Science Arena Publications
Specialty Journal of Knowledge Management
Available online at www.sciarena.com
2019, Vol, 4 (2): 20-33

Creating a Knowledge Management Framework: Using After Action Review Technique in Barez Industrial Group (R & D Section)

Mohsen Ghaffari[1*], Ahmad Sepehri[2], Mahnush Momeni Landi[3]

[1]R&D General Manager, Barez Industrial Group, MSC IT
[2]Knowledge management project manager, Future Development Consultancy Co., MSC Management
[3]R&D Knowledge Management responsible, Barez Industrial Group, PHD Chemistr.

***Corresponding Author**

Abstract: *In the era of knowledge-based economics, the creation, distribution and application of knowledge are the main factors behind the development and growth of an organization; therefore knowledge and its management are essential for any attempt to succeed. In the turbulent environment of organizations along with the intensification of the competitive processes, achieving new strategic advantages and creating distinctive competences are the prerequisite for overcoming competitors. And this, above all other things, depends on the quality of knowledge and elite capital of the organizations. Knowledge management in projects and project-oriented organizations is becoming a prerequisite for competitive advantage. Barez Industrial Group is the biggest tire manufacturer in Iran. After assessing the level of knowledge management maturity, this corporation has implemented knowledge management techniques and tools since 2014. One of the focus areas on the R & D roadmap has been creating a good framework for project knowledge management. So, reaching this purpose, knowledge management framework has been designed in Barez, and the knowledge of projects has been managed by using After Action Review (AAR) technique by which result projects' learned lesson were produced and shared in a standard format. Recording experiences and projects' learned lesson, and reusing them in future projects will prevent error repetition and reduce the waste of resources in this corporation.*

Keywords: *Knowledge Management, After Action Review, Project Knowledge, Knowledge Sharing, Lesson Learned*

INTRODUCTION

Human resources, machinery and material capital used to be determining factor in the superiority of the organizations. But nowadays, organizations can not expect that the products and services which used to result in success in the past, also lead to their survival in the future; for in the age of communication and information technology, possessing the more information and knowledge makes them more distinctive of their competitors.

One of the important issues raised in the recent period is Knowledge Management (KM). KM is a rapidly evolving approach which focuses on increasing the efficiency and improving the effectiveness of organizational processes, along with the continuous innovation.

Today, most of the large organizations have found that they can be successful due to their human resources' skills and experiences, and not because of their physical and mechanical systems, so if they fail in enhancing the scientific and professional level of their human resources, they definitely will be excluded from the global market. Considering the fact that in private organizations competition stands out, KM as the main factor of acquiring competitive advantage has been considered more (Abbasi & Cheshmeganzadeh, 2015).

Davenport (1998) states that acquiring knowledge is not an easy task, and requires diligence, effort and spending lots of expenses, and the most important organizational assets are skillful, expert and knowledgeable human resources. Sharing knowledge, gaining personnel's trust, and creating the necessary foundation for collaborative works and emerging the creativity and innovation, creating value added from the knowledge gained by the agents of the organization are referred to as KM (Earl, 2001).

KM was seriously integrated into organizational discussion in the early 1990s. Hoffman et al. (2005) believe that knowledge management is the process of creating, sharing, transferring and maintaining knowledge in a manner that can be applied in an effective way in the organization. Management scholars also believe that the basis of formation, maintenance, and promotion of competitive advantage is the knowledge base of the organization (Shah Bandarzadeh, 2012).

Knowledge concepts and management

The multidimensional nature of knowledge has led researchers of different domains to address it from different perspectives. It is necessary to distinguish among "data", "information" and "knowledge" before explaining the concept of "knowledge".

Data: "data" is a string of single facts about events. The data are null and void from any judgment, interpretation and reliance on the right to act. Data is important for organizations, because it is the raw material which is essential for the creation of knowledge.

Information: in contrast to data, information is meaningful. Information must include awareness and contain variable data. Having a connection and a purpose are characteristics of information. Data is converted to information when the presenter gives it a special meaning and concept. In other words, by adding value to data, we actually convert it to information.

Knowledge: knowledge originates from information, and information originates from data. Knowledge is an organized combination of data which are produced through rules, processes, practices and experiences. In other words, knowledge is the meaning and the concept which comes from thought without which data and information are considered. It is only through this concept that information transforms to knowledge. Knowledge is created and used in knowledge worker's mind. Knowledge in organizations is embodied in not only in documents and knowledge storage, but also in work approaches, organizational processes, practices and norms.

Since various writers from different disciplines have looked at the subject of KM from different viewpoints and motives, various definitions have been presented (Faghih Mirzaee 2009); some of which are considered bellow:

- Knowledge is a combination of experience, values, environmental information, and professional insight which provides a framework for assessing and linking experiences and information (Davenport & Prussack, 1998).
- Knowledge is argumentation of information and data to access efficiency, problem solving, decision making, learning and education (Backman, 1999).
- Nonanka and et al. (2000) identified knowledge creation as an interactive spiral process between visible and invisible knowledge which consists of socialization, externalization, combination and internalization (Holsapple, 2001).
- Knowledge is a combination of data and information to which is added specialized perspectives, skills and experiences in order to provide valuable assets over helping correct decision making (Chua et al, 2005).

