Identifying and Ranking Factors Affecting Successful Implementation of Knowledge Management

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ABSTRACT

In the developed countries, many organizations are regarded as knowledge-based businesses in which knowledge management is necessary. Today, this science is changing into integral activity of business in organizations. One of the concerns of knowledge management is its implementation. Many companies and organizations which try to start knowledge management don't ensure that the best approach is determined to accept it. Many studies have been conducted to identify factors effective on successful implementation of knowledge management but few studies have been conducted on prioritization of these factors. In this research, a method was presented to prioritize factors effective on successful implementation of knowledge management using analytic network process in which factors effective on successful implementation of knowledge management were identified considering main criteria of human resources , leadership and structure , knowledge creation and acquisition , knowledge maintenance , sharing and transfer of knowledge along with their sub criteria and they were expanded and ranked in an ANP network (Analytical Network Process) with Super Decision software . It was found that the main criterion of human resources among criteria of human resources, leadership and structure, knowledge creation and acquisition, knowledge maintenance, sharing and transfer of knowledge was ranked 1 with significant difference from other criteria and criterion of leadership and structure was ranked 2 in terms of importance and the experts also found that sub index of human resources creativity empowerment was more important than other sub indices of human resources as the most important factor in criterion of human resources. This process can be used to help the managers and planners reduce expenses of the organization through effective and successful execution of knowledge management and optimal use of knowledge management in the organizations.

Keywords

knowledge management, network analysis process

1. INTRODUCTION

Today, knowledge is very valuable and important and plays critical role in business environment. Therefore, knowledge management has been considered by different organizations. Since knowledge management has considerable effect on organizational performance, investment and activities of knowledge management are of special importance and causes creativity and increased organizational performance. Knowledge management is a process which helps the organizations identify, select, organize publish and transfer important information and the skills which are part of the organization's record and are generally available as unstructured information in the organizations. This knowledge structuring makes possible effective and efficient problem-solving, dynamic learning, strategic planning and better decision-making. For success of the organization, knowledge should be exchanged between humans as a capital and should be able to grow. Goal of knowledge management is to inform an organization of its individual and collective knowledge and use its knowledge in the most effective manner (Benent and Benent, 2003).

Knowledge management systems seek to help the organization adapt to some conditions such as loss of forces, rapid changes and small size of organization by allowing broad access to skill of human capital of the organization. They are prepared for hard organizational conditions to inform the labor force effectively. In addition, they have been made such that they can help large organizations provide fixed level of services to the customer.

Many organizations have created knowledge management systems to invest in knowledge and experience of the

personnel all over the world. In a suitable knowledge management system, knowledge is not ended at all because environment changes over time and in order for the knowledge to reflect these changes, it should be updated. Although knowledge management gives competitive advantage to the organizations, its factors should be identified and prioritized for successful implementation of the knowledge management. Considering that few studies have been conducted to identify criteria for prioritization of factors affecting successful implementation of the knowledge management in the organizations. The model provided in the present study can fill the mentioned gap. In this research, 6 main components and indices of each component have been identified which we will prioritize using ANP methodology based on carful study of main factors affecting successful implementation of the knowledge management which has been theoretically and experimentally conducted by different researchers and authorities. This research is unique in terms of presentation of a model for ranking and assessing factors effective ion successful implementation of knowledge management.

2. Knowledge Management

In simple language, knowledge management means organizing the knowledge. Knowledge management is a broad scope of activities which is applied for management, exchange, creation or promotion of intellectual capitals in an organization. Many definitions have been published for knowledge management. According to Simin, knowledge management is an intelligent design of processes, tools, structure etc in order to increase, renovate, share or improve the knowledge in which three elements of intellectual capital i.e. structural, human and social capitals are manifested. Knowledge management is a process which helps the organizations identify, select, organize and publish the important information and skills which are regarded as memory of the organization and have not been organized. This prepares the organization for problem solving, strategic planning and dynamic decision-making efficiently and effectively. Knowledge management means reaching goals of the organization with optimal use of knowledge or ability of an organization to use intellectual capital (personal experience and knowledge of each person) and collective knowledge in order to achieve its goals through process including knowledge production, knowledge sharing and its use with help of technology.

