ontology or knowledge taxonomy. The business objective and task knowledge requirements are used as the main criteria to select what is relevant and not relevant knowledge resources to be stored in the knowledge repository.

Employees who have knowledge need search the knowledge repository to retrieve knowledge that is relevant to solve task related problems. Task knowledge requirement serve as guide to formulate keywords to retrieve knowledge from the knowledge repository. The search result will be retrieval of the actual document or contact address of potential knowledgeable experts. Employees can discuss online or face to face to acquire the knowledge from other experts. Employees reuse retrieved knowledge to solve the problem. Reuse of existing knowledge in the task also leads creation of new knowledge. The new knowledge is used to update the knowledge repository.

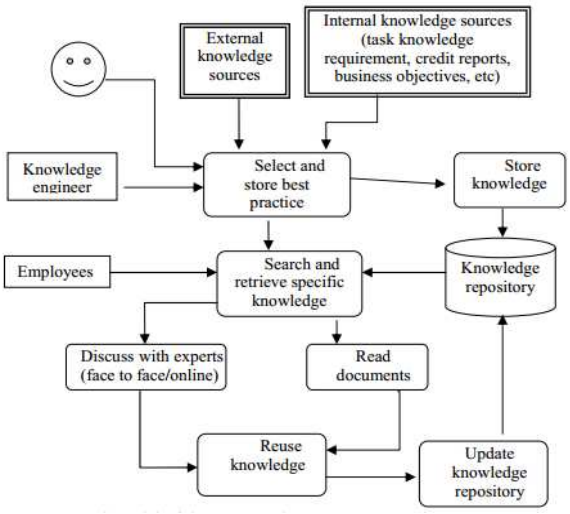

Figure 1. Logical model of the system

4.5.2 Knowledge modelling

Knowledge modelling refers to abstraction of the details by representing abstract concepts. It is referred to as knowledge taxonomy or ontology. It represents knowledge concepts with their relationships. It has many benefits in KMS. It creates a shared understanding and facilitates communication among different users. It is also used as a guide to systematically create and maintain knowledge repositories. The high level knowledge concepts for credit management include customer, credit policy, credit risk, projects and loan (see Figure 2).

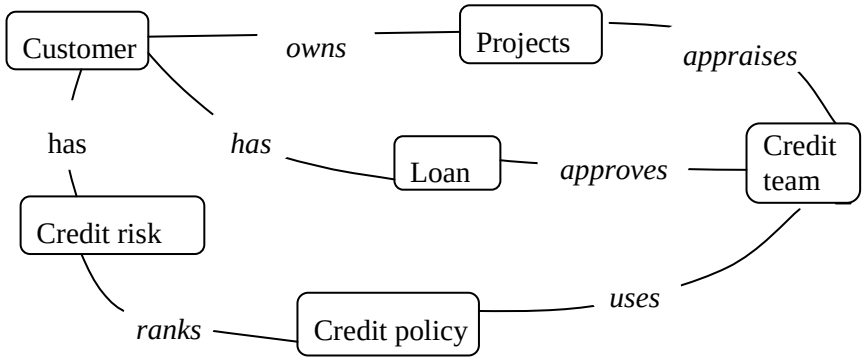

Figure 2. Knowledge modelling

4.6 Knowledge management tools

The necessary KM tools to implement KMS are readily available on the shelf. The most challenging task is to configure those tools as components of a single system to support the KMS functions and facilitate knowledge integration from different sources. KM process theory was used as lens to identify the necessary KMS tools.

