Applying knowledge management implementation model in Water Resources Management Company by the purpose of continuous improvement

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Abstract: This research seeks to explore the current knowledge management (KM) practice in the Water Recourses Management Company (WRMC) according to Jashpar's knowledge management cycle which comprises four loops, including knowledge creation, knowledge organization, knowledge sharing and knowledge leverage. This research used a qualitative method, and data were collected through questionnaires. The 92 respondents were the staff of office. The data were analyzed through SPSS software. The findings of this research reveal that, the knowledge creation and knowledge organization were in good level, but knowledge sharing condition was not suitable, therefore, it has negative effect on leveraging knowledge, hence we tried to demonstrate a knowledge management implementation model using the knowledge management concept and taking advantage from the concept of excellence model by the purpose of continuous improvement. This paper suggests proper knowledge management implementation (KMI) is a managerial approach that can turn an organization to an agile one. In order to verify and validate the performed research, the planned model has been accomplished in the Hydropower Plant Department, Water Recourses Management Company, positive and acceptable results were obtained and organizations total factor productivity increase was achieved which was appreciated by the organization.

Key words: knowledge management; continues improvement; agile organization

1. Introduction

Technology developments take place ever faster and cause major changes in almost every organization. The

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fact that change is the only certainty is not new message, but to better sustain in a competitive and volatile market and how to manage these changes most effectively is of important concern. In order to be successful, organizations need various types of resources including financial, social, technological and physical and human resources, but knowledge becomes a strategic resource, and it is a resource for gaining competitive advantages (Drucker, 1995).

The role of WRMC is identifying and managing water resources and overcoming the shortage of water, designing dams and producing clean energy through hydropower plants which plays an important role in the expansion of economy in the country. Therefore, to achieve competence, competitive advantages and to overcome its rival in this world of rapid change and in order to retain competitive and be able to better oppose with the challenges which the organization face, it should put information in the right context to enable concrete action. In this way, information is transformed to competencies, skill, expertise which we call knowledge that is volatile everywhere, mainly in people's head and work place environment (13 road berzt, 1998), therefore, proper management of knowledge is taken into consideration.

This research, using knowledge management for WRMC, focus on present status of knowledge management cycles according to Jashapara's model. A KMI model will be specifically designed, the knowledge management condition in the mentioned organization will evaluate after accomplishing the suggested model, and seek whether by proposed KMI can we turn office to agile one or not. Whether customer's satisfaction, quality of key process and productivity of employees will increase, which are the characteristics of an agile company?

The structure of this paper is as follows: First, in section 2, statement of problems on knowledge management in WRMC is given, and research definitions and research limitations are described in sections 3 and sections 4 respectively. Then, the proposed model for KMI by the purpose of continuous improvement is introduced. Finally, a case study is introduced in the department of hydropower plants which is a department of WRMC that produces energy through water and has an important role in the expansion of the country, and related discussion on mentioned case.

2. Statement of problems

Grant (1996) states that KM in organizations focuses on the utilization of knowledge in order to create value by creating, acquiring, storing and deploying knowledge for products and services. But it has been shown that the organization don't act well in knowledge management (Druker, 1995). They may not pay attention to crating knowledge or may lose the knowledge which they have or may not transfer the knowledge which they acquired or may not use it in their services or their product. These days' executives are facing several major obstacles to improve their organizational and business responsiveness. The development of information communication technology (ICT) in the era of globalization and competitive business environment indicates that agile organizations are able to better sustain in a competitive and volatile industry. Organization can be agile respond by creating, capturing, sharing and leveraging their knowledge.

How to implement KM into an organization in proper way is a question that made the researcher motivated to do this research in order to evaluate the current knowledge management practice in WRMC and demonstrate a model for implementing knowledge management and accomplish it in the company under study in order to verify

and validate the performed research.