According to the classification given by business experts, the 1980s, 1990s and 2000 are called the decade of quality movement, reengineering and knowledge management respectively. Different authors with different viewpoints and approaches have defined KM. KM, mostly, has been generally defined as anything that organization needs to have its own way of performing its tasks and activities. This definition of KM consists of official knowledge, programs and procedures rules, intangible technical knowledge, skills and individual's experiences.

The above definition of KM includes how organizations work, communicate, evaluate the position, present novel solutions and develop novel business methodology. Furthermore, the above definition involves cultural, ethnic and value issues, and relationships with suppliers and customers as well.

- Davenport and Prussack (1998) believe that KM consists of all activities which are necessary for making knowledge available, in a way that "true knowledge" is provided for "proper people".
- KM is the explicit and systematic management of critical knowledge and processes related to creation, organization, dissemination, use and discovery of knowledge (Madhavan & Grover, 1998).
- In another definition, KM is a scheduled and structured approach for managing creation, sharing, use and profitability of knowledge as an organizational asset to enhance the corporation's ability, speed and effectiveness in delivering services and products (Pieris et al, 2003).
- KM involves all the methods by which the organization manages its knowledge-based assets; this involves the way of collecting, saving, transferring, applying, updating and creating knowledge (Wickramasinghe & Rubitz, 2007).
- Picot (2008) states that KM is necessary for applying changes in an environment which faces lots of challenges such as increasing global competition, speeding up information and aging knowledge, the dynamics of products and process innovation, and competing for more market share.
- KM refers to a process through which organizations create values by their knowledge-based assets; and this value is shared in order to create the best practices among individuals within the organization (Hartley & Rawley, 2008).
- Malhoutra introduces KM as a process through which organizations acquire skills pertinent to learning (internalizing knowledge), coding knowledge (externalizing knowledge) and distributing and transferring knowledge (Tsang, 2008).
- KM refers to a set of business processes in organizations such as the creation, storage, distribution and use of knowledge (Laudon, 2007).
- KM is a structured process for the creation, acquisition, sharing, transfer, and use of implicit and objective knowledge as an organizational asset for encouraging innovation (King, 2008).
- Skyrome (2004) and Ralf (2008) define KM as a systematic and clear management of critical knowledge and the processes thereof such as creation, collection, arrangement, distribution, use and utilization. KM requires the transformation of personal knowledge into organizational knowledge that is widely shared across the organization and applied appropriately.

Project Knowledge Management

Nowadays most of the organizations carry out their own business operations through projects, in most of which KM is considered as one of the essential steps. In these organizations, the unpredictable and unrepeatable nature of project-based activities, as well as the complexity of many projects, can increase the possibility of errors in the way the activities are carried out. In project-based organizations, the main activity starts and ends in the form of a project at a specific time, and employees find their life moving from one project to the other. Employees can experience their favorite and various works, but for being temporary, they cannot choose their occupational path alone. So companies must pay attention to employees' information and experience acquisition, and provide documentation.

Accordingly, KM in projects and project-based organizations is becoming a prerequisite for the creation of competitive advantage. This should be taken into account that the lack of KM in projects leads to elimination of knowledge asset after completion of the projects. This ultimately causes the fragmentation of organizational knowledge and the loss of organizational learning.

Benjamins (2001) conclude that the KM is a key factor in influencing project performance in terms of implementation, cost, project quality and safety. Therefore, saving and sharing knowledge must be counted as one of the most important goals of managers of project-based organizations.

Most of the corporations find that knowledge is lost at the stage of separation of project members. Corporations should try to make this knowledge available in other projects. Gaining experience from previous projects as a lesson learned from projects and disseminating them among project people can provide organizational learning and can be a useful tool for preventing repetition of mistakes and the use of solutions.

Reaching this purpose, project-based organizations, provide the conditions for the use of knowledge through learning between projects and learning within the project. Therefore, project-based organizations should be designed in such a way to be able to identify, store and maintain their organizational knowledge, and when necessary, exploit it; and moreover, recognize their knowledge needs and use the information and the new knowledge efficiently.

A project-based organization, in any time, has a set of different domestic and foreign projects. An individual may simultaneously work in different projects, and take on different roles or be a project's sponsor. An individual, while playing a role in a project, has also responsibilities in project organization, such as the project office or technical management. By delegating different roles in an organization to one person, knowledge loss can be prevented, and as documenting the knowledge of the participants in the workshop, the transfer of knowledge takes place through the implementation of value engineering at the start of the new project. Therefore, people should be assigned to several projects at the same time in order to create a reasonable balance between the individual's involvement in the company's projects and programs. In a system with multi-resource allocation and ability to adjust the work load, we can create a balance between KM and its transfer between new and old employees.

The identification of key knowledge and the ability to exploit them is a major challenge for project-oriented organizations, since project team members are usually temporary and there is no support system for information storage and as an organizational memory, there is no culture to capture and maintain information. As a result knowledge assets will be lost easily after the completion of a project and dispersion of team members.

