

Using a KMERP Framework to Enhance Enterprise Resource Planning (ERP) Implementation

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Abstract

Enterprise Resource planning (ERP) systems mainly aims to develop information sharing between different sections within the organization, and consider as a way of continuous improvement. Implementation and use of ERP systems require a tremendous amount of knowledge and experience. There are many failure reasons in the implementation of ERP systems and facing many challenges to apply of knowledge within organizations. This paper proposed KMERP framework to manage various knowledge within the ERP software. The proposed framework is composed of five dimensions (KM life cycle, ERP life cycle, System Development life cycle, information systems project management, and organization's Knowledge). The KMERP framework allows the organization to identify relevant knowledge to ERP systems as well as management of diverse sources of knowledge. It also helps to link explicit knowledge that stored in ERP repository with tacit knowledge that has been converted to an explicit knowledge and storage Knowledge Management repository. Moreover, the Implementation of KMERP Framework on ERP is discussed.

Keywords: Enterprise resource planning (ERP), Knowledge Management (KM), System Development Life Cycle (SDLS), Information Systems Project Management (ISPM), KMERP Framework.

1. Introduction

Enterprise resource planning (ERP) is an integrated structure to help the organization in business process development and ERP systems used to automate processes to support and control on repository, sales and purchases, client relationship and accounts, financial and human resources, etc. [1]. ERP systems in the organization are used to process the business process for organization, reduce the threats related to inconsistencies and redundancy increases the chances of integration, and ideal

to achieve the objectives of the organization. The main approach to support and continue improvement in ERP is knowledge management that contributes significantly to its success. Organization should use knowledge management to create the knowledge during the implementation of ERP systems as well as the process of capture and distribution [2]. Knowledge Management (KM) is combination of management and technology that provide integrated management strategies for the organization. Also the activity of KM is to create, store, transfer, and apply knowledge, as well as provide the employees of the organization with the necessary knowledge to accomplish the tasks and achieve the organization's goals [4]. Implementation of knowledge management in any information system project is one of the most important challenges of the organization and it requires a deep look to makes the organization as an integrated and holistic system [3]. There is a strong relationship between knowledge management (KM) and resource planning systems (ERP), where it is considered as a reciprocal relationship (KM for ERP, ERP for KM). In this paper, we present the framework to enhance the ERP Implantation, which is called (KMERP Framework). KMERP framework consists of five dimensions (ERP life cycle, KM life cycle, organization Knowledge, system development life cycle, Information system project management life cycle). This framework is used to transfer the organization's knowledge from the individual to the group and the organization. Subsequently it helps to share knowledge, and ultimately leads to the success of the ERP implementation.

The rest of this paper is organized as follows; Section 2 will present background and related work and overview on KM, ERP. In section 3, The Methodology for ERP Implementation with KM will be explained; The Methodology for KM Implementation and Motivation for developing KMERP Framework will be presented in sections 4 and 5. The proposed framework for Knowledge Management Enterprise Resource Planning (KMERP) and their dimensions will be explained in section 6, while conclusion and future research work will be discussed in section 7.

2. Background and Related Work

An Enterprise System (ES) is set of integrated applications that interact together to perform the functions of the organization [6, 7]. Enterprise resource Planning (ERP) as integrated, customized, packaged application software solutions that is employed by organizations to interact with a range of processes and functions into a holistic view of the business from a single IT architecture [8, 9]. Knowledge Management (KM) is an attempt to put the existing expertise, knowledge of the Organization staff in specific place to be easily re-used and applied [10]. The Knowledge capture, codification, transfer, sharing and use of ERP implementation knowledge by large consulting firms conform to this particular definition.

Knowledge Management System should be consists of four elements, Knowledge creation and capture, Knowledge sharing and enrichment, Information storage and reuse, and Knowledge dissemination [11].