4.6.1 Knowledge repository tools

Credit analysis documents should be stored in one central location so that eleven credit processing centers can easily access the documents. Knowledge repository needs to have a formal knowledge representation (or formal language) before creating the actual contents in the knowledge repository. The formal language describes concepts in credit management and relationships between concepts. This serves as blue print to create and maintain the knowledge repository (Gu et al., 2006; Kim et al., 2003). It has also relevance for knowledge reuse by creating a common language to easily share knowledge. In other words, it promotes use of the same term for concepts that represent the same reality. W3C has recommended different technologies such as Web Service Description Language (WSDL), Resource Description Framework (RDF), Web Ontology Language (OWL) and Metadata that facilitate knowledge access from existing documents (Gu et al., 2006).
KMS should have its own databases. As the knowledge required for credit management is complex, the KMS will have different databases. This includes content database, expert database, reference database and ontology database.
The *content database* will be created from existing bank documents and transaction databases like credit database. *Expert database*. Expert knowledge is difficult to extract and store into the database. The best method so far is to create the expert profile and store it into the database to facilitate contact with experts to acquire the actual knowledge through discussion or other forms of interaction. *Reference database*. Knowledge searching a time consuming activity in the knowledge acquisition process. Once the relevant knowledge source is identified by one expert, other employees should not waste their time by searching similar information sources. The reference database will contain relevant knowledge sources. This will be a website URL address or title of documents and their location. CBE cannot create new knowledge without using external knowledge sources. *Ontology database*. It contains the concepts and relationship among concepts. This is description of concepts for the content, expert and reference database. Its main purpose is to facilitate knowledge retrieval from different knowledge sources by providing common definition for concepts used in the knowledge repository. It also serves as a guide to collect and update existing knowledge database. Knowledge repository tools support the knowledge storage functions of KM function.

4.6.2 Search engines

Search engines retrieve specific knowledge resources in response to user queries. Knowledge repositories contain generalized knowledge about credit management irrespective of the specific user requirements. It is the task of the search engine tools to search and retrieve the specific knowledge from large pool of knowledge repository. The search engines should have a capability to retrieve knowledge from a variety of knowledge sources. They support the knowledge application of KM function.

4.6.3 Communication tools

Successful KMS system should provide alternative communication channels to promote person to person interaction (see Al-Ma'aitah, 2008; Antonova et al., 2011). CBE is a large organization with many branches scattered throughout the country. KMS will help to integrate employees working in different branches by creating visibility and facilitating communication (Goswami, 2008, Chiran, 2008). The traditional KMS focused on creation of centralized knowledge repository. The problem of this type of KMS is that most of the knowledge resides with the people. It is difficult to manage knowledge through centralized knowledge repository (Blair, 2002). Most KMS are now shifted to become a conversional KMS that supports person to person communication (Antonova et al., 2011). Communication tools like Web 2.0 technologies and mobile applications create an opportunity to implement conversational KMS (Antonova et al., 2011; Lee & Lan, 2007).

4.6.4 Data mining tools

The system can use data mining tools to create new knowledge by extracting hidden knowledge in the data. For example, the customer database can be used as additional knowledge source to make the credit analysis and credit decisions more objective (Bekhet & Eletter, 2012). Kabari & Nwachukwu (2013) used hybrid model by combining decision tree and artificial neural networks to predict good and bad creditors in commercial banks. They reported that their model achieved 88 percent success rate and good explanatory background in evaluating loan applications. Teodoro & Botelho (2005) also used case based reasoning (CBR) system to predict bank lending decisions. The researchers argue that CBR is an appropriate tool to support decisions where there is no fully understood and well structured general rules capturing the relationships between problems and credit decisions. They claimed that the use of CBR system can forecast bank lending decisions with 90 percent precision. The use of such advanced technological tools will reduce amount of subjective judgments and create transparency in loan application evaluation (see Bekhet & Eletter, 2012; Kabari & Nwachukwu, 2013). Credit analysts in CBE use subjective judgments to evaluate loan applications. These tools supports the knowledge creation function of KM.

4.6.5 KMS portal

Current research on KMS focuses on development of knowledge portal that seamlessly integrate different organizational knowledge resources in one window (Gu et al., 2006). Knowledge portal supports personalization of knowledge resources by accepting personalized query from end users and retrieving knowledge content that meets the users query. The personalized search may also include for potential experts or knowledge sources if the actual content is not found in the knowledge repository. Once the users retrieve the required knowledge, they can add their own personal insights and judgment to make it more contextualized to solve their problems (Dixon, 2002). This also facilitates internalization of knowledge acquired from external sources (Jennex, 2008).

4.7 Proposed KMS architecture

The different KMS tools are configured or structured to support KM activities in credit management (Figure 3). This research provides an overview of KMS tools that required to implement the proposed KMS architecture.

The first layer is a presentation layer. It allows the KMS and the end users to interact with each other through information exchange. The users submit a knowledge request using formulated keywords to the presentation service. The presentation service communicates with different knowledge processing tools to retrieve useful content knowledge that can satisfy user requests (Gu et al., 2006). The personalized search may also display contact address of potential experts in CBE or external knowledge sources if the actual content is not found in the existing knowledge repositories. Linking users with potential knowledge sources is one of the goals of KMS (Chiran, 2008). The presentation service should also support visual navigation by organizing concepts by their relationships (Sureephong et al., 2007). It also facilitates knowledge externalization to update existing knowledge resources in the database (Jennex, 2008).