3. History of Research

3.1. Foreign Researches

Since knowledge plays important and strategic role in research organizations, the specialists should have a model for testing effectiveness of knowledge management in these organizations (Chin Kwai-Sang-2010, Lee Yaosho Hassan, 2010, Martinsons , 1997, Winch -19930. In this regard, Wan (Wan Yang Fang -2009) presented a model with 5 main criteria of personnel, data, information, knowledge and wisdom and 30 sub criteria for testing effectiveness of organizational knowledge management. He mentions that the most important problems with design of such models are: multiple objectives, difficulty of evaluation and fuzzy nature of knowledge management which should be solved. In another research, Tseng (Tseng Shu-Mei, 2008) introduces a model for evaluating performance of knowledge management based on financial and nonfinancial criteria and critical factors in order to improve quality of knowledge management system. He also mentions that suitable information technology considerably improves effectiveness and efficiency of the knowledge management executive system (Chin Kwai-Sang-2010). Many factors which can affect successful implementation of knowledge management are found in the literature. For example, factors of culture, information technology and leadership are regarded as important considerations for execution of knowledge management. Although no systematic work can be found for specifying an integrated sets of main factors of success for implementation of knowledge management. Although no systematic work has been found for specifying integrated sets of main factors of success for implementation of knowledge management (Wang -2005), many studies have been conducted to provide an overall list of success factors of knowledge management. Wang has defined success factors of knowledge management as the activities or actions which should be identified for guaranteeing successful implementation of knowledge management. He adds that these activities or actions should be cultivated if available or they should be created, if not available. These factors should be conducted as internal environmental factors which can be controlled by the company and not as external environmental forces. Considering this fact, Davenport and Prusak, 1998 have identified eight factors affecting success of knowledge management. Ryan and Prybutok, 2001 have introduced five factors. Moffet and Partkinson, 2003 presented 10 factors and recently, Chong and Choi, 2005 have identified 11 factors. Although factors presented for success of knowledge management are comprehensive and sufficient, they didn't help determine what factors are prior for implementation of knowledge management. Identification of primary factors affecting success of knowledge management should be fully considered by the organizations before implementation of knowledge management plan. Searching in literature of management shows that few efforts have been made to identify primary steps for implementation of knowledge management. It is necessary to note that the conducted studies on execution of knowledge management in the developed countries have focused on large organizations; therefore, the available factors are majorly related to large organizations and reflect position and needs of this class of organizations. Accessibility of the resources in the organization is vital because this factor can affect quality and quantity of the efforts which are made to manage knowledge. One of the available barriers to effective implementation of knowledge management in small and medium enterprises is shortage of their resources because they don't have some facilities like large enterprises and generally face shortage of resources. Therefore, resources are one of the important factors which should be considered in small and medium enterprises. It is necessary to note that some researchers have regarded this main factor as the factor which removes limitation of resources in their writings. According to the conducted study, different factors play role in success of knowledge management project and leadership and structure of organization are among the mentioned factors (Cabrera-2005, Chang Mang -2009, Egebo-2004, Hislap -2003). Among the studied criteria in application of knowledge management,

factor of human resources has been regarded as key leverage in competitive business in complex and dynamic environment (Aloson-1993, Chen Chung –Jen-2009, *Davenport-1996, Davis -1994, Edwinson -1996,* Hislap -2003, *Akmova -2006, Ultra Victor -2005,* Starbuck-1992, Tampoe-1993, Aldrich-1998, Van Yan –Fang -2009). Fang et al. introduced a fuzzy model of 7 indices for evaluating ability of organizational knowledge management system. They mentioned that creation of knowledge, knowledge collection; knowledge maintenance and application of knowledge have considerable effect on promotion of knowledge management ability (Wan Yang –Fang-2009). Another research shows that knowledge management ability depends on two dimensions of infrastructural ability and process ability (Chang -2004, Fan Zhi-Ping, 2009, Gold, 2001). Cui et al. (Chai Ana Shaji -2005) pointed out that knowledge management ability depends on three interrelated processes: knowledge collection, knowledge conversion and knowledge application (Nonaka -2006).

3.2.Local Researches

In a paper entitled "Prioritization of Main Factors of Success in Implementation of Knowledge Management in Small and Medium Enterprises" which Kambiz Talebi wrote in 2008, the main and alternate factors were identified based on careful study of the main factors of success in implementation of knowledge management and university experts interview method, questionnaire and factor analysis instruments have been used for determining their importance and priority. Statistical population of this research includes automotive companies and its statistical sample includes the parts manufacturing companies affiliated with Iran Khodro. In another paper entitled "Study of Factors Affecting Successful Implementation of Knowledge Management "which Abdolhossein Nisi has written in 2009 , the perceived importance and scientific implementation of five factors affecting successful implementation of knowledge management in Telecommunication Organization have been measured and these five factors include : business strategy, structure of organization , knowledge management team , knowledge auditing and knowledge pln. Data were analyzed through parametric indices and statistics using factor analysis and ranking of mean factors. Findings show that managers of Ahwaz Telecommunication Organization are aware of importance of factors effective on implementation of knowledge management but these factors have been less considered in terms of practical implementation. In a paper entitled "determination and prioritization of main factors of successful implementation of knowledge management in small and medium enterprises of the country" which Changiz and Almohammadi wrote in 2009, there are 12 main factors of success for implementation of knowledge management. Based on these main factors of success and the related elements, an instrument was developed as a questionnaire to determine their importance and priority from the viewpoint of experts in knowledge management field. Reliability and validity of these instruments particularly structural validity have been studied and confirmed using factor analysis with help of statistical tests. Then, importance and priority of these main factors of success were analyzed through which leadership and support of senior management and organizational culture were regarded as the most important main factors of success and rewarding, motivation and benchmarking were regarded as the least important factors and rank. In a paper entitled" determining prioritization of criteria affecting effectiveness of knowledge management in Iran research organizations with comparative pattern" which Bijan Nahavandi wrote in 2011, six factors affecting successful implementation of knowledge management have been regarded and have been ranked using fuzzy Analytical Hierarchy *Process and the obtained results show that criterion of human resources was ranked one and finally the above model was used to evaluate effectiveness of knowledge management in 9 Iran research centers.*

4. Variables Studied in a Conceptual Model

Many factors which can be effective on successful implementation of knowledge management are observed in literature. It was concluded from the review of literature that different factors had been effective on implementation of knowledge management. Although different researchers have used different terms for these factors in research, these factors can be classified and mentioned according to their implications. In addition, these factors have been mentioned with different emphases in different researches. Based on review of literature, 6 factors of success have been selected for implementation of knowledge management which include human resources, leadership and structure, knowledge creation and acquisition, knowledge maintenance, sharing and transfer of knowledge and finally application and update of knowledge. For 6 mentioned components, totally 34 indices have been obtained.