Information System analysis and design is a method used for the organizations of various sizes to establish and maintain the systems. As the stages of system development life cycle (SDLC) is a systems planning and selecting, systems analysis, systems design, and implementation and operations [5]. Information Systems Project Management is an important process for developing information systems and it requires good analysis skills. Also the focus on project management is used to ensure that the development of information systems harmony with requirements of the organization and developed the system within specific budget and time [5]. As the stages of Information Systems Project Management is an initiation, planning, executing, and closed IS project.

In paper [1] the authors focused on two areas according to knowledge management, a tacit knowledge management, and issues related to process-based nature of organizational knowledge. Paper [2] develop a continuous improvement model for the life cycle of ERP with the integration each phase in ERP with of knowledge management life cycle. Another approach presents ideas how knowledge management help to reduce the failure rate of implementation of ERP systems in organizations [12]. [13] In another paper, they proposed framework of the different types of knowledge required to manage software ERP systems. In [14] the authors a report evaluate the effectiveness of the implementation of the Enterprise Resource Planning (ERP) from Knowledge Management perspective. Knowledge Management Enterprise Resource Planning (KMERP) was proposed. The framework supports the ERP life cycle, KM life cycle, organization's Knowledge, SDLC, and Information Systems Project Management to develop the level of knowledge within the organization from the individual to the group and convert the tacit knowledge into an explicit knowledge.

3. The Methodology for ERP Implementation with KM

Enterprise System Planning (ERP) is an integrated structure of the organization to assist in the development of business process, ERP systems used to automate processes that support all functions of the organization. ERP allows the organization's information to integrate through a centralized database and to use the integrated business processes [16, 17, 18]. Knowledge about the functions and objectives of the organization are required by the users of ERP system. Knowledge management techniques used within the life cycle of ERP to facilitate the sharing of knowledge. There are four stages in ERP life cycle i.e. analysis, design, construction, and deployment, and each stage has deliverables and outcomes [2]. In fact, selection, implementation, use, continuing change in ERP systems desperately needs to experience and different kinds of knowledge during ERP life cycle [13].

3.1 Benefits of ERP systems

There are many benefits of ERP systems and these benefits can be divided into two parts: the tangible benefits and intangible benefits [27]. Tangible benefits are Rapid response, meet customer demands, increase quality and performance, improve the use of resources, and improving the accuracy of the information for decision-maker. Intangible benefits are cooperation and integration form, meet customer satisfaction.

3.2 Failure reasons of the ERP Systems

In fact, there are many failure reasons for ERP systems in organizations; some of them are as follows [12, 25]:

1. Changes issues during ERP implementation,
2. Issues of communication and coordination between team members in ERP project,
3. Budget issues during the implementation of ERP systems,
4. Customization issue, increased customization leads to reduce the ERP features, and
5. Lack of experience, Due to increased tacit knowledge and non-sharing of knowledge etc.

To address the failure reasons that mentioned previously, we need to merge knowledge management (KM) with Enterprise Resource Planning (ERP), and building a knowledge repository for storing most knowledge that addressing the problems mentioned above. For example: ERP management projects knowledge, accurately requirements for organization. This will ultimately leads to the process of knowledge sharing, coordination between

the members of the project team, ERP project management correctly, and increase experience sharing.

4. The Methodology for KM Implementation

Knowledge management has become important factor for the success of organizations. The importance of knowledge management is because its focus is on people, product and services and it is used to support the integration and development of productivity. Knowledge Management (KM) is the process of creating, capturing, and using the knowledge to improve the performance of the organization [24]. According to the literature review knowledge management can be classified into two types' i.e. explicit knowledge and tacit knowledge. Explicit knowledge can be expressed in words and numbers and can be shared, transferred and stored but tacit knowledge is personal knowledge and difficult to forming, share with others [22]. There are six basic processes of knowledge required to manage the knowledge of the organization, and the integration of knowledge sees as an important process to build the capacity of the organization [15]. The individual knowledge must convert to group knowledge by sharing knowledge within the organization; this requires knowledge management. Knowledge Management mainly aims to collect knowledge into knowledge repositories, which means storage practices and experiences and shared among teams in the Organization [19, 20, 21]. Knowledge in the organization retains in three main levels: individual, group, and organization. There are also four tracks between the two types of knowledge within the organization: socialization, externalization, combination, and internalization. Socialization is the information available to the team within the organization but it is a kind of tacit knowledge, Externalization is to convert the tacit knowledge to explicit knowledge through contact between groups. Combination means coordinating teamwork and Internalization is learning-by work and get ideas from several experiments and it is a kind of explicit knowledge [2, 23].