In fact, the ability to manage project knowledge leads to an increase in the ability to collect, share project information and knowledge, and more return on investment in business project. This function enables project management authorities to perform the following tasks:

- Create an approach to report project efficiency.
- Create an effective information management system.
- Facilitate collaboration between managers, project team members and stakeholders.
- Manage the activities of virtual teams and those which are geographically dispersed.
- Implement documentation centre and projects' experiences.
- Register and use the ideas and experiences of individuals.
- Establish a learning organization among project managers.

In fact, many project-based organizations lack the skills to utilize their knowledge capital (especially experiences and lessons learned from the previous projects). Project-based organizations are always at risk of losing their organization's knowledge after projects are completed. So, nowadays, knowledge management of projects is one of the main challenges of these organizations.

Therefore, knowledge management in project-based organizations is becoming a prerequisite for maintaining competitive advantage. The support and effort of management pertinent to knowledge management, during the lifecycle of completed projects, is a lost piece. However, sharing and learning knowledge can lead to project's success and business performance improvement. Lessons learned from the experiences of a project can be shared consciously among people before the project finishes. In the absence of such a knowledge management system, experiences gained from the previous projects will not be able to improve business processes in subsequent projects.

Traditional project managers, in the past, developed effective tools and methods for planning, organizing, directing and controlling the project. The project evaluation and project learning section were those to which the least amount of time and effort were devoted. In fact, project knowledge sharing is very effective for pioneering and rapid decisions making which has a positive impact on the project's functional aspects including quality, time and cost. Salehi et al. (2012) have counted the potential benefits of implementing project knowledge management plans as:

- Improving innovation which leads to increased efficiency and effectiveness of project products and services
- Improving decision-making and faster and less mistakenly solving of problems (in terms of facing them)
- Reducing of production time and presenting products and services
- Improving of customer service delivery and increase of customer satisfaction
- Maintaining competitive advantage in the organization

Reducing costs is a measurable and short-term goal of project knowledge management. Project knowledge management in the long run can lead to faster and more accurate decision-making, overcoming internal and external barriers, creating more opportunities for innovation and improving customer relationship which also significantly reduces the costs.

Reduction in the transfer of intellectual resources of organization which entails transport costs and time lost costs and the like, is amongst those costs which can be saved through sharing knowledge in projects. Also, the reduction of costs of reworks and repetition of errors, as well as the reduction of R & D and innovation costs in the organization is due to the implementation of project knowledge management in organizations and corporations. If it is possible to collect and categorize these experiences, it will be possible to compare the problems in the current activity with the problems of the previous work, and then find their similarities and, possibly, the previous solutions can be used to solve the new ones. This will create new knowledge in the organization, and consequently it will speed up the problem solving process of projects which causes delays in projects, thus wasted time and costs will be reduced.

Appropriate organizational methods for implementing knowledge management project and how it is managed is one of the most important factors determining the competitiveness of organizations. In general, for implementation of project knowledge management, there are two main approaches:

A. McKenzie method: In this method, the first step, which is the providing of information or receiving inputs, is carried out by the executive agents and the independent technical office in the project office and is considered in the form of an initial text or any other format which is intended to provide it. In other words, executive agents of project will produce technical knowledge of the project. This method has the following advantages and disadvantages.

One of the benefits of this method is that the information is collected by the operating agent based on the project, which means that there is no need for verification of another person and also there is no need to carry out necessary coordination to do this and collect information. In addition, according to the structure of receiving inputs in this methodology, the information collected is rich and largely unproblematic.

Disadvantages of this method mainly are as: the lack of willingness or weakness of the executive agent in writing information and recording the technical knowledge of the project, the lack of recognition regarding the importance of the work's subject due to its normalization and the banal appearance from the perspective of the executive agent and, consequently, not addressing them, being scared of making some mistakes and defects in doing work, employees' fear of jeopardizing their job security in terms of recording project technical knowledge, the high pressure level of current work, and neglecting the registration of project technical knowledge.

B. Anderson method: In this method, the data collection and inputs are different from McKenzi's method. In this way, people are hired to obtain project information in this way and they will be trained to collect project information. Advantages of this method generally include:

- focusing for doing the job
- addressing and reflection of all items, including defects and mistakes (regarding the lack of responsibility of these personnel for these errors)
- high quality of work (considering that the absorbed forces have the ability to do so)

The disadvantages of this method are summarized as follows:

- Those personnel who collect the information might not access to all items.
- Collected information by the personnel might have weaknesses, defects and/or technical problems.

In summary, the Anderson method is useful for organizations whose personnel have lower education level (B.A or lower) and the work condition is relatively hard. And McKenzie method is recommended for those organizations whose personnel higher education and more appropriate organizational culture.

The processes such as identifying, analyzing, documenting, storing and retrieving (applying) knowledge can be considered for project knowledge management. The following figure has illustrated these processes.

In identifying phase some questions such as what has been done correctly? What has been done wrongly? What must have been improved? and etc. are raised.