This research has been conducted to answer the following questions:

- **Main Research Question**

Main question of this research can be expressed as follows:
What model is suitable for evaluating factors affecting successful implementation of knowledge management which increases decision-making power of the organization's managers?

- **Research Alternative Questions** Alternative questions of this research can be expressed as follows:

What are the factors affecting successful implementation of knowledge management?

How are the factors affecting successful implementation of knowledge management ranked?

Table 1: Components and Indices of Organizational Knowledge Management (Bijan Nahavandi , 2011)

Index	Component
The number of researching personnel in organization (ratio of researching personnel to total personnel)	Human resource
The number of specialized personnel in IT section (ratio of specialized personnel to total personnel)	
The number of human resources relating to knowledge management section (ratio of personnel relating to knowledge management section to total personnel)	
Human resources creativity	
The number of human resources' suggestions for improving affairs	
Research budget (ratio of research budget to total budget)	leadership and structure
Top management's support of knowledge management	
Proportion of organizational structure	
The organization's support of human resources creativities	
Involving lower level managers in decision making and supporting them	
Learning atmosphere in the organization (necessary incentives for enthusiasm and motivation of the personnel for learning)	
The number of local patents	knowledge creation and acquisition
The number of foreign patents	
The number of papers published in scientific journals and scientific conferences	
The number of published scientific books	
The number of published scientific journals	
Totality of data and variety and quality of information applied resources in organization	
The number of scientific sites in which organization is member	
IT budget in organization (ratio of IT budget in the organization to total budget	knowledge maintenance
Rank and degree of system structure and information network	
Ideas and knowledge registration base	
Knowledge documents standards	
Educational budget in organization (ratio of Educational budget in organization to total budget	transfer of knowledge
total general educational hours in organization(ratio of general educational hours to total educational hours)	
total special educational hours in organization(ratio of special educational hours to total educational hours)	
Volume of the organization's information which is given to the personnel by computer networks.	
Use of computer networks in organization (internet , intranet etc)	
Cooperation and integration of local information	
The personnel's use of modern knowledge	application and update of knowledge
Term of accountability to complaints of customers	
Settlement of knowledge base of customer	
The number of professional certificates and scientific rewards granted to the personnel (except for educational degrees)	
Update of information and periodical evaluation	
The number of implemented ideas (ratio of the implemented ideas to total ideas)	

