

Identifying and Prioritizing Appropriate Tools of Knowledge Acquisition and Transfer in National Iranian Oil Company: a Benchmarking of Leading Oil Companies in the World Using Group AHP

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ABSTRACT

Nowadays, knowledge and information is the largest asset of organizations and human beings and having it can lead to a powerful and certainly valuable organization. The purpose of this study is to identify the suitable knowledge acquisition and transfer tools in the National Iranian Oil Company (NIOC). This study is applied in terms of purpose and case study from the point of view of strategy. Given the economic conditions of the NIOC as well as the need for maximum use of the knowledge, experience and skills, it is essential to identify the more effective ways of transferring knowledge, especially to the new entrances. Using the mixed method, in the qualitative section identified the tools of knowledge acquisition and transfer by studying leading oil companies in the world in knowledge management and using the expert panel, the appropriate tools for NIOC were determined. In the quantitative part of the research using questionnaire tools and group analytical hierarchical Process (AHP) method, knowledge acquisition and transfer tools were prioritized. Findings demonstrate that the NIOC can be effective in organizing the available knowledge by focusing on community of practice, peer assist, community of learning and lessons learned.

1. Introduction

Nowadays knowledge is considered as the most important strategic resource for leading companies and

one of the tools to gain the competitive advantage in the turbulent world of business. Studies conducted among the top 200 companies in the world show that more than 88% of the managers of large and successful companies

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have mentioned knowledge management (KM) as their second main priority (Vakili and Iranmanesh, 2014).

KM, KM tools and processes (mostly acquisition, creation, storage, sharing, application), tacit knowledge and explicit knowledge in an organization become crucial for the organization's success (Raudeliuniene et al., 2020). KM is a route even an approach that focuses on knowledge initiatives by collecting, storing and applying knowledge. KM has helped many companies or organizations in developing companies or their organizations, especially for the oil and gas industry (Ramadhan et al., 2020).

In the early years of the 21st century, BP, Royal Dutch Shell, Schlumberger and Chevron were recognized as KM leaders among oil companies (Grant, 2013). Also, Haliburton and Schlumberger gained considerable reputation for their KM program (Edwards, 2009). The application of KM is emphasized to face some of the most important issues in oil and gas industry due to the special circumstances of these companies. Society for Petroleum Engineers (SPE) estimated that between 2000 and 2010, 231,000 years of knowledge and experience would be lost over the next ten years due to the retirement of petroleum engineers and other technical staff (Grant, 2013). A similar challenge has existed for the National Iranian Oil Company (NIOC).

KM in the modern age has made dramatic changes in management disciplines. KM (by KM processes and acquisitions tools) seeks to capture the knowledge, wisdom and value-added experiences of employees as well as to implement, retrieve and maintain knowledge as an organization's assets. Implementing and implementing a KM system is one of the vital ways to record and refine and share the experiences of individuals in the organization (Mirzaei, 2020). Researcher's field studies show that there are capable people in NIOC who, because of the lack of a KM system and acquisitions tools, it is not possible to acquire, transfer and apply their knowledge, skills and experience; while this knowledge is able to solve many problems and challenges of the company. It is important to pay attention to due to the fact that in the current situation of NIOC and reducing the participation of international oil and gas companies, relying on domestic capacity and using the knowledge, creativity and innovation of employees can reveal many advantages to overcome the challenges. Here, what is important is to identify the tools for acquiring and transferring knowledge to share knowledge in NIOC.

Therefore, the best ways to acquire and transfer knowledge in NIOC was discovered and studied which

can provide effective solutions for large companies and organizations in the country. The preliminary investigations of researchers in NIOC showed that activities on KM were performed that have been as partially recording the knowledge of experienced and retired employees. In other words, no effective action has been taken in acquiring and disseminating knowledge as well as designing mechanisms for transferring and sharing knowledge, especially in plans and projects.

On the other hand, studies show that an organization puts a lot of effort into keeping it innovative and acquiring sustainable competitive advantages if it does not store and disseminate its critical knowledge in proper place (Abbas et al., 2020). Literature related to knowledge mentions that KM via KM tools acquisition and sharing as well as KM processes affects an enterprise's performance (Van Aswegan and Retief, 2020; Andreeva and Kianto, 2011). Many researches demonstrate the benefits of KM in achieving sustainable innovation in organizations. They create that KM and organizational innovation processes are integral part of the progress and survival of the enterprises (Abbas et al., 2020). Also, those organizations that are not having a KM system are unable to develop individual and organizational learning skills and abilities (Cabeza-Pulles et al., 2019). Some studies stated that employees that share knowledge across the company, helps the organization in bringing sustainability through innovative and new products (Cegarra-Navarro et al., 2019).

Furthermore, digital transformation threatens the stability of organizational knowledge flows. Rifts may emerge as companies shift to new technologies and ways of working, and critical knowledge is often lost when systems, roles, and corporate structures change. KM teams with emphasis on knowledge acquisition and transfer have a lot of work to do in this fast-paced and high-risk environment (APQC, 2019).

Therefore, the main question in this study is that; what are the more suitable knowledge acquisition and transfer tools in the NIOC?