4.1 The relationship between KM and ERP

There are two types of knowledge that are transferred during the ERP implementation: transfer knowledge related to work procedures of the organization (organization requirements), transfer knowledge to users about how to use ERP systems [26]. The relationship between KM and ERP can see as mutuality relation, we can express this relationship (ERP for KM) and (KM for ERP) [13]. ERP for KM means implementation of ERP systems in organizations and it is a major source of explicit

knowledge to the members of the organization. And KM for ERP means management and implementation of ERP requires expertise and extensive knowledge, so we use KM to identify all kinds of special knowledge that help us to manage ERP correctly. The other relationship between KM and ERP can see as complementary relation, Enterprise Resource Planning (ERP) systems used to integrate information within the organization between the different sections and put the explicit knowledge in central databases, Knowledge Management (KM) will work to manage the tacit knowledge and this will create balance and integration between KM, ERP.

4.2 The knowledge challenges in ERP implementation

In fact, there are many challenges when applying knowledge management in ERP: that are as follows:

1. Knowledge that captured and addressed during the life cycle of ERP systems may fade after the implementation of ERP systems, and this means that the knowledge will not be available to all members of the organization [2],
2. In most organization, there is no clear methodology to make sure that knowledge is captured, shared and stored for the future,
3. Increasing the size of knowledge in the organization could leads to knowledge loss if it's not captured and stored quickly in organizations,
4. Converting tacit knowledge to explicit knowledge within the organization. It means that to store experience, skills, and understand the individuals within the repositories of knowledge [12], and
5. Disregarding the importance of knowledge management in most organizations, where organizations are struggling to get knowledge [13].

To address the above challenges, the organizations needs to capture knowledge during all stages of the ERP implementation and will transport it to knowledge repository in order to share and distribute knowledge at various levels.

5. Motivation to develop KMERP Framework

Without the implementation of KMERP framework for knowledge management through all stages of the ERP life cycle, it could leads to the failure in the appropriate implementation of ERP system within the organization. We need cohesion between knowledge management elements and ERP life cycle to avoid a lack of knowledge within the organization. In this paper we proposed the

KMERP framework to address the knowledge challenges in ERP implementation and reasons for the failure of ERP. The KMERP framework consists of five dimensions as show in figure 1:

1. System Development Life Cycle (SDLC) dimension which consists of four different stages (systems selection and planning, systems analysis, Systems Design, and Implementation and operation). During these stages all the necessary information and knowledge about the system and organization's objectives will be extracted.
2. Information Systems Project Management dimension which consists of four different stages (Project Initiation, Planning the project, executing the Project, and Closing down the Project). During these stages the project schedule and proper feasibility study will be managed.
3. ERP Life Cycle dimension which consists of four different stages (Selecting, Using, Implementing, and Changing).
4. Knowledge Management Life Cycle dimension which consists of five stages (Identifying, Creating, Transferring, Storing, and Reusing).
5. Knowledge of the Organization (Business K, Technical K, ERP Knowledge, Organization K, and Project Management K).

6. Proposed Framework

The main objective of KMERP framework is to store specific knowledge in five dimensions that are mentioned previously where it will be re-used in the life cycle of ERP systems. As KMERP framework also allows to manage the ERP from the point of view of knowledge management. This framework focuses on the definition of the different kinds of knowledge as well as knowledge management through the ERP life cycle.