Conceptual Model Diagram and Research Questions

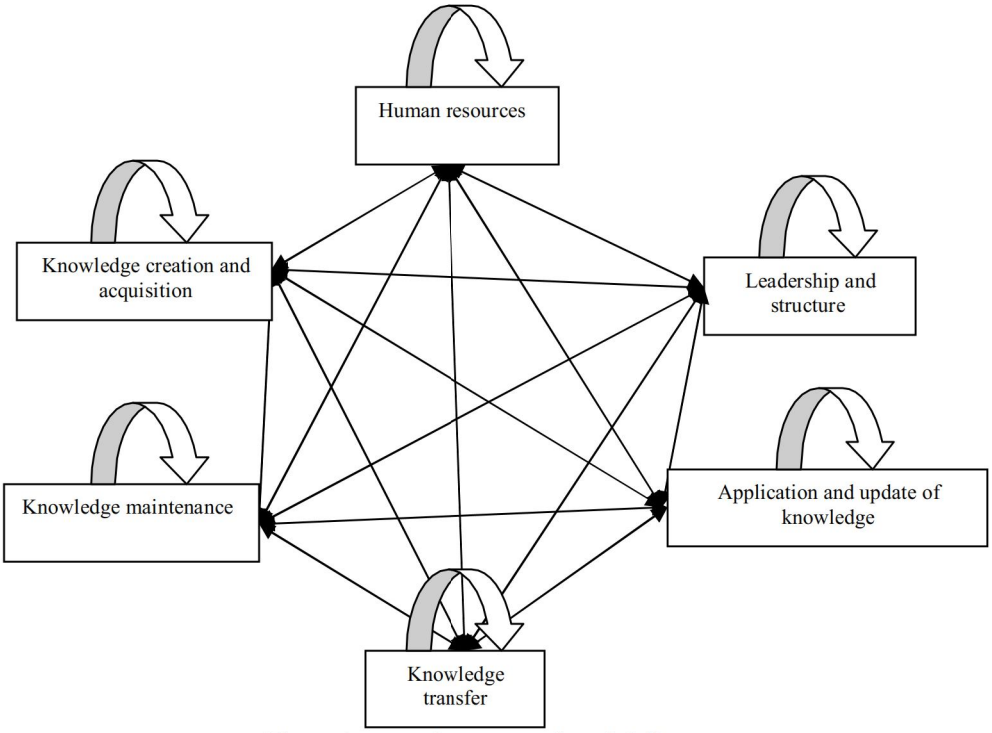


Figure 1-research conceptual model diagram

5. Research Methodology

5.1. Analytical Network Process (ANP)

Analytical Network Process (ANP) is one of the multiple criteria decision-making techniques and is included in compensatory models. This model has been designed based on Analytical Hierarchy *Process and replaces the network with hierarchy. Saati presented a method for multiple criteria in 1996 which is called ANP.* Analytical Hierarchy *Process ANP is a new theory which develops* Analytical Hierarchy *Process for dealing with dependency in feedback. Although* analytic network process and Analytical Hierarchy *Process take the priorities through paired comparisons, there are some differences between them. The first difference is that* Analytical Hierarchy *Process is a special form of* analytic network process because analytic network process considers internal dependency and external dependency. The second difference is that analytic network process has nonlinear structure. Generally, Analytical Hierarchy *Process model is the framework of decision-making which considers unilateral and hierarchical relation between decision levels. Instead,* analytic network process doesn't need this *hierarchical and vertical structure. The* analytic network process includes all tangible and intangible factors and criteria interfering in decision making and is able to model correlations and feedbacks between the effective elements in a decision making and includes and enters all internal effects of the components effective on decision making in the calculation. Therefore, this technique is distinct from and preferred over the previous models due to this characteristic. The method used in this research is descriptive (modeling) and is applied in terms of objective. In order to gather information, the questionnaire and archived information are used. Questions of the questionnaire have been designed considering variables available in conceptual model of research. In order to determine all criteria effective on successful implementation of knowledge management, 6 factors of success were selected for implementation of knowledge management based on review of literature which included human resources , leadership and structure , knowledge creation and acquisition , knowledge maintenance , sharing and transfer of knowledge and finally application and update of knowledge which have been selected to be used in ANP method and finally a network has been designed in Super Decision software and the designed network will be solved using view of the experts gathered through the designed questionnaires. The statistical population of this research is managers and experts and the full numeration method is used due to small size of the statistical population. Some characteristics such as the related education and familiarity with concepts of research were used as basis of selection. It is worth noting that the only activities which should be done are to form network, establish relationships and perform paired comparisons. Groups' weights matrix coefficient in unweighted matrix and cubing the weighted-matrix for forming limited super matrix are performed automatically in the software. In order to calculate reliability of questionnaires, there are different methods and consistency ratio has been used in this research. Most questions used in questionnaires of this research are paired comparisons. Therefore, consistency ratio is used for testing their reliability. Consistency ratio is a mechanism which shows the obtained priorities so that if CR is below 0.1, one

can accept consistency of the comparisons, otherwise, comparisons should be made again. All stages of calculating consistency ratio to ensure reliability of the questionnaires have been performed with Super Decision software.

6. Steps of Problem Solving in Super Decision Software

6.1. First step: Formation of Analysis Network

In order to solve a problem with this method, first, a network of objective, criteria, sub criteria, alternatives and relations between them should be identified and drawn. Problem solving with help of network depends on the model maker and formation of network doesn't follow a special model. For this reason, solution of any problem has its own complexity and one cannot present a general formula for solving network problems. Formation of the analysis network includes main groups or clusters and there is a set of indices and criteria inside each group or cluster which are regarded as nodes of the network. In addition that the criteria have relation inside each node, they may have relation with nodes in other clusters and such relations and their feedback should be considered in calculations. Considering the final selected criteria, the problem is designed in Super Decision software according to figure 2.

6.2. Second step: Performing Paired Comparison and Estimation of Relative Weights

After creation of the network and relations between them, it is time to do paired comparisons. Determination of relative weight in ANP is the same as that in AHP. In other words, one can specify relative weight of criteria and sub criteria through paired comparison. Paired comparisons of the elements in each levels are done like AHM method considering their relative importance compared with the control criterion. Saati proposes two components with scales 1-9 for paired comparison (table 2). In order to create paired matrices, personal judgments of 10 related experts were used. In order to prevent special problems in such decision making such as power inequality, hiding or distorting preferences, all organizational authorities of the same level and with enough knowledge and specialty are selected. In this method, each one of the decision makers enters the desired value in the matrix for each one of the comparisons and judgments of the people are converted to group judgments using geometrical mean(Ghodsi Poor, 2008).