In this study, firstly in the qualitative section, after reviewing the literature, the experiences of the world's leading oil and gas companies on KM with a focus on tools and methods of knowledge acquisition and transfer were investigated. In this section, benchmarking and expert panel would be used. Then, the research questionnaire was designed taking into account the Analytic Hierarchy Process (AHP), so that respondents can provide their views on the effectiveness of each



method of knowledge acquisition and transfer. the research method and steps of doing this research has been expressed in detail in 2.2 section.

2. Materials and Methods

2.1. Materials

Knowledge is an intellectual asset owned by each organization that greatly influences the performance of the organization (Ramadhan et al., 2020). KM is considered as a tool to increase intangible assets, which in turn guarantees tangible assets and financial success. To fully implement KM in an organization, different topics such as the human aspects of knowledge workers directing, improving interactions to create and share knowledge, the processes of acquiring knowledge, using customer knowledge and measuring an organization's performance for increasing the intellectual capital included. The culmination of this journey is the new application of existing knowledge, creation of new knowledge and the role of management in promoting innovation (Pasher and Ronen, 2011).

Knowledge management is the process by which organizations create value through their knowledge-based assets (Hartley and Rowley, 2008). Although KM has been raised for a long time, its application, especially in the oil and gas industry, has not been remarkable or has failed. Moreover, no significant studies have been conducted on KM, its processes and systems in the oil and gas industry of developing countries (Badpa et al., 2018).

Asian productivity organization (APO) in its report titled "knowledge management tools and techniques manual" has been divided the methods and tools of KM, especially with emphasis on acquisition and transfer (sharing), into IT based and non-IT tools and methods. Peer assist, after action review, communities of practice, storytelling and knowledge café are some of the most important non-IT tools and methods. Also, knowledge base, social network services, building knowledge clusters and expertise locator are some of the most widely used IT tools and methods (APO, 2010). Studies in oil and gas companies demonstrate that some of these tools are used. In addition, other applicable tools in oil and gas industry would be introduced in result section of this study (1.3 part) too.

The stress of KM tools and techniques has been maneuvered to share knowledge through communication and collaboration tools which specify the shift from process to practice. KM is not one single discipline. Rather it is an integration of numerous endeavors and

fields of study (Ghani, 2009). On the other hand, knowledge sharing is critical to both the acquisition/creation and application of organizational knowledge, which are essential processes in organizational knowledge management (Castaneda and Cuellar, 2020). Sharing knowledge, which claimed that is considered one of the most important topics of research in management (Serenko and Bontis, 2016), is the act of making knowledge available to others. In a wider sense, knowledge sharing is the process of transference of experience and organizational knowledge to business processes through communication channels between individuals (Oyemomi et al., 2016).

Studies, especially in the field of oil and gas, indicate the positive effect of applying knowledge management on organizational performance (Badpa et al., 2018; Li et al., 2016; Elizabeth et al., 2015; Moffat and Crichton, 2015; Tanaka, 2014; Gardiner, 2014; Akeel, 2013). On the other hand, the NIOC also has a significant role in the economic growth of Iran. While in a knowledge-based economy, knowledge is considered as a source of competitive advantage (Alvesson and Benner, 2016).

Acquisition and sharing knowledge and information in organizations is increasingly important and is a vital asset for business success. Easy access to knowledge and information is very useful for employees. KM defined as the process of identifying, acquiring, organizing and disseminating intellectual capital that are critical to the long-term performance of an organization (Debowski, 2006).

Knowledge and information are essential for decision making, problem solving, interpersonal communication and relationships, improving the effectiveness of the business, performance and success (Hartley and Rowley, 2008). Today, organizations growing very fast are companies that have a better understanding of the role of KM in the organization. In a knowledge-based economy, what you know is at least as important as who knows you (Bontis, 2002). It means the tools and methods of knowledge acquisition and transfer plays a key role in firm's competitive advantage.

Although many studies show the positive effect of KM on the performance and success of the organization, KM must continue to prove its worth. Moreover, knowledge acquisition and transfer as basic stages of KM take time, but they also save time (APQC, 2019)

Knowledge tends to flow at the organization and people can access knowledge more than they use it. Organizations seek to know what they know and they start from this point; what employees know plays a key

role in the success of the organization. Although IT and innovation are important, the most important factor is the organizational culture. Investment in technology requires a thorough and accurate understanding of the needs of the end users and customers (Banjoko, 2010). In other words, although the tools and methods of acquiring and disseminating knowledge based on technology facilitate the sharing of knowledge in the organization, the important role of organizational culture should not be overlooked, what has been emphasized by researchers in the quantitative stage of this research and the questionnaires completion.

2.2. Methodology

This study is a descriptive-exploratory research that has used mixed method (qualitative and quantitative) to find the answer to the question of which tools and methods are more suitable for knowledge transfer at the level of the NIOC. First, in the qualitative section, after reviewing the literature, the experiences of the world's leading oil and gas companies on KM with a focus on tools and methods of knowledge acquisition and transfer were investigated. At this stage, by benchmarking these companies and using the qualitative method of the expert panel, the tools and methods of acquiring, disseminating

and transferring knowledge identified. There were 7 experts in this study have been selected from the perspective of mastering the subject of KM and company activities.

The experts met face to face at relatively regular intervals. These sessions lasted about eight hours for about three months with the facilitation of the researchers. During this time, the research problem was explained and the findings of the literature review were provided to them. Then, with the help of expert panel, qualified people were determined from all over the company to answer the questionnaire (judgmental sampling method).