The KMERP Framework consists of five dimensions (SDLC, KM Life Cycle, ERP Life Cycle, IS Project Management and Knowledge for the Organization) as show in figure 2. Each element in ERP life cycle will be surrounded by elements of software development and project management. Using a Joint Application Design (JAD) method in software development life cycle will be a right way of communication and coordination between the ERP team: and the elements of project management will facilitate the process to customize ERP correctly, completely and to understand the organization requirements to extract it properly.

Henceforward, knowledge repository will capture important knowledge and will re-use in the rest of the stages associated with the other dimensions. All explicit knowledge of the organization will be captured, distributed, and will stored in ERP repository.

In terms of tacit knowledge, it will determine the required knowledge of the organization and is convert it into explicit knowledge that will be further distributed and stored in KM repository. There are reciprocal, complementarities relationships between KM repository and ERP repository, which ultimately leads to the distribution of knowledge in various levels of the organization and to make knowledge transfer from individual to the group and organization levels. The framework proposed in this paper is a starting point for analyzing and structuring the knowledge available and required within organizations.

This framework will focus on the teamwork's needs in ERP implementation, where each stage in ERP implementation will produce an outcome or deliverable. The skills and experience will be documented, converted to explicit knowledge and stored in a knowledge management repository, which will be available later for all members in the organization.

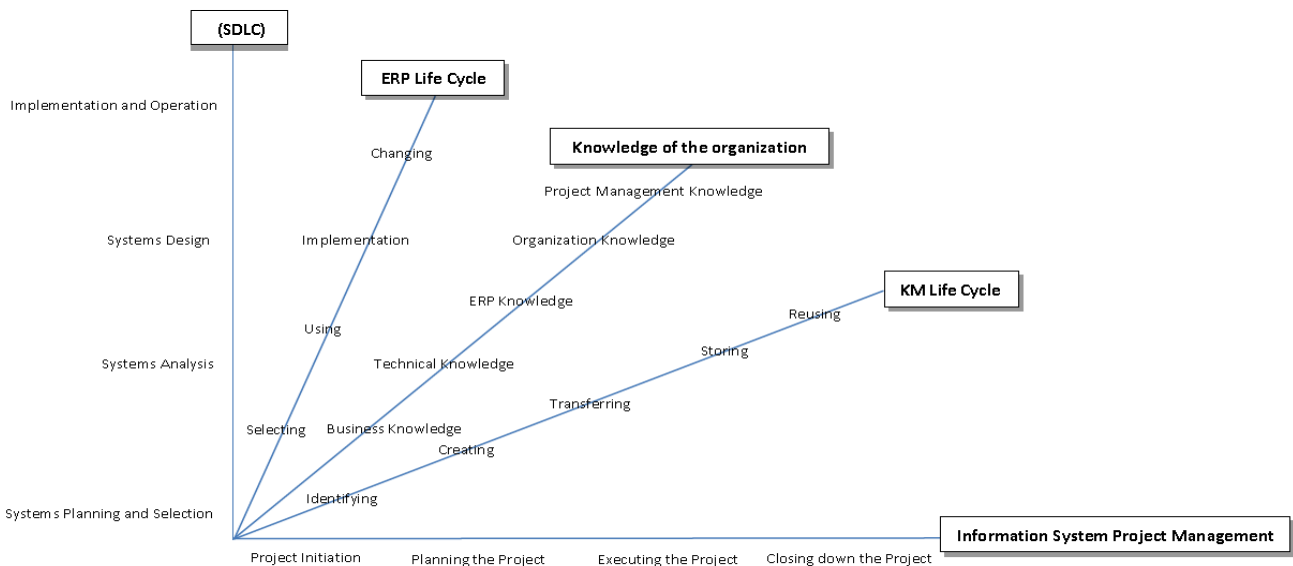


Fig. 1 Dimensions for KMERP framework

6.1 Implementation of KMERP Framework on ERP

KMERP framework that is discussed previously consists of five dimensions that will be used to surround every application in ERP as shown in figure 3. ERP applications (Inventory Management, Payroll, CRM, Purchasing, Accounting, Sales, Vendor Integration, and E-Commerce) will be analyzed and managed properly and will store all kinds of knowledge in a KM repository. This method will lead to integrate ERP, KM to succeed the ERP implementation that means the success of the organization.