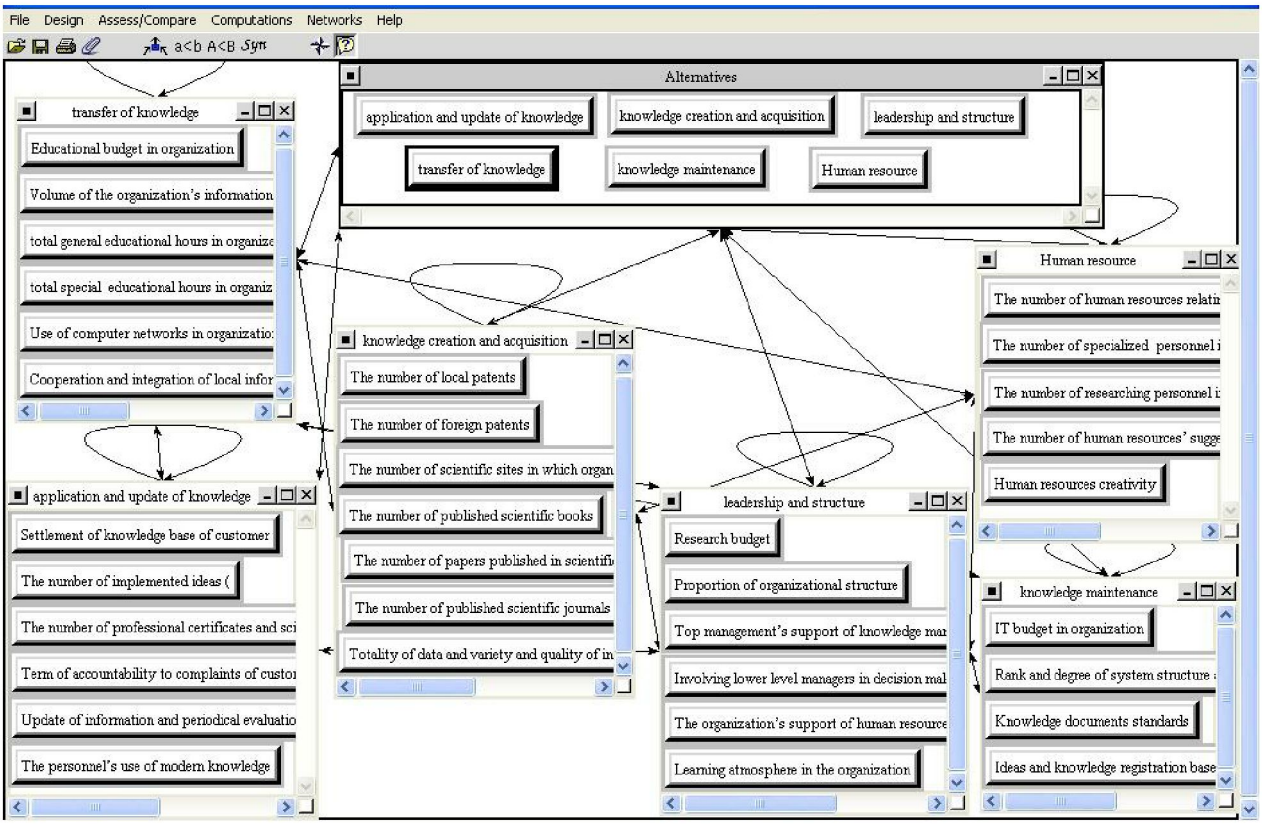


Figure 2. designed analysis network in Super Decision software

Table 2. relative importance scale in paired comparisons (Saati, 1980)

Priority	Definition
9	• Extremely Preferred
7	• Very strongly Preferred
5	• Strongly Preferred
3	• Moderately Preferred
1	• Equally Preferred
2,4,6,8	Preferences between the mentioned intervals

In the software, different methods can be selected for performing comparisons: Graphic, verbal, matrix and questionnaire methods. In this research, consistency ratio of each expert was calculated after gathering questionnaires of paired comparisons of the main criteria effective on implementation of knowledge management and the questionnaires with consistency ratio of above 0.1 were returned to the related professor to revise them. In the following figures, an example of paired comparisons is given as questionnaire and matrix of the main group of human resources.