The research questionnaire was designed taking into account the Analytic Hierarchy Process (AHP), so that respondents can provide their views on the effectiveness of each method of knowledge acquisition and transfer. In this questionnaire considering the structure and cultural conditions of NIOC to express their opinions was emphasized. The gathered date further enriched by conducting face-to-face interviews, by telephone or through online applications and as a result, appropriate tools for acquiring and disseminating knowledge were identified. The steps of doing this research has been illustrated in figure (1)

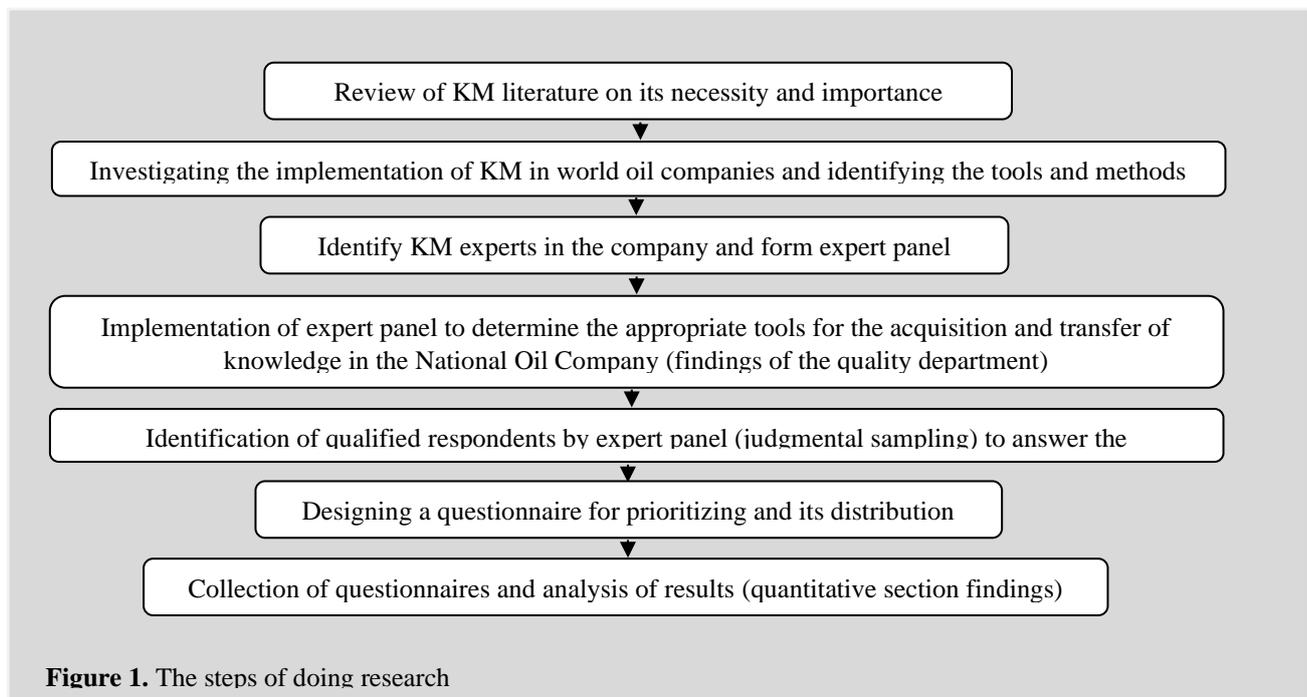


Figure 1. The steps of doing research

community. The whole community includes individuals from all subsidiaries and the headquarters of the NIOC that in fact selected by judgmental sampling method. This community is the dominant part of Iran's oil and gas industry in terms of number of employees and scope of work. The validity and reliability of investigation tools in two stages of the research shown in table (2)



Table 2. The validity and reliability of investigation tools.

Stage of research	investigation tool	Validity method	Reliability method
Qualitative section	Review of studies, Expert panel	Face and content validity: by expert opinion	Consensus
Quantitative section	Group AHP questionnaire	Face and content validity: by expert opinion as well as CVR index=1 upon Lawshe method	CR index =0.057 in AHP method

3. Results and Findings

3. 1. Findings from the qualitative part of the research

In this section, while presenting a brief description of KM in the world oil and gas industry and its conditions, various methods of knowledge acquisition and transfer

in oil companies identified using the expert pane are introduced.

a.The starting point and motivation of KM in the oil and gas industry

Studies show that each oil and gas company has a starting point for using KM tools in their company. Some of them are mentioned in Table (3).