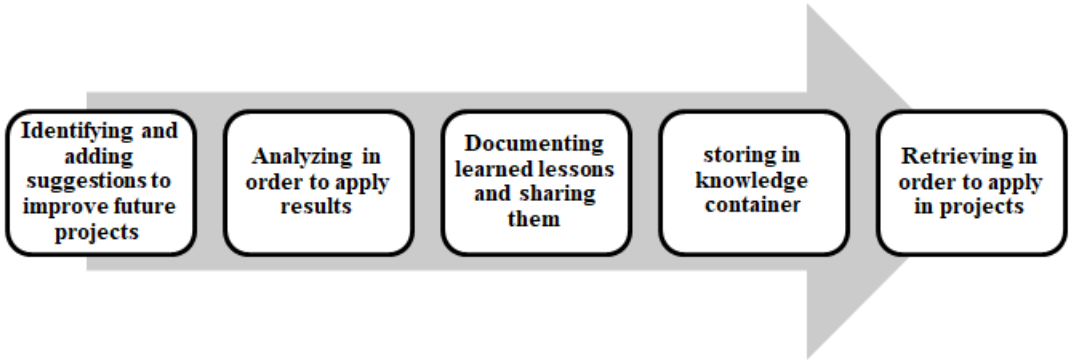

Figure 1: Project knowledge management steps

In the analysis phase, some cases such as discovering success and failure origin, identifying and determining improvements of project processes, determining educational requirements, updating educational programs, determining appropriate learned lessons to deliver to other teams and also determining ways of connection and transferring learned lessons are investigated.

The third and fourth phases are documenting and saving. These phases address some cases such as recording learned lessons, summarizing discoveries, considering former project's reports, maintaining learned lessons along with project's documents, providing learned lesson registration format, and establishing learned lesson and project knowledge base.

Retrieving and applying knowledge, the last phase of KM, considers reviewing learned lessons (before starting the new project), sharing the information with the project team, establishing an official process in the organization so as to review the learned lessons.

After action review (AAR)

Nowadays, pertinent to their needs and conditions, the organizations adapt different tools to streamline their strategies. The need to improve knowledge sharing and creation, human resources, demographic structure, knowledge life span in the organization, the level of attention to innovation and creativity, and IT infrastructure are crucial in choosing knowledge management tools for improving human resources development.

As stated, for the proper selection of KM tools, there are several factors to consider: organizational goals, organizational needs and issues, and attention to the dimensions of KM are factors that influence the choice of KM approaches and tools. They have to choose those tools which will facilitate the long-term and short-term goals of the organization. Identifying and analyzing organizational goals, activities and actions of human resources to produce products, and services, and the need for employee knowledge to improve business processes, are among the first steps that should be taken to select the best knowledge management tools. Along with the goals of the organization, the issues and needs of the organization's employees are also effective in choosing appropriate tools.

Organization staff, to improve and resolve issues, may require the acquisition of knowledge from external or internal knowledge resources of an organization or create an interactive environment to improve the quality of products and services based on customer needs. Therefore, the needs and issues that the organization faces will affect the choice of KM tools. Importantly, there are numerous KM tools available to facilitate and develop the learning and improvement of human resources and organization knowledge and the optimal choice among them to improve the business of the organization.

After action review (AAR) is the evaluation of the process and actions taken after the completion of the project or an important activity by holding meetings and allowing the members of team and team leaders to discover and learn about what happened and the reasons for it, to re-evaluate the course of implementation, and to review successes and challenges as well. In other words, the review after the action is a method for evaluating and recording the results of a completed project which allows project team members to understand what has happened and how they can maintain their strengths and improve their weaknesses.

AAR or a review after the actions can be used at the end of the project to obtain key milestones in the long-term projects. The purpose of this meeting is not to provide an evaluation report. This meeting, also, is not held for criticizing or evaluating project participants and project participants should not feel that they are being reprimanded. These meetings are an expert discussion that can be held officially or informally. In this way, everyone at each level and organizational hierarchy can comment on the project's performance.

The purpose of this method is to investigating and reviewing project's achievements in comparison to expected achievements. Learning after action, critically, is a tool for learning from project's successes and failures and transforming implicit knowledge to explicit knowledge. This is a starting point for improvements in future projects. Team members can identify their strengths and weaknesses, and find out how to improve their own performance in the future. This way, team members can document their acquired knowledge and provide it to the entire organization and thus the decision-making process can be improved.

AAR can immediately be done after the completion of project or after key milestones in long-term projects. In implementing this method, the following questions are generally used to start a discussion.

- What did you expect to happen?
- What happened in reality?
- What went well and why?
- What can be improved and how?
- What were your learned lessons which may be useful in future?

In general, AAR is a tool of learning . The meeting should be held when the team is ready to learn. The best time to implement this method is immediately after the event, because at this time, the minds of people are still emotionally and technically fresh, but as time passes the related emotions become faint.

The focus of this approach is on learning and identifying learned lessons rather than blaming and evaluating wrong decisions. But mistakes and weaknesses in decision making should be considered as learning opportunities. In order to achieve this, there must be an open and honest atmosphere for the session. The discussion must include both positive and negative points. Using one person as a facilitator can be very effective.