The second layer is a Process layer. It contains search engines, data mining software and communication tools (see Figure 3). The knowledge processing tools receive requests from the presentation layer and respond results to presentation layer that meet the specific user needs. The knowledge processing tools response can be the actual content of the knowledge or a reference to the knowledge sources such as contact address of the experts. Retrieving the location of knowledge is one piece of knowledge required by knowledge seekers to fill their knowledge gap (Yimam-Seid and Kobsa, 2003).

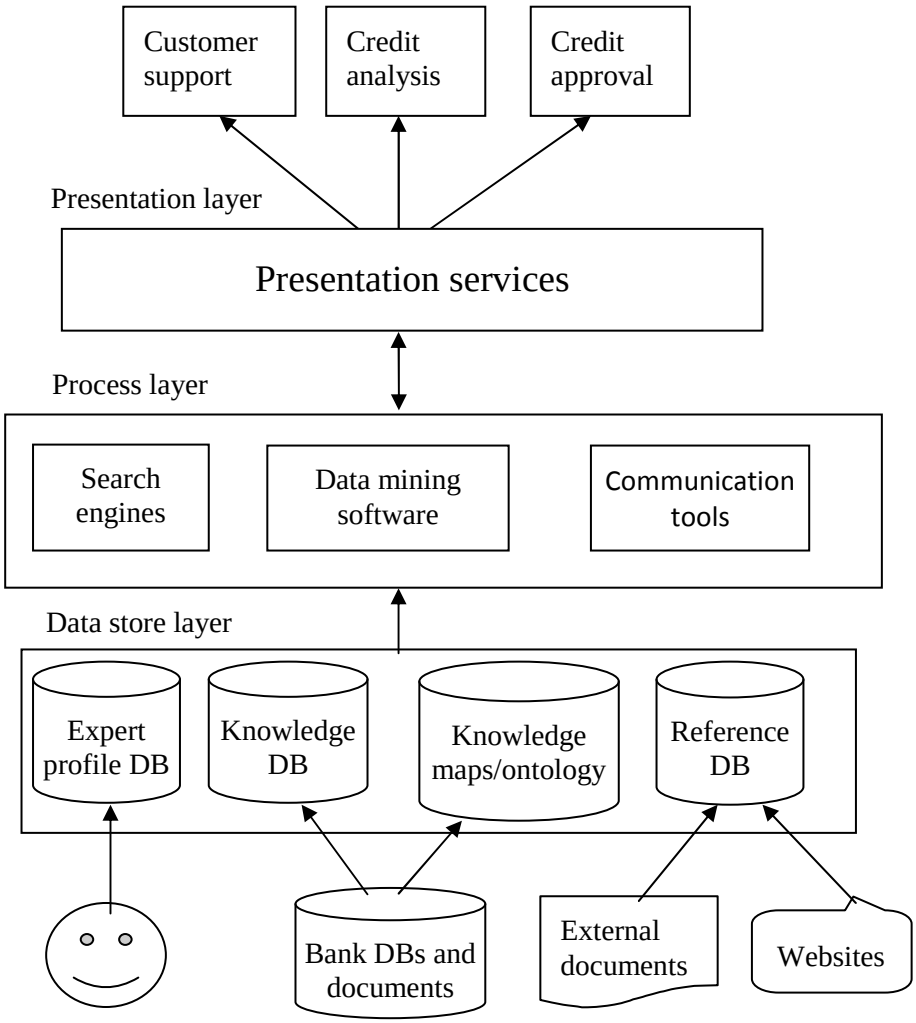

Figure 3. Physical model of the KMS architecture

The third layer is a data store layer. It contains different databases that stores knowledge contents to be manipulated by the KMS tools in the Process Layer. Knowledge stored in the knowledge repository should knowledge which is useful to be used in task related activities. It will reduce unnecessary efforts to filter useful knowledge. This layer contains content database, expert database, reference database and ontology database.