6.2 Type of knowledge required to manage ERP

In fact, the lack of ERP knowledge for organization's staff is lead to the reduction of development the business process and procedures within the organization. For that, any employee must be answering these questions: What is the required knowledge to manage ERP? What is knowledge that should be collected and stored?, In KMERP framework we mentioned the knowledge of the organization dimension which identified areas of knowledge required to manage ERP, as the five areas of knowledge as described in Table 1.

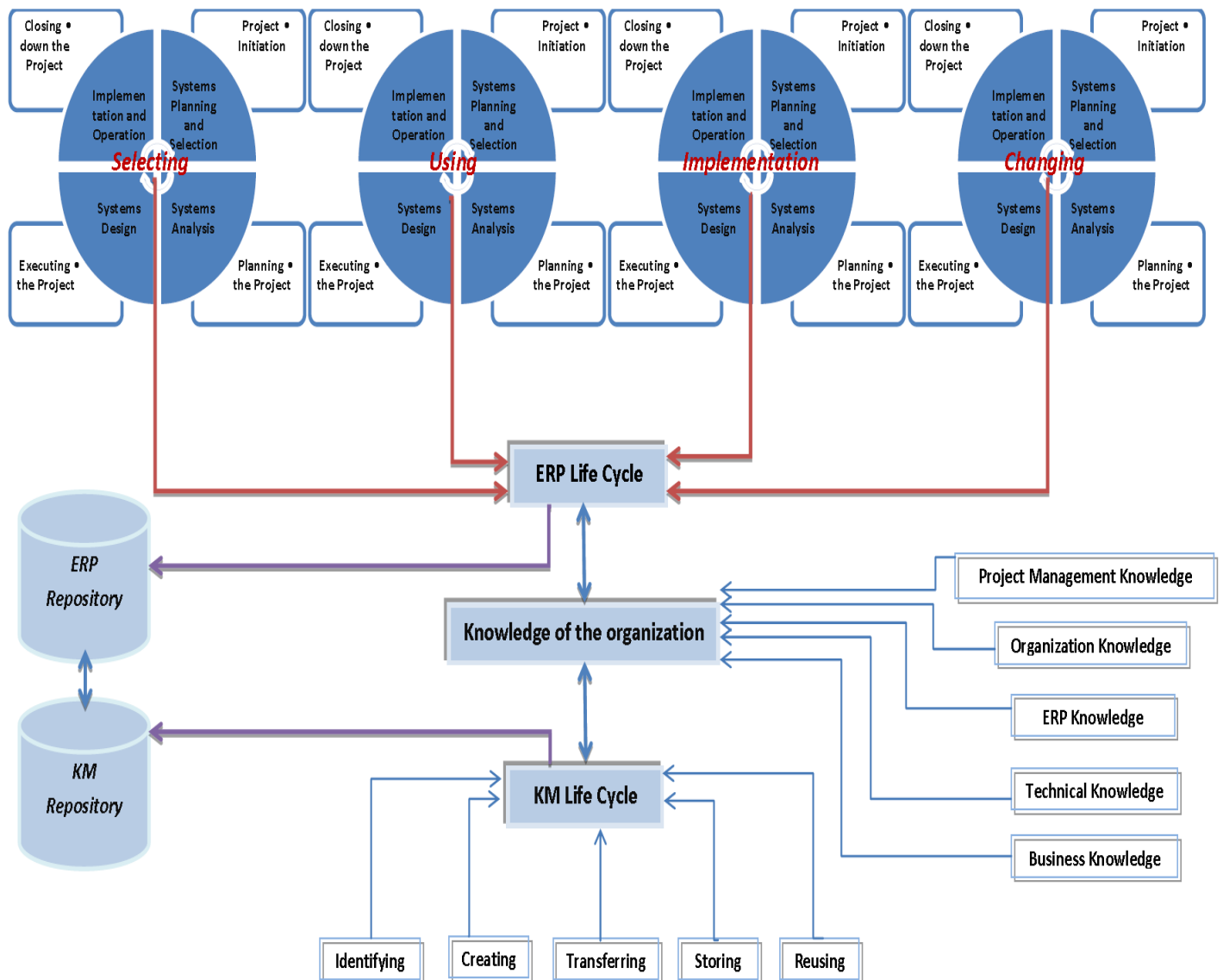


Fig. 3. Proposed framework (KMERP)