The facilitator helps to keep discussions intact, and help everyone to participate in discussions and not get censured. It is better if the facilitator does not have a significant role in the project. An independent facilitator can be used to implement the procedure. An independent and trained facilitator can ensure the participation of everyone. Also, the facilitator can take out the views and issues through his exploration questions.

In some projects, other stakeholders can also have helpful views and ideas for viewing processes. Before the review session, the facilitator or the person who chooses the team members must consult with external stakeholders and summarize the results for the project, or, in addition to the project manager and key members, invite project clients and project team members who intend to carry out activities to do the same thing.

AAR will be useful for the organization when its achievements be utilized in similar situations of future. During the meetings, through a professional discussion, managers and staff identify and define the required steps to improve project process. The support of managers, the prompt implementation of the method and the integrity of the participants will make the meetings more effective.

Project KM framework in research projects of Barez industrial

Barez Industrial Group has one of the most equipped R & D centers in tire industries of Iran; an equipped center which encompasses different testing and measuring equipment, different workshops and laboratories of designing and developing new products, and trained and expert personnel. Based on the composite essence of tire industry, tire manufacturing has become a high tech process whose products have an influential effect on automobile function. Therefore, tire design and optimization require a variety of knowledge in different areas such as automotive dynamics, automotive functions, chemistry and polymer science, simulation and modeling, manufacturing process and the like. This, definitely, is out of individual capacity, so the execution of each project is the result of the participation of experts in various fields. Consequently, the role of project knowledge and results along with recording and managing of them become critical so as to reuse them in similar projects of tire industry. So, in Barez R & D department, the formation of specialized teams with specific objectives for the design and development of new products, along with mechanisms such as collecting, recording, and sharing knowledge of these teams and managing the project team for achieving the expected results and recording the learned lessons have become the indispensable part of project implementation.

Project KM's structure in Barez R & D group has been formed based on the following framework. Further explanations are provided on the different sections of this framework and key points in the implementation of each step.