3. The research definition

3.1 Knowledge

Knowledge can be considered as an abstract thing which can be seen in many forms, and located everywhere around us. Knowledge resides in many locations and things, such as in human heads, skills, action (Newell, et al., 2002), work practices (Brown & Duguid, 1998; Davenport and Prusak, 1998), organisation routines (Badaracco, 1991; Davenport & Prusak, 1998), procedure manuals, books and other codified materials (Sutton, 2001), and norms (Davenport & Prusak, 1998).

3.2 Knowledge management

Knowledge management is defined as a conceptual framework of activities and perspectives in order to gain, deal with, and benefit from the corporation's knowledge assets (Wiig, 1994). KM is associated with organizational objectives or strategy (Sunassee & Sewry, 2002), KM is connected with organizational processes and emphasis of their relation (Malhotra, 1998), KM is linked with information, communication or knowledge technologies (Carey, 2003).

3.3 Knowledge creation

Knowledge creation involves generating and discovering new knowledge of any types (AlHawamdeh, 2003)

3.4 Knowledge sharing

Knowledge sharing is the transfer of knowledge between people or organizations (Keong & AlHawarden, 2002). Knowledge transfer is concerned with knowledge flows or dissemination to other parts of the organization or other organizational members (Gupta, Sharma & Hus, 2004).

3.5 Knowledge storing

Knowledge storing is concerned with storing knowledge in a proper way in order to be possible to use (Jashapara, 2004).

3.6 Knowledge utilization

Knowledge utilization is concerned with using and applying knowledge to work processes or business functions (Jashapara, 2004).

3.7 Agility

Agility is the ability to survive in a continually changing and unpredictable business environment. It is a comprehensive response to the challenges of profiting from rapidly changing and continually fragmented global markets for high quality, high performance, customer configured goods and services. Agile organizations and individuals not only survive but also take ample advantage of the uncertain, changing environment and create greater opportunities for themselves. Organizational agility (OA) is the capacity to be inherently adaptable without having to change. For a company, to be agile is to be capable of operating profitably in a competitive environment of continually and unpredictably changing opportunities. For an individual, to be agile is to be capable of contributing to the bottom line of a firm that is constantly reorganizing human and technological resources in response to unpredictably changing customers and business opportunities. All in all, agility is about profits and successfully winning the market share in the very eye of the competitive storm. Agility in addressing new ways to

manage enterprises for quick and effective reaction to changing markets, driven by customer designed products and services, has become the dominant vehicle for competition (Zhang, 2007)

3.8 Hydropower

Hydropower, hydraulic power or water power is power that is derived from the force or energy of moving water. Hydropower which is called clean energy is the renewable energy source.

3.9 Hydropower plants

Hydropower plan is a power plant that uses moving water to a turbine generator to produce electricity.

3.10 Water Resources Management Company (www.energy.gov)

The mission of Water Resources Management Company is to identify water resources and provide programs, policies and approaches for managing and putting into operation of water resources and offering good recommendations for proper operation from water recourses.

3.11 Department of hydropower plants

The mission of the Department of Hydropower plants is to conduct research and development (R&D) programs that will improve the technical, societal, and environmental benefits of hydropower and provide cost competitive technologies and approaches that enable the development of new and incremental hydropower capacity which will result in increasing the clean energy that has an important role in the expansion of economy of the country and this department is located in Water Resources Management Company (www.hydropower.id.doe).

3.12 Continuous improvement process (CIP or CI)

CIP is an ongoing effort to improve products, services or processes. These efforts can seek "incremental" improvement over time or "breakthrough" improvement all at once.