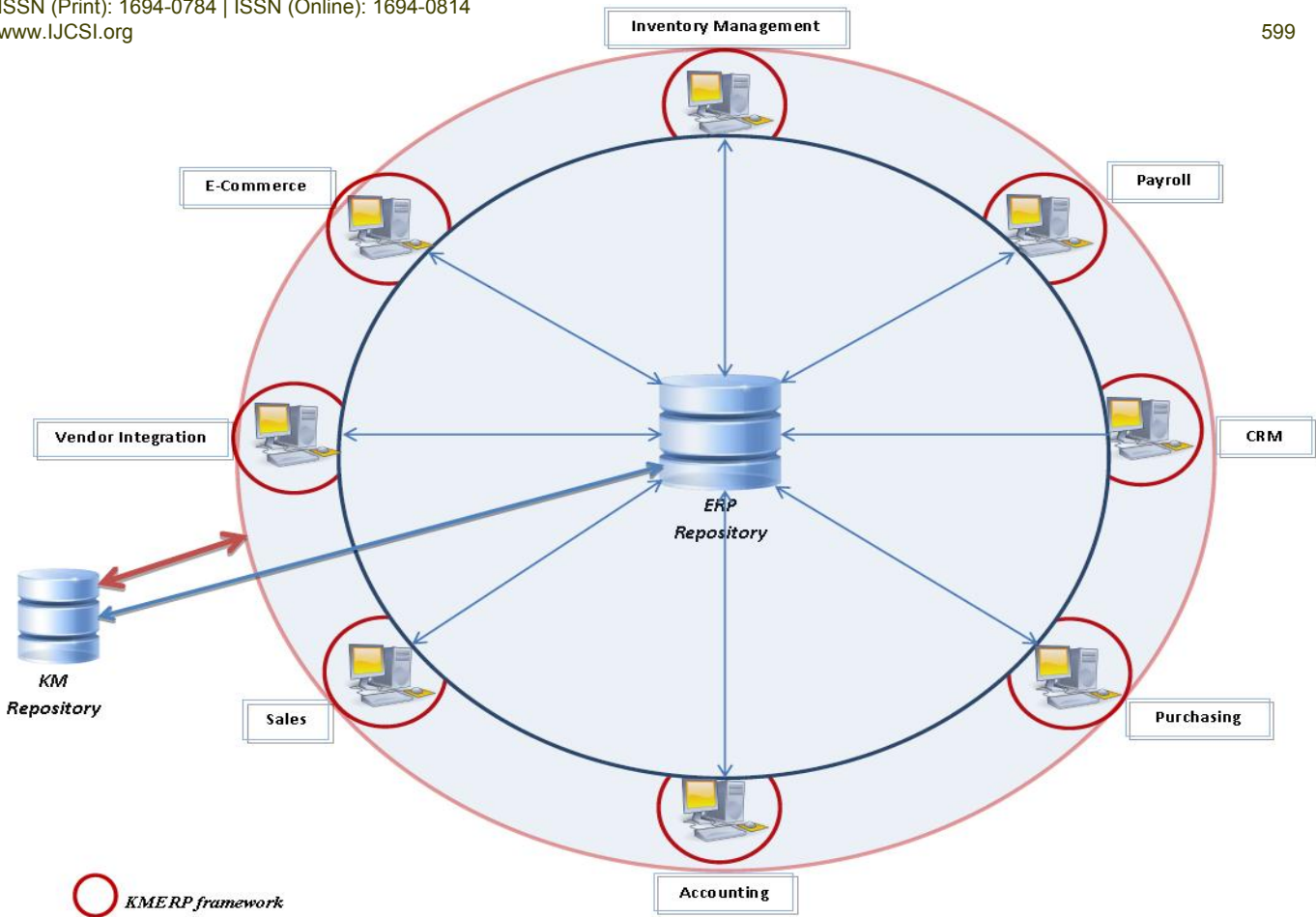


Fig. 7 Implementation KMERP framework on ERP Systems

Table 3. Type of knowledge required to manage ERP

		<i>Knowledge of the organization</i>				
<i>Life Cycle</i>	<i>Stages</i>	<i>Business K</i>	<i>Technical K</i>	<i>ERP K</i>	<i>Organization K</i>	<i>Project Management K</i>
<i>SDLC</i>	<i>Selecting and planning</i>		Criteria for evaluating projects	Select right package	Organization's Objectives	Determining the appropriate project
	<i>Analysis</i>	Determine work procedures	Business Process Redesign, Joint Application Design	Process Modeling, Data Modeling	Organization's requirements	
	<i>Design</i>		Interface, Database	Interface, Database		
	<i>Implementation and Operation</i>		User training, documentation, maintenance	User training, documentation, maintenance	Using the system	Management system and distribution privileges
<i>IS project Management</i>	<i>Project intention</i>	CRM	Solutions the technical issues	Team management	Change, Conflict Management	Leadership and managerial
	<i>Planning the project</i>	Project Charter	Using Gantt chart, network diagram, Economic feasibility, Expected Time Durations Using PERT	Identify risks	Organization's Resource, Objectives	Time, Scheduling Management
	<i>Executing the project</i>		Monitor and measure the productivity of the project		Execute Basic planproject	Changes, risks Management
	<i>Close down the project</i>				Meeting, workshops skills	Reports, documentation skills
<i>ERP</i>	<i>Selecting</i>	Business Process		Select right package	Flow Quality Management	
	<i>Using</i>	Business Process in Organization				
	<i>Implementation</i>		Technical support	Implement ERP	Subdivisions Organization	System management
	<i>Changing</i>	Development work procedures	Business Process Redesign		Development organization work	
<i>KM life Cycle</i>		<i>Identifying</i>	<i>Creating</i>	<i>Transferring</i>	<i>Storing</i>	<i>Reusing</i>
		↓ ↓ ↓ ↓ ↓				
		<i>Stored all types of Knowledges in KM Repository</i>				

7. Conclusions and further work

In this paper, a new framework that handles all kinds of knowledge within ERP implementation has been proposed. The KMERP framework dimensions and organization's knowledge have been identified and show how to implement in ERP systems. The integrated work flow between KM and ERP has been presented. The all kinds of knowledge required to manage ERP is identified and show the relationship between ERP repository and KM repository. As for a future work, we plan to use the quality of services (QoS) to test the performance of all dimensions with the KMERP framework. Also, we plan to apply how to separately control the unexpected knowledge and the dimensions rules from the separated view.