4.8 KMS architecture evaluation

Evaluation is used to check alignment of the new system with expected user and organizational requirements. Descriptive evaluation method was used to evaluate the proposed KMS architecture (Hevner et al., 2007). This method uses qualitative evaluation by asking potential users of the system. The two basic questions in evaluation are what and how questions. What question refers to what attributes of the architecture to be evaluated and how question answers the evaluation process (Hevner et al., 2004). With regard to what questions, the design model is evaluated from user acceptance and organizational capability perspectives. Users have different challenges in the current system. They expect a design model that can solve current problems when it is implemented. With regard to organizational capability, it refers to organization readiness to implement the proposed design. This is evaluated by assessing CBE's IT project implementation experience, technological, manpower and financial capability.

With regard to user acceptance, the interviewed users confirmed that the proposed KMS architecture has high acceptance because of its capability to reduce social and distance barriers to access existing knowledge resources. It also serves as additional communication channels to create flexibility in the use of communication channels for knowledge sharing. Knowledge owners will not be interrupted by simple questions that can be solved by referring existing knowledge databases. It also serves as a data store for knowledge shared through personal interactions that has the potential for later reuse.
CBE has long experience to use technology to improve its internal efficiencies. CBE also recently implemented a core banking project that allows it to provide the state of the art banking services such as Internet based banking services. CBE installed high bandwidth Intranet networks among its branches. All professional employees of CBE have basic computer skills and one to one computer access. CBE has also IT department at Vice President Level which is at the same level with other core functions of CBE such as credit and customer service. CBE has IT professionals specialized in different fields as system analyst, system designers, programmers, hardware engineers, network experts, information security experts and IT technicians.
CBE has an initiation to implement a KMS. It uses different file sharing services to facilitate document exchange among its employees. CBE has also website which serve as a forum to share documents among its employees in different branches. Some departments have also implemented different database and file sharing services to facilitate information exchange. CBE also bought SharePoint software for core banking project to facilitate information sharing among project team members. Training on SharePoint was also given for employees at managerial positions. The core banking project also creates good culture to use ICT for knowledge sharing among project team members. All communication among project team members was only through e-mail. All these efforts show some level of understanding to promote knowledge sharing through ICT in CBE. The main challenge is the lack of skill to develop an integrated KMS that can support its strategic business objectives. The proposed architecture is assumed to solve currently observed KM problems in the Bank.

5 Discussion

Knowledge has become one of the strategic resources of the modern organizations (Grant, 1996; Alavi & Leidner, 2001; Ali & Ahmed, 2006). Knowledge can be used as a resource when organizations have an explicit KM strategy and KMS infrastructure (Jennex, 2008). This paper highlighted that different KM models and KMS architecture in the existing literature. This implies that KMS implementation is complex process that requires understanding the business problem and implementing a KMS that can serve specific organizational problems. There is no one best solution that is adapted to every organization (McDermott and O'Dell, 2001). This paper uses the KM cycle theory as a theoretical lens to propose the KMS architecture. The focus is to improve the overall KM activities and enhancing CBE's capability to use its knowledge resources. KMS implementation is not only a technical solution but also it requires an enabling business context. The organization should encourage its employees to have a positive attitude to engage in personal interactions and contribute their personal knowledge to the organizational knowledge repository. The proposed KMS architecture is designed to support the core business functions in the credit management. Different literature also mentioned alignment of KM activities with the business objectives as one of the critical success factors for newly evolved IT based systems (see Alavi and Leidner, 2001; Hsia et al., 2006, Jennex, 2008).

6 Conclusions

This study identifies the existing practice of knowledge sharing practice in CBE and proposes a KMS architecture that can enhance CBE's capability to use its knowledge resources. The main contribution of the study is to provide a guide for practitioners in CBE to implement a KMS and to leverage

knowledge as a vital resource to achieve CBE's business objectives. The study also suggests the necessary knowledge management tools and how they are integrated to implement the proposed KMS architecture. Although the model is not empirically tested, it is a viable architecture as it is supported by previous studies. The study also highlights the key role of knowledge as a strategic resource by aligning the KMS functions with CBE's business processes. This alignment of objectives will help to improve service quality and enhance efficiency of CBE by reducing costs and improving internal efficiency. Improvement of information flow among employees as well as units increases knowledge creation and application. KMS is instrumental to support smooth flow of knowledge within CBE. The study has a theoretical contribution for KM/KMS researchers. There is limited research on development of KMS architecture especially for commercial banks. The study contributes what procedures other researchers to follow to develop KMS architecture.

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