3.13 Deming cycle: The wheel of continuous improvement

A model (made popular by Edwards Deming) describes an iterative process designed to drive continuous improvement.
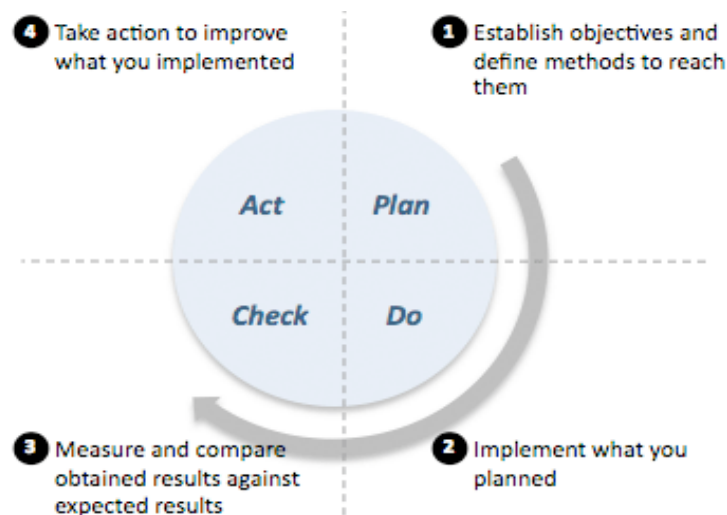
Fig. 1   The Deming cycle

This process has four main steps (see Fig. 1):

(1) Plan: establish objectives and define methods to reach them;

(2) Do: implement what you planned;

(3) Check: measure and compare obtained results against expected results;

(4) Act: take action to improve what you implement.

3.14 The EFQM excellence

Model is a non-prescriptive framework based on nine criteria. Five of these are "enablers" and four are "results". The "enabler" criteria cover what an organization does. The "results" criteria cover what an organization achieves. "Results" are caused by "enablers" and feedback from "results" help to improve "enablers". The model, which recognizes there are many approaches to achieve sustainable excellence in all aspects of performance, is based on the premise that excellent results with respect to performance, customers, people and society are achieved through leadership driving policy and strategy, that is delivered through people partnerships and resources, and processes(Business Excellence, 1998).

4. Research design, limitations and delimitations of the study

4.1 Research design

This research uses qualitative and quantitative methods with narrative research. This is because narrative research focuses on the lives and experience of individuals in connection with social events and other people (Clandinin & Connelly, 2000; Creswell, 2005).

4.2 Limitations

The shortage of resources and documents about KM, willingness and the number of cases and respondents (the researcher delivered 120 questionnaires among managers and staff that just 92 were backed) are some limitations and risks that might affect the proposed research.

4.3 Delimitation of study

Given the limited time available for this study, it focuses on a single case study.

4.4 Document analysis

The data collection phase of this research began with document study before going on to the other techniques, but this also occurred concurrently. This is because documents provide a mental image for researchers (Mason, 2006), and useful information and guidelines for the other data collection techniques (Frechtling & Sharp, 1997). Documents are a rich source of data order to identify the social research (Punch, 2005). The researcher started by examining leaflets, books written, research, reports and photos about knowledge management. Then, the researcher delivered some questionnaires in Water Resource Management Company.

5. Proposed model

Model of KMI has to be based upon a concrete definition of KM. It must be obvious what is KM and what should be the main outcomes of model deployment. The authors demonstrate this model for implementing knowledge management in WRMC by using the knowledge management concept and by taking advantages of the concept of excellence model, and the authors are going to show that by deploying the model which is a proper way of KM, it can be successful to help organization to be agile. Agility in addressing new ways to manage enterprises for quick and effective reaction to changing markets, driven by customer designed products and

services, has become the dominant vehicle for competition (Sharifi, 2007).