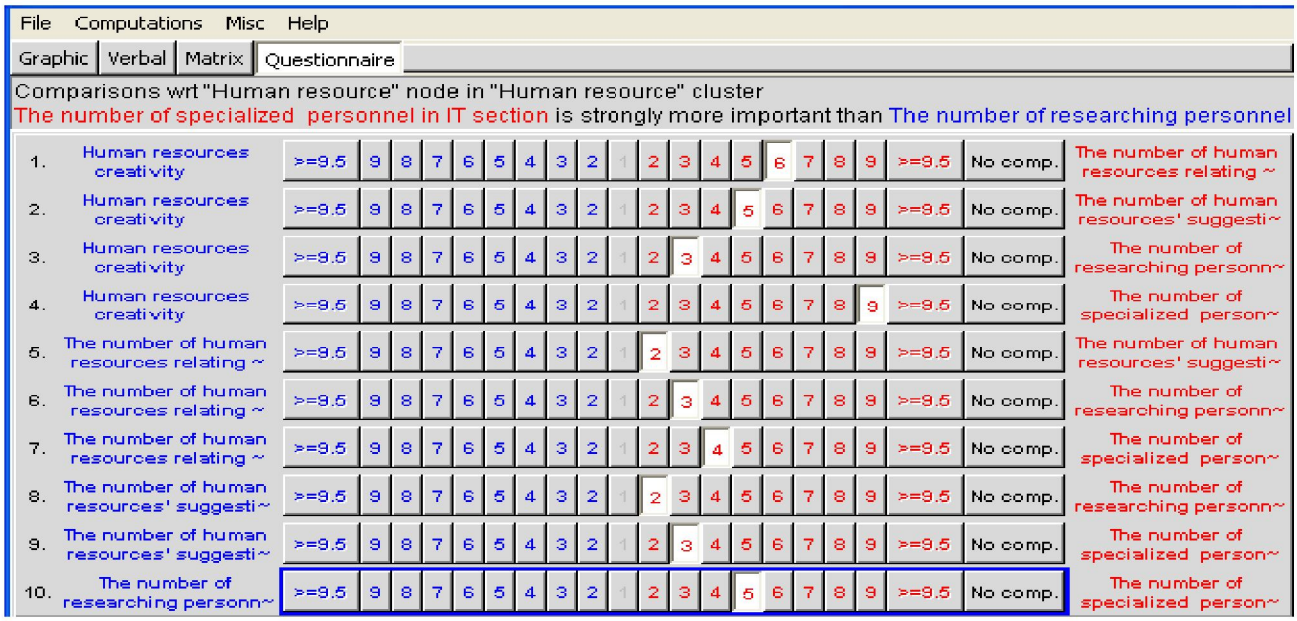
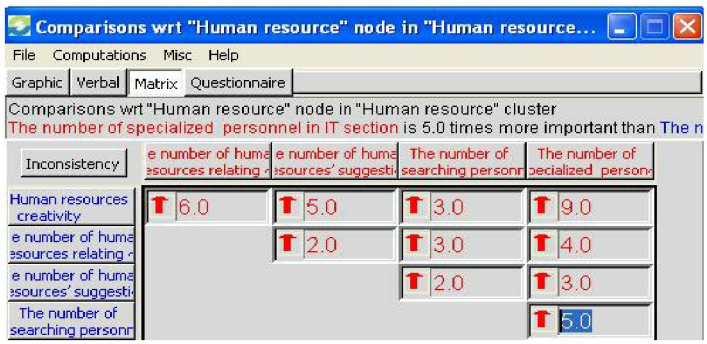


Figure 3. paired comparisons of indices of human resources as questionnaire



xFigure 4- paired comparisons of indices of human resources as matrix

6.3. Third Step: Formation of Super Matrix

ANP elements interact with each other. These elements can be decision making unit, criteria, sub criteria, obtained results; alternatives etc. relative weight of each matrix is calculated based on paired comparison like AHP method. The obtained weights are entered in super matrix which shows interaction between elements of the system. The super matrix is able to limit coefficients for calculating all priorities and cumulative effect of each element on other elements. Unweighted super matrix includes the relative priorities which have been obtained from paired comparisons of the network.

6.4. Step 4: Formation of Weighted Super Matrix

In fact, each column of super matrix is composed of some eigenvectors. Sum of each one of the vectors is equal to 1. In this regard, sum of each column of the initial super matrix may be above 1(based on eigenvectors which are available in each column). In order to factorize elements of the column based on their relative weight and in order for the sum of the column to be equal to 1, each column of the matrix will be standardized. As a result, a new matrix is obtained and sum of its columns will be equal to 1. This subject is similar to Markov chain and probable sum of all conditions is equal to 1. The new matrix is called weighted matrix. Weighted super matrix is obtained by multiplying all components of un-weighted super matrix by corresponding components of the weight. Figure 6 shows a part of weighted super matrix.

6.5. Step 5: Calculating General Weighted Vector

In the last step, weighted super matrix is cubed to make elements of matrix convergent and make their row values equal. Based on the obtained matrix, general weight vector is specified. The matrix which is obtained from cubing of weighted matrix is the limit matrix and values of each row are equal to each other. Limit super matrix is obtained by cubing weighted super matrix. When numbers of each line are equal, the limit super matrix is obtained and multiplication process will stop. Figure 7 shows a part of limit super matrix.

Cluster Node Labels		Alternatives						Human resource	
		application and update of knowledge	Human resource	knowledge creation and acquisition	knowledge maintenance	leadership and structure	transfer of knowledge	Human resources creativity	The number of human resources relating to knowledge management section
Alternatives	application and update of knowledge	0.000000	0.126512	0.079169	0.078730	0.085576	0.062288	0.000000	0.000000
	Human resource	0.503872	0.000000	0.396616	0.500199	0.471952	0.447171	1.000000	1.000000
	knowledge creation and acquisition	0.176279	0.279449	0.000000	0.129060	0.231205	0.162621	0.000000	0.000000
	knowledge maintenance	0.094497	0.147533	0.167763	0.000000	0.154763	0.080129	0.000000	0.000000
	leadership and structure	0.187210	0.391196	0.300301	0.257468	0.000000	0.247790	0.000000	0.000000
	transfer of knowledge	0.038142	0.055310	0.056150	0.034543	0.056504	0.000000	0.000000	0.000000
Human resource	Human resources creativity	0.000000	0.502018	0.000000	0.000000	0.000000	0.000000	0.000000	0.250000
	The number of human resources relating to knowledge management section	0.000000	0.038336	0.000000	0.000000	0.000000	0.000000	0.250000	0.000000