Table 3. The start point of KM in the oil and gas companies (Grant, 2013)

Company	Year of acceptance of KM	Starting point of KM
Royal Dutch Shell	1995	Organizational learning initiatives through corporate planning (e.g. scenario analysis, cognitive maps)
British Petroleum (BP)	1996	Organizational learning, transfer of best practices to upstream
Chevron	1996	Transfer best practices and cost savings to Chevron's downstream businesses
Schlumberger	1997	Application of IT in drilling
Halliburton	1998	Application of IT in drilling and seismic analysis

Exxon Mobil	2003	in Exxon: Application of IT in exploration and production in Mobil: Transfer the best practices to the downstream
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In most of these companies, senior managers persuaded to understand the importance of KM in the company's management system and as a key factor in improving and enhancing the company's performance. Former chief executive officer (CEO) of Chevron says: "We learned that we can learn and improve the company through knowledge. We emphasize that instead of inventing everything ourselves, knowledge can be acquired or even purchased from outside the organization. Every day that better ideas are left unused, an opportunity is lost. We need to share knowledge more and faster". Also, the former CEO of BP recognizes a similar role for knowledge and he believes that all companies face a common challenge and that is the more effective use of knowledge compared to competitors. (Grant, 2013)

Although oil and gas companies had relatively common reasons for adopting KM in the late 1990s, their circumstances were different that this had a significant effect on the accepted strategies for KM in each company. Some companies, such as Schlumberger, emphasize IT and information coding to achieve their KM goals, while some other companies, such as Shell and BP, emphasize more on human-centered approaches to KM. Nevertheless, no matter what approach each company takes, IT is an important facilitator for many technology-oriented and human-centered activities that contribute to the success of KM. Some of these tools include databases, software, portals, and groupware (Grant, 2013)

For more than two decades, the issue of KM and its application in the oil and gas industry has been paid serious attention. The growing importance of environmental issues, the rapid growth and development of petroleum technologies, the expansion of offshore exploration and drilling, the rapid and numerous changes in the integration of oil companies, the growing dependence of countries on oil and gas resources, and other cases have led to the importance of KM in the oil and gas industry.

b. Identify and introduce KM tools used in oil and gas companies

Here, some of the most important and widely used tools and methods of knowledge management are introduced with a focus on the acquisition and dissemination of knowledge in oil and gas companies. After studying these methods, the results prepared and provided to KM experts in NIOC - those who were known in KM at the company and had done significant activities in this field to implement and establish KM.

c. Community of knowledge

Communities of knowledge are virtual teams that communicate with each other through the corporate network and within organizational boundaries. Their goal is to flow and spread knowledge to different location and situations. In this regard we can refer to "knowledge, research and the best practices of the company", "expertise and personal experiences of individuals", "recommendations, suggestions and ideas obtained from the company network" and "content acquired from outside the company". Communities of knowledge in some companies, such as Shell, form and introduce three different types of forum:

- The forum has the highest level of coding and structure, which are considered the best practice forums and are maintained and validated by the community of practice.
- The lowest level of coding is discussion forum, which are voluntary communities of people who have a common interest in a particular topic (for example, knowledge management or seismic modeling).
- Task forums that is the middle ground between the two species above, and in this case, the members of a community work together to solve a problem or make suggestions about a particular challenge. In this case, members of a community may be working directly on an issue.



Each forum uses a manager or moderator whose job it is to identify members of the community, refer people with questions to people with possible answers, evaluate and adjust the content, and maintain the forum. Such a person must know who knows as much as what knowledge exist (Grant, 2013).

d. Community of practice

Among all the tools used for KM in the oil and gas industry, communities of practice widely accepted and welcomed (Wenger, 2002). Shell defines community of practice as groups of people who are geographically dispersed and share information, insights, and suggestions on a common theme, interest, or action. Schlumberger also defines them as a group of people who share a common field of expertise and need similar solutions to common problems. Despite some differences between the definition and naming of this tool in different companies, their approach to the formation and operation of community of practice is very similar. The main differences between companies in the use of community of practice are related to the degree of formality, the processes through which they are formed and the degree of support by each company (Grant, 2013; APO, 2010).

Communities of practice in different organizations are known by different titles. For example, they work for Chevron as the "best practice team", in Texaco as the "people network (PeopleNet)", and in BP as the "connect" (Rao, 2005).

e. Community of learning

Most community of learning forms around field of work or study such as geology, or topics that address new challenges. These topics are mostly topics that are either related to people's education, or people are naturally interested in or are skilled in them. Most communities of learning hold regular problem-solving meetings that are facilitated by the coordinator (McDermott, 1999).

f. Peer assist

Peer assist is a technique used by the project team that seeks the assistance of collaborators regarding an important issue they have encountered. It is part of a process that BP calls pre-action learning; Such as gathering the necessary knowledge and information before starting a project. Peer assist meetings usually last from half a day to two full days. In these meetings, the project team gains the necessary insight and information

about the project from their colleagues and the colleagues learn about the project as well as each other (Young, 2010, APO, 2010).

g. Virtual team

The opportunities created by information technology for communication, collaboration and new thinking as a result of knowledge management have led to effective actions among companies. Particularly at BP, KM was less about creating a parallel structure for knowledge sharing management, and more about making teams work more effectively. BP's virtual teams started in the drilling sector, where separate drilling teams make vital decisions with very little time for analysis or consultation and in fact benefit from closer contact with co-workers in other workplaces (Grant, 2013; Egbu and Katherine, 2002).

h. Best practice groups

Some oil and gas companies had teams or groups that recorded and shared the company's best practices throughout the organization. In Schlumberger identifying and validating the best practices is one of the main roles of communities of practice. Each member of the community is encouraged to identify best practices. Once the community has validated the practice, it is stored in the "knowledge hub". The role of the "knowledge champion" in each community is to persuade and encourage to propose the best practices, to validate these and to integrate new practices in the "knowledge repository" of the community (Grant, 2013).