The proposed model has initiation, planning, executing, monitoring, controlling and closing phases. These phases clearly depict continuous improvement. Moreover, the core of proposed model is designed in three main sections. Section 1 constructs strategy formulation, execution of KM, monitor and control are section 2 and section 3 respectively. The proposed model initiation phase is acquiring support of top managers. The proposed model closing phase is documentation of results and compiling lessons learned for future applications. The proposed model is shown in Fig. 2.
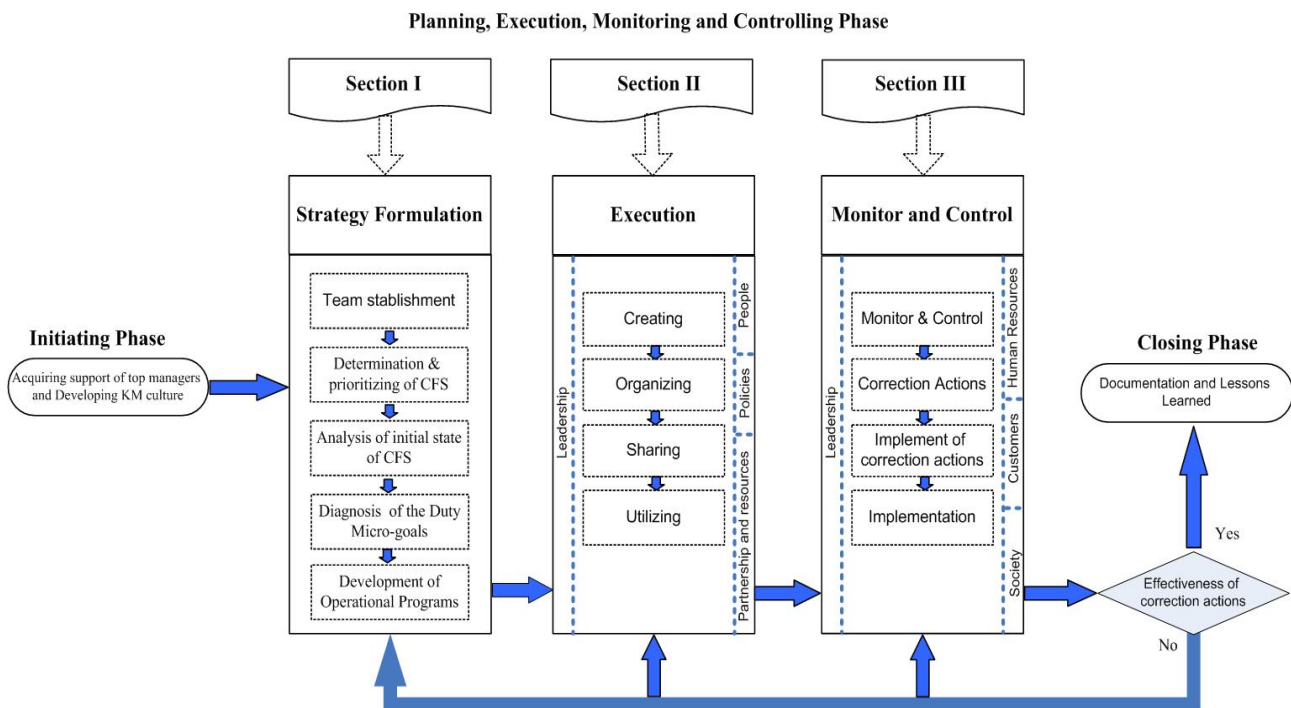
Fig. 2   The proposed KM model with considering continuous improvement

5.1 Strategy formulation (section 1)

(1) Assembly of a realization team and training the knowledge management concept

A team which will be responsible for the whole process of KM implementation is developed, in developing the teams, care should be taken of that various viewpoints and different specialties exist in the teams.

(2) Determination and prioritizing of critical factors of success (CFS)

In this step, the members are asked to describe the original goal of their department, and after instructing the concepts of the critical factors of success, all the members are requested to discuss the critical factors of success of the organization (factors in the organization, which failure to access them will make it impossible to achieve the organization goals). The members will reach some critical factors of success after discussion. The critical factors of success will be prioritized by multi attribute group decision making (MAGDM) techniques.

(3) Analysis of initial state of CFS

The main objective of this phase is recognition of knowledge that is essential for CSFs via which we can access the objective goal, and we call it knowledge asset, team create an integrated view on the current state of the CSFs, specification of its strengths and weaknesses, then analyze the obtained results, SWOT matrix may be a

proper technique, the outcomes are strategies, among them the strategies which cause organizations obtain their objective goal according to knowledge are called knowledge strategy.

(4) Diagnosis of the duty micro goals

The team members interpret the approaches in their own units.

(5) Development of operational programs

The members prepare operational programs related to approaches.