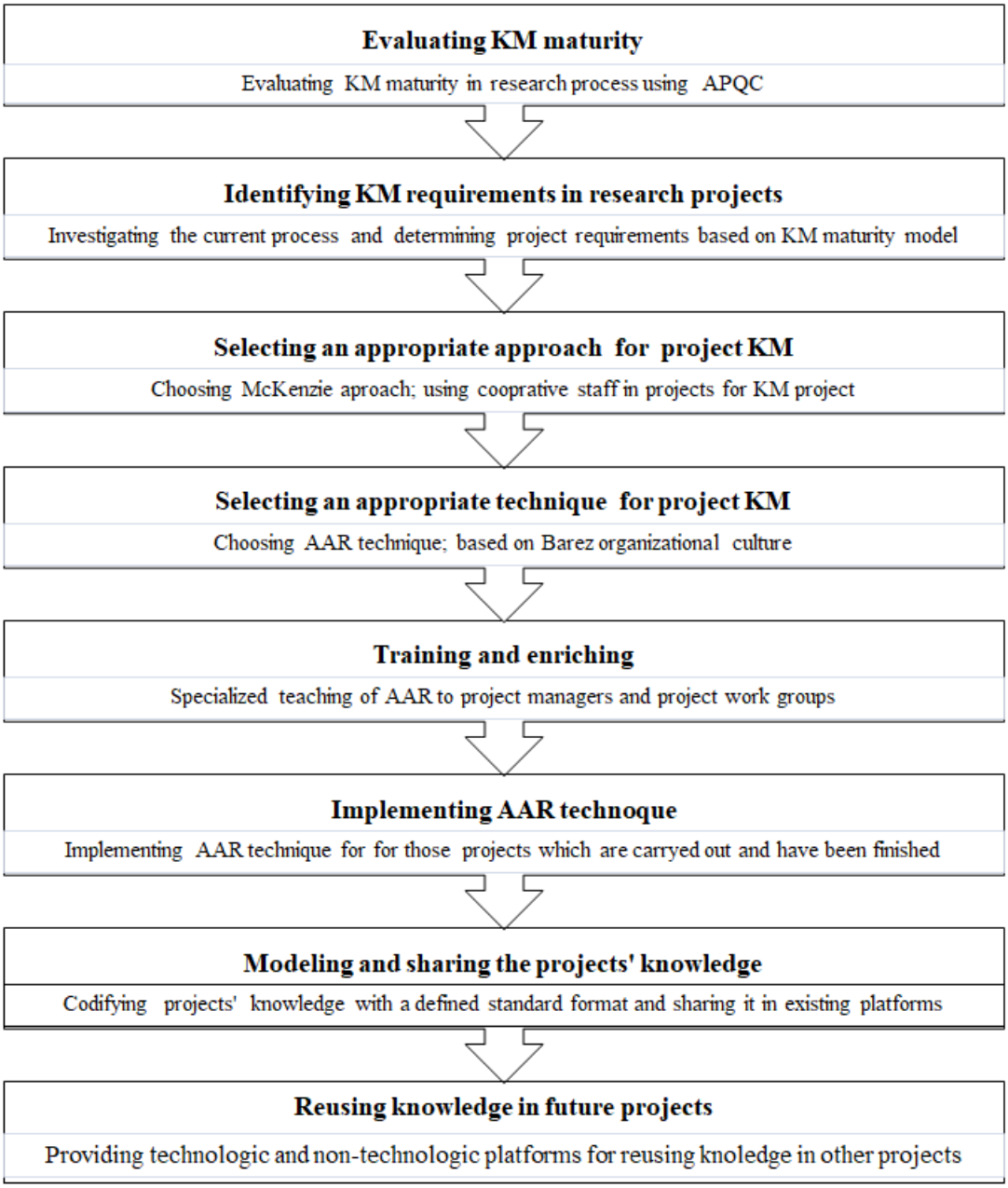

Figure 2: Project knowledge management structure in Barez R&D

Evaluating KM maturity: After evaluating the state of KM maturity by using the APQC model regarding the research and development processes in 2014, research project's KM was identified as one of the most significant improvement points in this process.

Identifying KM requirements in research projects: The main objective of this phase was to review the current KM process in projects and determine the requirements of project KM based on the KM maturity model. Reaching this purpose, various actions were designed in a four-year plan which is further elaborated. In the first step (2015-2016), in order to modify the learned lessons, the main questions of the review technique were created after the action on the software platform of the corporation and at the end of the project, the project executives were obliged to answer these questions and provide the relevant documentation. The measures taken at this stage, mostly, were aimed at designing and familiarizing the personnel with the concepts of

project KM. Based on the road map, the second step (2017-2018) began with the approach of enriching the learned lessons in the projects.

Selecting an appropriate method for project KM: Considering the educational and experimental characteristics of R & D staff in Barez industrial group, McKenzie approach was selected as the appropriate approach in project KM. This approach focuses on using cooperative partners for codifying learned lessons and project KM.

Selecting an appropriate technique for project KM: Performing projects in the group and having team work spirit in Barez industrial group, especially among R & D staff, have caused AAR technique become an interactive technique for coding the learned lessons.

Training and enriching: Reaching this purpose, first, the specialized trainings with project KM subject was held. In these trainings some concepts were explained to all R & D staff, for instance the necessity of project KM, project KM importance in guidelines and standards, different kinds of KM, difference between organizational and project KM, techniques of identifying and submitting learned lessons, and etc.

Implementing AAR technique: as it is mentioned, AAR is the main method for project KM in Barez R & D department. Considering the organizational culture in Barez industrial group and the essence of strategic research projects, an instruction was developed for this purpose whose steps has been summarized in the following figure.

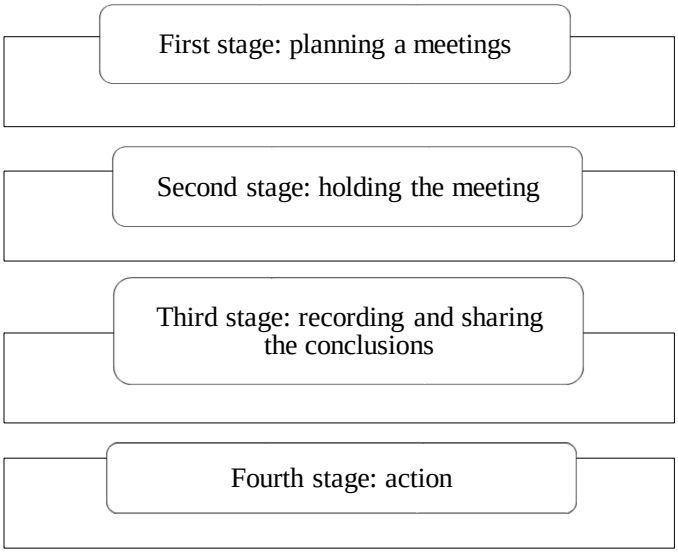

Figure 3: AAR stages

Implementing AAR is a four-stage process which will be explained more regarding each step.

Planning a meeting: when the project team decides to hold an AAR meeting, the facilitator, for the maximum of two weeks after the project's completion, determines a proper time for the meeting. In order to get positive results, it is better to:

- Hold the meetings in person and not virtually using the video conference.
- Ensure that all members of the project team are present at the meeting.
- If possible, use an external facilitator (other than project members) to manage the meeting.

The duration of AAR technique depends on several factors, such as the availability of members and the documentation of the project, but typically it is considered to be 20 minutes per person. If necessary, topics can be tracked in the second and third sessions.

In each review session after action, people with the following roles should be present:

- Project manager: based on having the comprehensive information on the conditions and manner of implementation of the project, project manager analyzes the issues and makes conclusions.
- Facilitator (meeting manager): directs topics with a critical viewpoint, and assures the attendance of all members in the discussion. During this meeting, the facilitator must hold the session timetable and, according to the specialized training that he/she has completed, will record the knowledge and results of the meeting.
- Project members: all people involved with the project activities attend the meeting.