It should be noted that due to the similarity of the best practice groups with the communities of practice in many companies, the expert panel of this study decided to define this method as "community of practice".

i. Lesson learned

One of the most powerful KM tools for project-based organizations is the "lessons learned" that were first used in the US military (Slabodkin, 2006). ConocoPhillips introduced group meetings where the staff from recently completed projects meet and record lessons learned from their experiences in that project. In these meetings, with the presence of an individual as a facilitator, the lessons and studies recorded in the project reports are made available to other groups (Grant, 2013).

It is clear that many of these tools have similarities and because of using in different companies, they have

different names. Table (4) shows the KM tools that are mostly used in the studied companies.

Chevron emphasizes that KM is not just about people-to-people communication and IT, but redesigning work processes is an important part of it. Chevron needed to find a simple and effective way to access the company's data and information. But many existing software tools either did not work together or did not work in the same databases. To increase the efficiency of the staff, it was decided to create a central data repository on the one hand, and on the other hand, use a set of tools that can connect work processes and redesign them (Smith et al., 2001).

Statoil, like other large oil companies, was decentralized and needed to find a way to transfer experience, share best practices, and create network. Also, many projects

were underway and it was necessary that most of the time of the people in the projects not be spent on collecting information.

The ability of BP to leverage knowledge is at the heart of its competitive strategy. Instead of relying on its fundamental research, BP learns from its partners and disseminates the knowledge gained rapidly at the company. BP does this not by creating a large electronic library of the best practices, but by connecting people in a way that they can think together.

Table 4. KM tools in studied oil and gas companies

Company	KM tools
British Petroleum (BP)	Community of practice, peer assist, virtual teams, connect (yellow page), daily community of practice, formal community of specialists, community of informal network, community of problem solving, email, public folders, discussion groups, Joint documentation, after action studies, good practice record, on the job experiences and agreed learning, video conference
Royal Dutch Shell	Community of knowledge, community of practice, scenario planning, community of learning, best practice forum, discussion forum, functional forum, global network (worldwide), local or regional networks, community of problem solving on the basis of software from IBM
Chevron	Community of practice, best practices dissemination, senior bee of knowledge, Internal/external benchmarking, technology brokers, networking, intranet network, video conference, classifying knowledge and documents as good ideas, good practices, teaching classes, technical and skill coaching, knowledge coaching, acquisition of knowledge from specialists, peer assist, the best local practices and the best industry practices
Schlumberger	Community of practice, , best practice groups
Aramco	Community of practice, , best practice groups, idea management system, lessons learned, best technological practices, external knowledge, determination of challenges, specialists finding, virtual teams in the form of Shark program, Repository knowledge management tool named SMARTS

3.2. Findings of quantitative part of the research (data collection and analysis)

At the beginning of the section, it is necessary to point out that the expert panel decided considering the various methods and tools mentioned in Table (3) and also the different naming them in different companies, finally in the AHP questionnaire, six tools or methods for priority

should be used. To select these six methods, numerous discussions held in expert panel, some of the most important of which are as follows:

- a. As mentioned earlier, it was decided to "best practice groups" method as "community of practice" in the AHP questionnaire.



- b. Since IT tools as well as networking and messaging software could be used as a platform for each of these methods, the expert panel decided to remove the method of “virtual teams” in the questionnaire and to provide the respondents that all methods and tools to acquire and transfer knowledge virtually.
- c. The expert panel decided to introduce “discussion forum” as “community of knowledge” according to the different levels of “community of knowledge forum” and considering the use of “functional forum” (problem solving groups), mention this group of tools for acquiring and disseminating knowledge as an independent method in the AHP questionnaire.

With these explanations, six methods were included in the research questionnaire. At the end of the questionnaire, an open-ended question was assigned regarding the opinion of experts to introduce their methods.

With the cooperation of the expert panel, 24 people were identified and introduced as experts at the company to answer the questions and according to the seven-member of expert panel, finally 31 people answered the research questionnaire. The questionnaires were designed to allow pairwise comparisons between the six selected and main tools of KM. In the designed questionnaire, six tools of knowledge acquisition and dissemination used in oil and gas companies were explained and individuals were asked to determine the importance of each method in pair comparison with other methods. Due to researcher follow-up, all the questionnaires were returned and the return rate of the questionnaires was 100%. The questionnaire emphasized that the answers should be according to the organizational structure and culture of NIOC. The group AHP method was used to analyze the data.

In using AHP for decision-making or prioritization, the use of the opinions and judgments of only one expert in forming the matrix of pairwise comparisons, which is the basis of decision-making, may not be accurate. The group AHP method seeks to combine the opinions of experts without making useless pairwise comparisons or influencing the opinions of individuals towards each other. The solution to this problem is to use a geometric mean. Because the geometric mean, while taking into account the judgment of each person, since the pairwise comparisons are done as a "ratio", it provides the best average mathematically. If $a_{ij}^{(k)}$ is a component of person

k to compare factor i with respect to j , the geometric mean is calculated as follows (Habibirad, 2007):