5.2 Execution (section 2)

In this stage, operational programs are performed and are controlled and reviewed by the help of predetermined indices. We took advantages of excellence model's concept for designing our model.

- Leader should demonstrate his commitment to a culture for exploit knowledge, he should personally ensure that KM system is developed and improved; his interaction with costumers should be based on the knowledge.

- People should be planned, managed and improved. They should be empowered in knowledge asset and rewarded for contribution knowledge asset.

- Policies should be developed and reviewed base on knowledge and be deployed through key process.

- Partnership, technologies and resources should be managed in a way to add knowledge asset.

- KM process should be systematically designed according to knowledge asset, product and services should be based on knowledge asset.

5.3 Monitor and control (section 3)

The authors designed their model by the purpose of continues improvement. In this stage, the authors evaluate the impact of KMI on the costumer, employee, society, key process. If the results are not successful, the authors will reform each stage which is necessary. Once all this stages are completed to the fullest satisfaction, the improvement is standardized. The standardized work or product is the result of improvement initiative, but it is not stopped here. With the changing circumstances or new techniques, this standardized work, process, product or service is again subjected to further improvement thus repeating the Deming cycle again and again.

5.4 closing phase

The team documents the result and experience for the next project and uses knowledge asset in services and product.

6. Case study

6.1 Acquiring the support of the top management

The manager of Water Resources Management Company was interested to achieve competence, competitive advantages and decrease expense, and had in mind to turn the department to an agile one. One department of the company under study is hydropower plants department which has an important role in generating income for the company, in which we decide to run our model. The researchers designed a meeting and through that explained about the benefits of KM implementation by using the experiences of successful organization which used KM, in order to make the manager interested in implementing KM in that special organization in accordance to its model.

- Team establishment: A team was organized from the staff with different specialties, the members of team were selected from managers and employees, some training courses about KM concept were celebrated.

- Determination and prioritizing of CFS: The members were asked to talk about objective goal of hydropower plant department. They mentioned that increasing the generation of clean energy is the most important goal of this department which makes profit and competitive advantages for WRMC, after that, they were requested to find CSFs for achieving the goal. The members searched the internal and external documents about Hydropower development, the ways to increase generated energy. They used their own knowledge and experience and the one which acquired by reviewing internal and external documents and listed some CSFs all of which are essential to increase the quality identity mentioned here.
  - Decreasing outage rate.
  - Management and human resource development.
  - Technology management.
  - Procurement management.
  - Financial management.

According to the measured weights by MAGDM, among 5 of the CSFs which had the maximum weight, decreasing outage rate gained 70% of the weights, and it was the most important critical success factors.

- Analysis of initial state of critical factors of success. In this step, the team should recognize the knowledge which is essential for CFSs. The members were requested to find the strength, weakness, opportunity and threat of the CSFs, SWOT matrix was used. Some knowledge strategies were obtained. For example, for decreasing outage rate, the members need knowledge which enables them to control outages, like:
  - Optimization knowledge, preventive maintenance knowledge, monitoring knowledge.
- Diagnosis of the duty micro goals: The staffs were organized into three teams including: maintenance, optimization, planning and controlling team and training course for improving their knowledge was taken into consideration. Preparing optimization, performance and planning and controlling tools and purchasing software was taken into consideration. The board of members were persuading for preparing budget.
- Development of operational programs: Operational programs and time schedules for training courses via successful companies and the list of essential tools and software were prepared.

6.2 Execution of proposed KM model

In this stage, the leader demonstrated his commitment to a culture for exploit knowledge. He took part in knowledge management meetings and had interaction with customer based on their knowledge, the policies developed and reviewed base on knowledge, and were deployed through CFS and key process. Technologies were managed in a way to add value to knowledge asset. KM processes were systematically designed according to knowledge asset which was known according to knowledge strategy in the last stage. Employees took part in the training courses by the purpose of improvement regarding knowledge and were empowered in knowledge asset acquiring knowledge, sharing new knowledge, leveraging their knowledge to satisfy costumers and increase generation of energy and quality of their services. Intranet, corporate portals websites which is an electronic gateway to a comprehensive pool of information about optimization, maintenance and planning, controlling and integration was established in hydropower plant department, and staffs were asked to do projects in groups.