Figure 5. A part of Unweighted super matrix of the model

Cluster Node Labels		Alternatives						Human resource	
		application and update of knowledge	Human resource	knowledge creation and acquisition	knowledge maintenance	leadership and structure	transfer of knowledge	Human resources creativity	The number of human resources relating to knowledge management section
Alternatives	application and update of knowledge	0.000000	0.000463	0.000813	0.001152	0.000715	0.002771	0.000000	0.000000
	Human resource	0.020749	0.000000	0.004073	0.007321	0.003944	0.019894	0.200000	0.200000
	knowledge creation and acquisition	0.007259	0.001024	0.000000	0.001889	0.001932	0.007235	0.000000	0.000000
	knowledge maintenance	0.003891	0.000540	0.001723	0.000000	0.001293	0.003565	0.000000	0.000000
	leadership and structure	0.007709	0.001433	0.003084	0.003768	0.000000	0.011024	0.000000	0.000000
	transfer of knowledge	0.001571	0.000203	0.000577	0.000506	0.000472	0.000000	0.000000	0.000000
Human resource	Human resources creativity	0.000000	0.500179	0.000000	0.000000	0.000000	0.000000	0.000000	0.200000
	The number of human resources relating to knowledge management section	0.000000	0.038195	0.000000	0.000000	0.000000	0.000000	0.200000	0.000000

Figure 6. A part of weighted super matrix of the model

Cluster Node Labels		Alternatives						Human resource	
		application and update of knowledge	Human resource	knowledge creation and acquisition	knowledge maintenance	leadership and structure	transfer of knowledge	Human resources creativity	The number of human resources relating to knowledge management section
Alternatives	application and update of knowledge	0.002749	0.002737	0.002764	0.002753	0.002760	0.002751	0.002737	0.002737
	Human resource	0.110445	0.111044	0.109677	0.110272	0.109894	0.110359	0.111048	0.111048
	knowledge creation and acquisition	0.023046	0.022771	0.023453	0.023100	0.023260	0.023081	0.022769	0.022769
	knowledge maintenance	0.011161	0.011044	0.011306	0.011210	0.011266	0.011177	0.011043	0.011043
	leadership and structure	0.036997	0.036612	0.037430	0.037122	0.037405	0.037059	0.036610	0.036610
	transfer of knowledge	0.001419	0.001410	0.001431	0.001422	0.001427	0.001420	0.001410	0.001410
Human resource	Human resources creativity	0.137734	0.138486	0.136770	0.137516	0.137042	0.137625	0.138490	0.138490
	The number of human resources relating to knowledge management section	0.095214	0.095736	0.094546	0.095063	0.094734	0.095139	0.095738	0.095738

Figure 7. a part of limit super matrix

7. Studying Results Obtained from in Super Decision Software

7.1. Ranking Main Criteria

In order to calculate reliability of the questionnaire, there are different methods and consistency ratio has been calculated in this research. Since most questions used in questionnaires of this research are paired comparisons, therefore, it is possible to determine logicality of the performed comparisons. In other words, one can measure consistency ratio of the performed comparisons on factors by calculating consistency ratio (CR). For this reason, consistency ratio is used to measure their reliability. Consistency ratio is the mechanism which shows reliability of the obtained priorities so that if CR is below 0.1, one can accept consistency of the comparisons. Otherwise, comparisons should be made again. All stages of calculating consistency ratio to ensure reliability of the questionnaires have been performed with Super Decision software. Ultimate output is as follows after software solution:

Regarding raking of the main criteria (figure 8), criterion of human resources is ranked one in terms of importance with significant difference from other criteria and criterion of leadership and structure is ranked 2. Inconsistency ratio is also 0.0776 which is below 0.1 and desirable. Raw column include the same numbers of limit super matrix and normal column includes the same normalized results of each node. Ideal column is obtained by dividing numbers of each normal or raw column by the largest value of the related column.

7.2. Ranking Sub Criteria of Human Resources

In figure 9 which shows ranking of sub criteria of human resources, human resources creativity empowerment is regarded as the most factor in criterion of human resources and then , index of the number of human resources' suggestions for improving affairs and the number of researching personnel in organization are important among other criteria . Inconsistency ratio of the matrix obtained from paired comparisons is also 0.0960 which is below 0.1 and desirable.

7.3.Ranking Sub Criteria of Leadership and Structure

In figure 10, the presence of learning atmosphere in the organization is ranked one and after that, the organization's support of human resources creativities is ranked two. Inconsistency ratio of matrix is 0.0970 which is below 0.1.

7.4.Ranking Sub Criteria of Knowledge Creation and Acquisition

In figure 11 which shows ranking of knowledge creation and acquisition, total data and variety and quality of resources has been regarded as the most important factor in knowledge creation and acquisition. Inconsistency ratio of matrix obtained from paired comparisons is 0.0942 which is below 0.1 and acceptable.