$$a_{ij} = \left[\prod_{k=1}^N a_{ij}^{(k)} \right]^{\frac{1}{N}}$$

Also, since almost all calculations related to AHP are based on the initial decision of the decision maker in the form of a matrix of pairwise comparisons, any errors and inconsistencies in the comparison and determination of the importance between the options will distort the final result. Compatibility ratio (CR) is an indicator that determines the consistency of judgments and shows the extent to which the priorities of comparisons can be trusted. Ensuring the consistency of the components of the pairwise comparison matrix increases the reliability of the results. The consistency ratio is obtained by dividing the consistency index (CI) by a random index (RI) as follows (Habibirad, 2007):

$$CR = \frac{CI}{RI}$$

Experience has shown that if CR is less than 0.1, the compatibility of the comparisons is acceptable, otherwise the comparisons must be repeated (Habibirad, 2007). Whereas the calculated CR for prioritizing the 6 tools of knowledge acquisition and transfer (dissemination) was 0.057 and less than 0.1, It can be concluded that the components of the pairwise comparison matrix in this study have the necessary compatibility.

After collecting the answers using group AHP method, data analysis was performed, the results of which are shown in Table (5).

As shown in Table (4), according to experts of NIOC, the tools of community of practice, peer assist, community of learning (problem solving meeting), lessons learned, community of knowledge (task or problem solving forum) and discussion forums were identified respectively as the best solutions to acquire and transfer knowledge.

After collecting data and analysis through AHP method, telephone, face-to-face and online interviews were conducted with the respondents to receive additional explanations that enrich the results of quantitative analysis. Perhaps it can be accepted that according to expert opinion, there is not much difference between four or even five methods. According to the

respondents, all of these methods in different circumstances can be suitable tools for acquiring and transferring knowledge in the NIOC.

Table 5. Results of the analysis of questionnaires using group AHP method

Rank	Methods / tools for acquiring and transferring knowledge	Weight / importance / priority
1	Community of practice (also includes the best practice groups/forum)	0.217
2	Peer assist	0.204
3	Community of learning (problem solving meeting/forum)	0.186
4	Lesson learned	0.179
5	Community of knowledge (task or problem solving forum)	0.162
6	Discussion forum	0.042
Sum of priorities		1

4. Discussion

Findings and the investigation of studies and researches show that due to the geographical distribution of the NIOC, community of practice is a suitable tool. In connection with this method, according to the mentioned examples in two companies, Shell and BP, two important factors can be deduced. First, such communities are very likely to be used where there is a process of socialization and networking. Shell and BP are very famous for this. Second, these communities are as much technology-oriented networks as social networks, and the need for a manager or moderator as the human hub and network switch is equal (Earl, 2001).

The method of peer assist and lessons learned were also emphasized due to the importance of advancing projects. Studies show that many managers, with the help of peer assist (peer groups), quickly get rid of the ambiguities they are trapped in. The group members have different level of commitment to cooperation. In addition, peer groups are usually informal and lack the power to force members to participate and cooperate. It is possible that these meetings become more of a friendly gathering than a real impact on business performance over time (Young, 2010).

Peer groups in BP had unusual characteristics; Instead of being informal networks, they were known as formal parts of the organizational design. Instead of focusing on functional managers, they focused on line managers and identified the responsibility for the profitability of each business unit. Instead of vague goals and objectives, they specified clear deliverables and instead of a simple

meeting to meet and discuss, they were able to make decisions (Goold, 2005).

Two main goals are pursued in connection with the community of learning meetings. First, by daily solving real problems, community members help each other, which in turn build trust between individuals. Second, by solving problems in a general meeting, a common understanding of tools, approaches, and solutions is formed (McDermott, 1999).

Subsequent deep interviews with experts (respondents) showed that knowledge coaching, because of the leading to transfer of knowledge and experience to younger people, is a good way to record experiences, due to the fact that it is often less possible to transfer the tacit knowledge of experienced people.

Many experts also believed that the formation of virtual teams and networking is a platform for the best performance of these tools and it is better not to be considered as a tool. In BP Company, through the groupware and video communications, online communications have been established between drilling teams in different situations, suppliers and contractors (Grant, 2013; Egbu and Katherine, 2002). However, the majority of experts emphasized that organizational culture and management support are essential for the establishment of KM and the use of these tools. It is clear that the managers will play a key role.

However, KM must become an integral part of the organization's culture, work processes, and information systems, and of course this will be the result of successful and accurate implementation of KM. Be careful that KM tools specially knowledge acquisition and transfer



methods are not used at the same time as the important point is to start with small and successful steps (Pasher and Ronen, 2011). Anyway, digital transformation presents exciting opportunities for KM to serve an even more strategic and vital role. The opportunity that start with knowledge acquisition and transfer (APQC, 2019).

Most of the experts in this study believe that although because of special economic conditions and sanctions in recent years, NIOC has not been able to achieve new technologies in cooperation with foreign companies, but due to efforts to achieve the company's goals, knowledge, experiences and skills have been nurtured in the company that can be considered as a competitive advantage of the company - knowledge and experiences that may be so widespread in less global companies. Moreover, in the field of technology, many requirements have been met by domestic knowledge-based companies. The important point is that these capabilities are recorded using the methods of acquisition and dissemination (transfer) of knowledge in this study and transferred to the next generations of the company so that they are not lost or evolved.