Holding the meeting: at the beginning of the meeting, facilitator has to review the steps and procedures of those subjects under the review, so as to all the audience can find out what the AAR is and how it works. The initial introduction must include the rules and procedures for holding the discussion. The AAR meeting has some rules that all the attendees need to know about and the meeting organizer has to ensure its implementation.

- Active participation of all members in discussions is essential and necessary.
- The attitude of all members is of the same weight.
- It is prohibited to blame and reprimand people.
- There must be enough space for the new ideas.
- The attendees must be creative and express their ideas to avoid the obstacles and problems.
- Discussions have to reach consensus as much as possible, otherwise be cleared.
- The participants are committed to achieve recovery opportunities and offer remedial solutions.
- Expressed statements in the meeting are not attributed to the person without the consent of himself/herself.

Based on the participants and the subject, the meeting facilitator can select between two approaches to begin the meeting. He/she can begin the meeting by raising some questions about the project and let the discussion take place; or if the participants are completely familiar with the technique, the facilitator can identify the important issues and address one of them for the discussion. The main questions of these meetings are illustrated in the following figure.

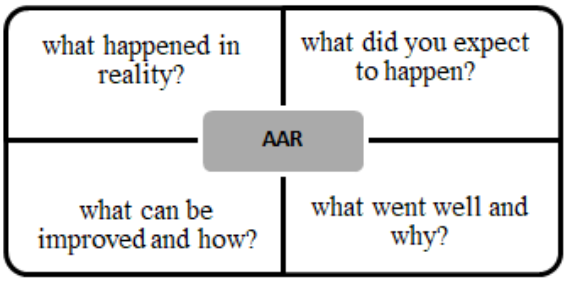

Figure 4: AAR questions that should be snswered

At the end of the meeting, important points and issues are identified and summarized. It is worth mentioning that AAR meeting must be finished with a positive statement, and present some recommendations for future improvements as well. Access to documents and results of the meeting is also shared with the participants, and the facilitator is required to categorize and record the results based on the subject in such a way that all present members in the meeting can access them.

Modeling and sharing the projects' knowledge (recording and sharing results of meeting): the facilitator is required to categorize the record the results based on the subject in such a way that all present members in the meeting can access them. Also, different ways of accessing the documentation and the results of meeting will be shared with the audience.

In Barez Industrial Group, knowledge of projects is codified and shared by a standard format called "learned lessons of project".

Table 1: Recording format of lessons learned of a project

Recording format of lessons learned of a project
Project's subject
Learned lesson's title
Issues and challenges
Explanations of the learned lesson
Results and discoveries
Complementary points

Reusing knowledge in future projects (action)**:** the most important benefit of an AAR meeting is when the results become effective in improving the activities and performance of future team works. After identifying and codifying essential and key points, the facilitator must summarize them and ensure that they will be implemented in the future activities. Regarding this aim, it is better to:

- Provide a clear summary of the improvements to be made.
- Identify the activities and the issues which require the attention of upstream managers.
- Share the results of the meeting with the authorities of each section in order to follow up and implement the improvements.
- Codify the learned lessons in a standard format to provide accessibility, therefore the learned lessons can be shared and at last reused.

Based on the roadmap, the next step in developing the project KM process in the industrial group is to create a platform of interactive software. By creating this system, all users can access the knowledge of research projects based on the defined access level and use it in various work processes. There is also a set of instructions for transferring the knowledge of previous projects to the new ones before the start of executive implementation. This activity is one of those proceedings for which executive planning has been predicted.
Another key step in continued use of AAR technique and the development of projects' learned lessons is to create a requirement for doing so. Accordingly, codifying the projects' learned lessons has become a part of the project's executive activities, and the development of a Gantt chart at the end of the main milestones there has added an activity called "codifying learned lessons". By doing this, project KM is considered as one of the main activities of all projects and the presentation of learned lessons is also considered as one of the products to be presented in the projects.

Conclusion

With the globalization of economy and the creation of massive economic networks, the creation of knowledge in the competitive market has moved toward the specialization, and in this midst, KM has increasingly grown. In such a situation, the emergence of knowledge-based organizations in the existing economic system is undeniable. These organizations have found out that knowledge is a key strategic recourse which helps them to learn what they need to know and learn in order to define and implement their own strategies. In fact, in such organizations, knowledge is the most important asset of the organization, and the success of organizations depends on their ability to create, acquire, use and transfer of this knowledge. KM is an attempt to discover the hidden knowledge in the minds of individuals and turn this hidden treasure into an organizational asset so that a wide range of decision-makers can use it.

KM in the project-based organizations is becoming to a prerequisite for a competitive advantage. This should be taken into account that with the lack of KM in projects, the related knowledge will be lost after the completion of the project. This issue eventually leads to the fragmentation and dispersion of the organizational knowledge, and the loss of organizational learning as well.

The identification of key knowledge and the ability to exploit them is a major challenge for project-oriented organizations, since project team members are usually temporary and there is no information service and support system as organization's memory to store the Knowledge. Subsequently, the knowledge is lost easily after the completion of the project and dispersion of its members.