Formal and informal knowledge sharing and college wide FAQs were done. Time table schedule was designed and a project was chosen as pilot. Since many scholars affirm that reward and incentive systems can influence the motivation and willingness of organization members to share knowledge and contribute knowledge

asset (Bartol & Srivastava, 2002; Gupta & Govindarajan, 2000a; Hislop, 2005; Smith & McKeen, 2005). Reward and incentive systems to encourage organizational members to participate in KM were both extrinsic and intrinsic. Extrinsic reward and incentive systems were concerned with tangible values provided to motivate organizational members to work towards particular goals (Amabile, 1993; Bartol & Srivastava, 2002). Formal knowledge sharing through information technology, such as intranets and knowledge databases, was consistently evaluated and rewarded with extrinsic reward systems.

6.3 Monitor and control

The impact of knowledge management was measured on costumer, society satisfaction and key process like: profit productivity, increasing of generated energy, capital, the share of stockholder, that we saw good growth in all of them, which are the signs of agile company.

6.4 Closing file

The team documents the result and experience for the next project and use knowledge asset in services and product.

7. Obtained results

The creation loop stands in the top in the organization under study, and the sharing loop at the lowest, it means people are not interested in sharing knowledge, therefore some improving comment should be prepared (see Table 1). The result has shown that most of people in WRMC which create knowledge prefer to organize it for themselves rather than share it.

The results are obtained after implementing the knowledge model in Table 2.

Table 1   First knowledge management practice (before applying proposed model)

Loops	Grades
Creating knowledge loop	75.5%
Organization loop	58.4%
Sharing loop	42.1%
Leverage loop	44.18%

Table 2   Second knowledge management practice (After applying proposed model)

Loops	Grades
Creating knowledge loop	82.5%
Organization loop	61.4%
Sharing loop	63.1%
Leverage loop	78.18%

The result has shown an improvement in all loops, employees create the knowledge, organize the knowledge in a way that is accessible for everyone whenever is needed as soon as possible, they prefer to share the knowledge rather than keep in their mind and of course, they use the knowledge which prepare competitive advantages for them in their product, services and use knowledge in facing with changes.

Grade increment rate is the comparison between the grades of the first KM practice and the second KM practice (after applying proposed model) which show that grades for each loop has been increased remarkably through continuous improvement, for instance, the grade of sharing loop of the first practice is 32.10% and the grade of the same loop in the second KM practice is 63.10 which 96.57% is increment rate. Therefore, KM practice increment rate is computed as follows:

$$Grade_{Increment}\% = \frac{Grade_{first} - Grade_{second}}{Grade_{first}} \times 100\% \tag{1}$$

Consequently, the grade increment rate of KM practice is presented in Table 3 for each loop. These increments can depict that the proposed model is making a better result in accuracy of the criteria for each loop in KM practice. Moreover, comparison is shown in Table 3.

Table 3   Grade increment rate

Loops	Increment rate
Creating knowledge loop	10.69%
organization loop	6.20%
Sharing loop	96.57%
Leverage loop	54.32%

8. Conclusion

This model consists of certain steps that can assist an enterprise in knowing its knowledge asset which makes competitive advantages for company, develop it and evaluate its impact on society, employee and key process. Its creation was based on the establishment of KM definition and taking advantage of the excellence model concepts by the purpose of continuous improvement, since knowledge is a strategic resource for twenty-first century, managing this strategic resource would profit organization in all aspects, this model includes four basic phases. These phases are the initial phase, strategy formulation, execution, monitor and control. Since to be truly agile, an enterprise must logically integrate and deploy a number of distinguishing providers with drivers and good capabilities, being finally transformed into strategic competitive edge. This model, which considers KM according to CSF and knowledge according to costumers' need and resulted in improvement of costumer, society, employee, key and resources' performance, can be a managerial approach to change organizations to agile one.

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