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References

- [1] Usman Musa Zakari Usman, Mohammad Nazir Ahmad, "KNOWLEDGE MANAGEMENT IN SUCCESS OF ERP SYSTEMS," International Journal of Advances in Engineering & Technology, March 2012.
- [2] Thomas, Zhenyu huang, "Incorporation of Knowledge Management into ERP continuous improvement: A Research Framework", Issues in Information Systems, Nov 2 2004.
- [3] Alsadhan, A., Zairi, M. and Kamala, "KM System Implementation: A Best Practice Perspective and Proposed Model", The European Centre for Total Quality Management (ECTQM), Report No. R-06-10, October 2006.
- [4] Alsadhan, A.O., "The implementation of knowledge management systems: an empirical study of critical success factors and a proposed model" Unpublished Ph.D dissertation, School of Informatics Department of Computing, University of Bradford, 2007.
- [5] Joseph Valacich, Joey George, Jeff Hoffer "Essentials of System Analysis and Design", 3th Edition, 2006.
- [6] Hernandez .J , "The SAP R/3 Handbook", New York, Mcgrqw-Hill, 2000.
- [7] IDC, "Enterprise Resource Management Application Market Forecast and Analysis," IDC Software Research, June, 2000-2004.
- [8] Watson E., Schneider H., "Using ERP in Education", Communications of the AIS, Vol, No 9, February, 1999.
- [9] Klaus H., Rosemann M., Gable G., "What is ERP?", Information Systems Frontiers, Vol2, PP. 141-162, 2000.
- [10] IM I., Hars A., "Knowledge Reuse- Insights from Software Reuse", Proceedings of the Nineteenth International Conference on Information Systems, 13-16 Dec, Helsinki, Finland, 1998.
- [11] Filemon A., Uriarte JR., "Introduction to Knowledge Management", Japan. ASEAN Solidarity Fund, 2008.
- [12] Anubhav Kumar, P C Gupta, " Implementation Of Knowledge Management To Minimize ERP Based System's Failure Of An Organization: A Survey", IJRFM Volume 1, (ISSN 2231-5985), Issue 3 July, 2011.
- [13] Michael R., Roy Chan, "Structuring and Modeling Knowledge in the Context of Enterprise Resource Planning", Brisbane, Australia.
- [14] Eric W.L. Chan, Derek H.T. Walker and Anthony Mills, "Using a KM framework to evaluate an ERP system implementation", Journal of Knowledge Management, VOL. 13 NO. 2, pp. 93- 109, 2009.
- [15] A.F. Buono, &F. Poulfelt, "Challenges and Issues in Knowledge Management", Information Age Publishing, Greenwich, CT, USA, 2005.
- [16] C. Argyris, &D.A. Schön, "Organizational learning II: theory, method and practice", Organization Development Series, Addison Wesley, Reading, MA, USA, 1996.
- [17] P. Brossler, "Knowledge management at a software engineering company – an experience report", Workshop on Learning Software Organizations, Kaiserslautern, Germany, pp. 77–86., 1999
- [18] R. Baskerville, S. Pawlowski, & E. McLean, "Enterprise resource planning and organizational Knowledge", ICIS conference, 2000.
- [19] M. Beer, &N. Nohria, "Cracking the code of change", Harvard Business Review, p.p133–141, 2000.
- [20] M. Alavi, &D.E. Leidner, Review. "Knowledge management and knowledge management systems", Conceptual foundations and research issues, MISQuarterly, pp.107–136, 2001.
- [21] L. Argote, B. McEvily, &R. Reagans, "Managing knowledge in organizations: an integrative framework and review of emerging themes", Management Science, pp 571–582, 2003.
- [22] Nonaka W. and Konno N. , "The concept of building a foundation for knowledge creation", California management review. Pp.40-54, 1998.
- [23] Nonaka I., "The Knowledge-Creating company", Harvard Business Review, PP. 96-104, 1991.
- [24] Wigg, K. , "Knowledge Management Foundation: thinking about thinking how people and organization create, represent and use knowledge", Arlington, TX: Schema Press, 1993.
- [25] "Why ERP fails: most common reason", an article at website: <http://articleseo.org/most-common-reason-why-erp-system-is-not-successfully-implemented/>
- [26] Z., Lee & J., Lee , "An ERPs implementation case study from a knowledge transfer perspective", Journal of Information Technology, Vol. 15, no. 4, pp. 281-288, 2000.
- [27] Ellen & Wagner , "Concept in Enterprise Resource Planning", Course Technology , 2008.

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