In order to use KM approaches and promote the maturity level, Barez Industrial Group has evaluated the maturity level of KM in all organizational processes using APQC model since 2014, and regarding the obtained results, has codified an executive roadmap for each process.

One of the focus areas on the R & D roadmap was to create a good framework for project KM. Reaching this purpose, after the creation of the framework, the executive measures were planned for 4 years. The overall stages of the framework are: evaluating KM maturity, identifying KM requirements in research projects, selecting an appropriate approach for project KM, selecting an appropriate technique for project KM, training and enriching, implementing AAR technique, modeling and sharing the projects' knowledge and reusing of the knowledge in the future projects.

The technique used to integrate knowledge in this area is the AAR. This technique is implemented in an interactive context based on the four main questions: "what happened in reality?", "what did you expect to happen?", "what can be improved and how", "what went well and why?", and then the results are codified and shared in a standard format of learned lesson in R & D. recording the projects' learned lessons and experiences along with reusing them in the future projects prevents the repetition of errors and decreases waste of resources.

Last year, the technique was used for all the research projects of the Barez Industrial Group, which not only has led to developing the capabilities of R & D staff, but also has led to the sharing of their implicit knowledge in research projects. During the AAR sessions, all of the collaborators in a project, using the aforementioned structure, describe the successful experiences and failures in the project and the results are recorded in standard formats.

References

1. Abbasi,I. & Cheshmeganzadeh,R.(2015). Knowledge Management: its Implementation in Organization. First conference of organizational education in Iran. Payam noor university. https://www.civilica.com/Paper-SCSPSEI01-SCSPSEI01_083.html
2. Beckman T.J., (1999) The Current State of Knowledge Management, In the Knowledge Management Handbook, (ed). J. Liebowitz, CRC Press.
3. Benjamins, V. R. (2001) "Knowledge Management in Knowledge-Intensive Organizations", Intelligent Software Components.
4. Chua, A. and Lam, W. (2005). Why KM projects fail: a multi-case analysis, Journal of Knowledge Management, Vol. 9 No. 3, pp. 6-17.
5. Davenport,T. & Prussack,L. (1998). Working Knowledge: How Organizations Manage what They Know. Harvard Business School Pres.
6. Earl, M. (2001). Knowledge management strategies. Journal of Management Information Systems 18(1): 215–223.
7. Faghih Mirzaee,S. (2009). A framework for knowledge strategy. Motaleat e Modiriat biquarterly Journal of Management and Accounting School.Vol,19. No.59.Winter and Spring 2009.
8. Hartley,R. & Rawley,J. (2008) An Introduction to Managing Access to Information . Aldershot: Ashgate Publishing Limited.

9. Hoffman,J.J, & Hoelscher,M,L & Sherif,K.(2005). Social capital, knowledge management, and sustained superior performance. Journal of Knowledge Management 9(3):93-100 · June 2005
10. Holsapple, C.W. and Joshi, K.D. (2001). Organizational knowledge resources. Decision Support Systems, Vol. 31 No. 1, pp. 39-54.
11. King, W.R. (2008). An integrated architecture for the effective knowledge organization. Journal of Knowledge Management 12(2): 1367–1380.
12. Laudon,K,C. (2007). Management Information Systems: Managing the Digital Firm - 9th edition. Pearson Prentice Hall, Pearson Education, Inc., Upper Saddle River, New Jersey.
13. Madhavan, R., & Grover, R. (1998). From embedded knowledge to embodied knowledge: New product development as knowledge management. Journal of Marketing, 62, 1-12.http://dx.doi.org/10.2307/1252283
14. Nonaka, I., Toyama, R. and Konno, N. (2000). 'SECI, Ba, and leadership: a unified model of dynamic knowledge creation'. Long Range Planning, 33, pp 5-34.
15. Picot A, (2008) Reichwald R, Wigand R. Information, Organization and Management. Berlin/Heidelberg: Springer.
16. Pieris, C., David, L. and William, M. (2003). Excellence in knowledge management: an empirical study to identify critical factors and performance measures, Measuring Business Excellence, Vol. 7 No. 2, pp. 29-45.
17. Ralph,L,L. (2008). An Investigation of a Knowledge Management Solution for Reference Services. Nova Southeastern University. Thesis for Doctor of Philosophy in Information Systems (DISS).
18. Salehi,A. & Ahmadi,A & Sharif,H. (2012). Knowledge Management. Payam-e-Noor University.Tehran
19. Shah Bandarzadeh,H.(2012). A model for Implementation of Knowledge Management. The first conference of Menageent Strategies.Azad University. https://www.civilica.com/Paper-IMIIMAIEO01-IMIIMAIEO01_023.html
20. Skyrme,D.J. (2004). Knowledge Management: Making it Work. Resources, http:// www.skyrme.com>, (accessed 2/12/2004).
21. Tsang,E,W,K.(2008). Knowledge management and innovation strategy in the Asia Pacific: Toward an institution-based view. Asia Pacific Journal of management 25(3):361-374 · February 2008.
22. Wickramasinghe, N., Rubitz, D. (2007). Knowledge based Enterprise: Theories and Fundamentals. Idea Group Publishing.