5. Conclusion

In NIOC as a very important company in the country's economy, the need to transfer knowledge, experience and skills from the staff especially managers to the next generation on the one hand and the importance of this knowledge dissemination in the sanctions on the other, raised the question of what solutions can lead the company to that goal more productively. In this study, first, various methods of knowledge acquisition and transfer in the world's leading oil and gas companies were studied and the final methods were determined by expert panel. Then, by designing a researcher-made questionnaire, the opinion of the company's KM experts about these methods was obtained. In face-to-face, telephone and online interviews with experts, the reasons for choosing their proposed solutions were identified and the research results were enriched. The respondent community was people who studied and cared about KM at the company and even had experience of partially implementing of the KM process in the company. At the end, it was determined that according to the conditions of the company, the tools of community of practice, peer assist, community of learning (problem solving meeting), lessons learned, community of knowledge (task forum or problem solving) and discussion forum, respectively, they will have the greatest impact on the effective

transfer of knowledge, especially in the current economic conditions of the country. The result shows that although most experts believe that it can be accepted that in terms of technology, NIOC is moving significantly slower in competition with global oil companies, there are experiences and skills in the company that can be considered as a competitive advantage of NIOC - experiences gained in the difficult economic and technological constraints of the company and may be so widespread in fewer companies in the world.

References

- Abbas, Jaffar, Zhang, Qingya, Hussain, Iftikhar, Akram, Sabahat, Afaq, Aneeqa, Afzal Shad, Muhammad, (2020), Sustainable innovation in small and medium enterprise: The impact of knowledge management on organizational innovation through a mediation analysis by using SEM approach, *Journal of Sustainability*, 2020, Vol. 12, 2407, pp.1-19
- Akeel, H. 2013. Evaluation of Information Systems Deployment in Libyan Oil Companies: Towards an Assessment Framework (Doctoral dissertation, University of Gloucestershire)
- Andreeva, T., Kianto, A., (2011), Knowledge processes, knowledge-intensity and innovation: A moderated mediation analysis, *Journal of Knowledge Management*, 2011, Vol. 15, pp. 1016-1034
- Asian productivity organization (APO), 2010, knowledge management tools and techniques manual, Hirakawacho, Chiyoda-ku, Tokyo, Japan
- APQC, 2019, Knowledge management in 2019: KM leaders double down on strategy and fundamentals in the shadow of digital transformation, www.apqc.org, US: 1.800.776.9676
- Badpa, Akbar, Salim, Juhana, Yahaya, Jamaiah, Foroozesh, Peyman & Arbabi, Mohammad Saeid, (2018), The Effect of KMS Usage on Organizational Performance in Oil and Gas Industry: An Empirical Study in the Context of Developing Economy, *International Journal of Trend in Research and Development*, Volume 5(2): 21-31
- Banjoko, Bode, (2011). Shell in the new decade: the way forward, University of Dundee
- Behounek, M. and Martinez, M. R. (2002). A tour of a successful knowledge management strategy,

- Journal of Petroleum Technology, Vol. 54, No. 11, pp. 33-35
- Bontis, Nick, (2002). the Rising Star of the Chief Knowledge Officer, Ivey Business Journal, March/April 2002, pp. 20-25
- Cabeza-Pulles, D., Fernandez-Perez, V., Roldan-Bravo, M.I., (2019), Internal networking and innovation ambidexterity: The mediating role of knowledge management processes in university research, European Management Journal, 2019
- Castaneda, Delio Ignacio, and Cuellar, Sergio, 2020, Knowledge sharing and innovation: A systematic review, Journal of Knowledge and Process Management, vol. 27(3), pp. 159-173, published by John Wiley & Sons Ltd
- Cegarra-Navarro, J.-G., Jimenez-Jimenez, D., Garcia-Perez, A., (2019) An integrative view of knowledge processes and a learning culture for ambidexterity: Toward improved organizational performance in the banking sector, IEEE Transactions on Engineering Management, 2019, pp.1-10
- de Oliveira, V. L. C., Tanajura, A. P. M., & Lepikson, H. A. 2013. A Multi-agent System for Oil Field Management. IFAC Proceedings Volumes, 46(7): 35-40.
- Debowski, S. (2006). Knowledge Management, Australia, Sydney: Wiley
- Dickel, D. G., & de Moura, G. L. 2016. Organizational performance evaluation in intangible criteria: a model based on knowledge management and innovation management. RAI Revista de Administração e Inovação, 13(3): 211-220.
- Earl, Michael, (2001). Knowledge Management Strategies: Toward a Taxonomy, Journal of Management Information Systems, Summer 2001, Vol. 18. No. 1. pp. 215-233.
- Edwards, S. John, (2009). Knowledge Management in the Energy Sector: Review and Future Directions, Operations and Information Management Group, Aston Business School, Aston University
- Egbu, Charles and Katherine Botterill, (2002), Information technology for Knowledge Management: Their Usage and Effectiveness, Edited by Abdul Samad Kazi, Journal of ITcon, Vol. 7, pp. 125-137
- Elizabeth, Lauren, D. Delaney, Kevin, Giudicati, Gianna, & Capriotti, Filippo, (2015), Knowledge management at Eni: a case study of managing knowledge in an international oil and gas company, Dublin Institute of Technology, For Knowledge Management Symposium, Dublin Castle. 12: 1-16.
- Gardiner, P. D. (2014), Creating and appropriating value from project management resource assets using an integrated systems approach. Procedia-Social and Behavioral Sciences, 119: 85-94.
- Ghani, S., 2009, Knowledge Management: Tools and Techniques, DESIDOC Journal of Library & Information Technology
- Goold, Michael, (2005), Making Peer Groups Effective: Lessons from BP's Experiences, Journal of Long Range Planning, Vol. 38, pp.429-443
- Grant, M. Robert. (2013). The Development of Knowledge management in the oil and Gas Industry, Universia Business Review, pp. 92-125
- Habibirad, Amin, (2007), Presenting an integrated model of value engineering (VE) and analytical hierarchy process (AHP) for optimal face lift design of Samand (Master Thesis), Shahid Beheshti University, Tehran, Iran
- Hartley, R., and J. Rowley, (2008). Organizing Knowledge: An Introduction to Managing Access to Information, England, Hampshire: Ashgate Publishing
- Hester, A. 2012. Measuring alignment within relationships among socio-technical components: A study of wiki technology use. SIGMIS-CPR '12 Proceedings of the 50th annual conference on Computers and People Research, 147-154.
- Kankanhalli, Atreyi, Fransiska Tanudidjaja, Juliana Sutanto, and Bernard C.Y. Tan, (2003). the Role of IT in Successful Knowledge Management Initiatives, Communications of the ACM, September 2003, Vol. 46, No. 9, pp.69-73
- Li, J., Liu, M., & Liu, X. 2016. Why do employees resist knowledge management systems? An empirical study from the status quo bias and inertia perspectives. Computers in Human Behavior, 65, 189-200.
- McDermott, Richard, (1999), Why Information Technology Inspired But Cannot Deliver