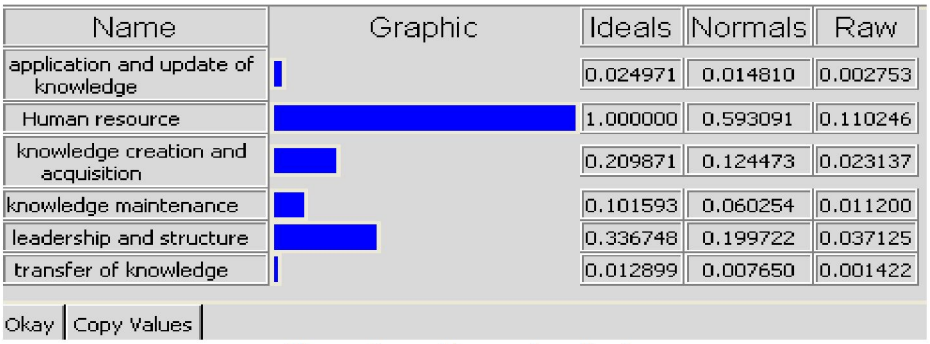


Figure 8: ranking main criteria

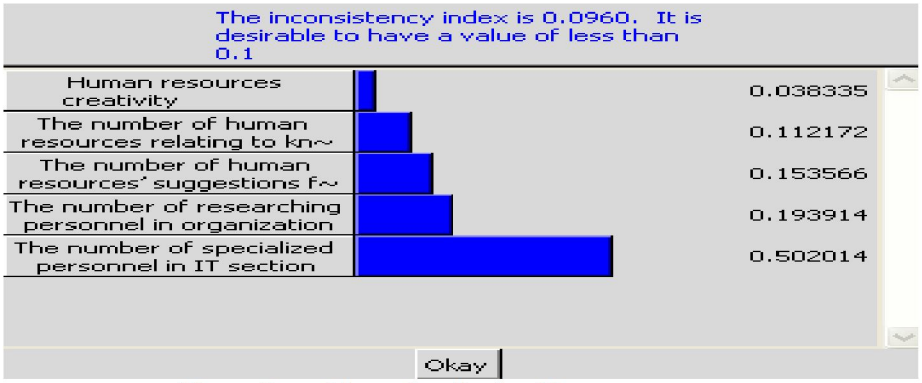


Figure 9. ranking sub criteria of human resources

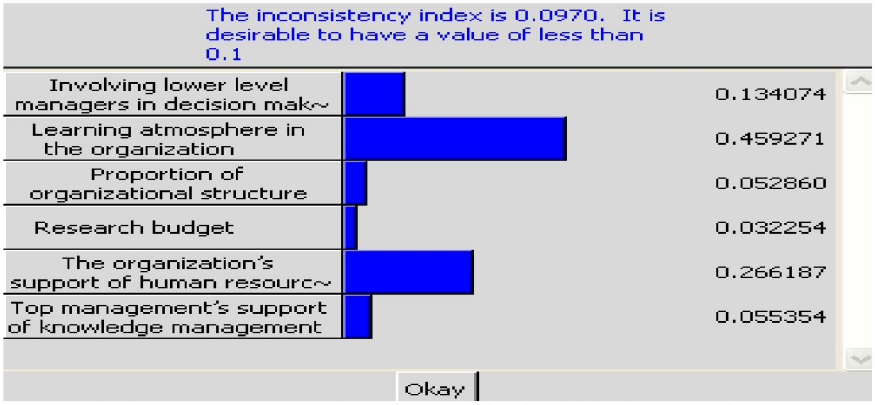


Figure 10. ranking sub criteria of leadership and structure

Figure 11- ranking sub criteria of knowledge creation and acquisition

8. Discussion and Conclusion

In this research, a method was presented to rank factors effective on successful implementation of knowledge management using analytical network process in which factors affecting successful implementation of knowledge management were identified considering main criteria of human resources , leadership and structure , knowledge creation and acquisition , knowledge maintenance , sharing and transfer of knowledge along with their sub criteria and they were expanded and ranked in an ANP network (Analytical Network Process) with Super Decision software . It was found that the main criterion of human resources among criteria of human resources, leadership and structure, knowledge creation and acquisition, knowledge maintenance, sharing and transfer of knowledge was ranked 1 with significant difference from other criteria and criterion of leadership and structure was ranked 2 in terms of importance and the experts also found that sub index of human resources creativity empowerment was more important than other sub indices of human resources as the most important factor in criterion of human resources. This process can be used to help the managers and planners reduce expenses of the organization through effective and successful execution of knowledge management and optimal use of knowledge management in the organizations.

In any case, any method which has some advantages also has some limitations. In order to specify it, one should compare results of this method with other methods in the next researches. The more complete and more accurate the criteria and indices, the better results we will have. In this regard, there is need for more researches in this field. Considering that analytic network process is a powerful instrument. Researcher believes that one can obtain interesting and useful results relating to that analytic network process based on fuzzy logic while recommending more researches in other fields of decision-making because fuzzy logic studies and analyses zero to one instead of dealing with zero and one and it is closer to actions and attitude of the humans. For this reason, the future researchers are recommended to rank fuzzy methods for execution of hybrid algorithm and to rank the corrective alternatives in a fuzzy medium that is they can rank these factors using FUZZY -ANP technique.

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