- Knowledge Management, California Management Review, Vol.41, No. 4, Summer 1999
- Mirzaei, Maryam, (2020), Effects of Knowledge Management (KM) in Chemical Industry and University by Learning Management System (LMS), International Journal of New Chemistry, Published online 2020 in <http://www.ijnc.ir/>
- Moffat, S., & Crichton, M., (2015), Investigating non-technical skills through team behavioral markers in oil and gas simulation-based exercises. *Procedia Manufacturing*, 3: 1241-1247.
- Oyemomi, Oluwafemi, Liu, Shaofeng, Neaga, Irina and Alkhuraiji, Ali, 2016. How knowledge sharing and business process contribute to organizational performance: Using the fsQCA approach, *Journal of Business Research*, Elsevier, vol. 69(11), pages 5222-5227.
- Pasher, Edna and Tuvya Ronen, (2011). *Knowledge management*, USA, new jersey: Wiley
- Rao, Madanmohan (Editor), (2005), *Knowledge Management Tools and Techniques: Practitioners and Experts Evaluate KM Solutions*, USA, Butterworth-Heinemann: Elsevier
- Ramadhan, Handoko, Permana, Majesty Eksa, Sensuse, Dana Indra, Lusa, Sofian, and Elisabeth, Damayanti, (2020), KM Maturity for A Gas Company in Indonesia: G-KMMM Assessment and Improvement Recommendation, 2020 7th International Conference on Electrical Engineering, Computer Sciences and Informatics (EECSI), IEEE, Yogyakarta, Indonesia
- Raudeliuniene, Jurgita, Albats, Ekaterina, and Kordab, Mirna, 2020, Impact of information technologies and social networks on knowledge management processes in middle eastern audit and consulting companies, *Journal of Knowledge Management*, ahead-of-print(ahead-of-print)
DOI: 10.1108/JKM-03-2020-0168
- Serenko, A. and Bontis, N. (2016). Understanding counterproductive knowledge behavior: Antecedents and consequences of intra-organizational knowledge hiding. *Journal of Knowledge Management*, vol. 20(6), 1199–1224. <https://doi.org/10.1108/JKM-05-2016-0203>
- Slabodkin, G., (2006), *Army lessons learned*. FCW: The Business of Federal Technology, July 17
- Smith, Reid, Abo, Erik, Chipperfield, Lesley, Mottershead, Chris, Old, John, Prieto, Rodulfo, & Stemke Jeff, (2001), *Managing Knowledge Management*, Oilfield Review, Spring 2001
- Syed, N., & Xiaoyan, L., (2013), The linkage between knowledge management practices and company Performance: Empirical evidence. In *LISS 2012* (pp. 763-769). Springer Berlin Heidelberg.
- Tanaka, H., (2014), Toward project and program management paradigm in the space of complexity: a case study of mega and complex oil and gas development and infrastructure projects. *Procedia-Social and Behavioral Sciences*, 119: 65-74.
- Vakili, Ali and Iranmanesh, Seyed Hossein, (2014), *Oil, Gas and Petrochemical Project Management Guide*, Tehran, Hezareh sevom Andisheh
- Van Aswegen, M., Retief, F.P., (2020), The role of innovation and knowledge networks as a policy mechanism towards more resilient peripheral region, *Land Use Policy*, 2020, 90, 104259
- Wenger, E.; McDermott, R.; Snyder, W.M., (2002), *Cultivating Communities of Practice*, Boston: Harvard Business School Press
- Wint Jr, N. 2016. An Investigation of Socio-technical Components of Knowledge Management System (KMS) Usage.
- Young, Ronald, (2010), *Knowledge Management: Tools and Techniques Manual*, Japan, Tokyo: Published by the Asian Productivity Organization