

## **Identify Dynamic Capabilities of Knowledge Management and Knowledge Management Process Capabilities; and Prioritizing Dynamic Capabilities by FUZZY AHP**

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**Abstract.** The main purpose of this paper is investigation and identification the concept of dynamic capabilities and clarifying the relationship between these capabilities with the knowledge management process capabilities. As expected, the results showed a positive relationship between these two concepts. This paper includes three main sections. In first section, we identify the concept of process capabilities of knowledge management and dynamic capabilities and then examining different levels of these capabilities. In the second section, we explain that there is a close relationship between these two capabilities in such a way that they can be interdependent, and finally in the third section, dynamic capabilities have been prioritized based on their level of importance in gaining sustainable competitive advantage and increasing organizational performance. For this purpose, Method Fuzzy Analytic Hierarchy Process is applied to examine the variables. Three variables Knowledge generation, Knowledge exploitation and knowledge recombination have been considered as main indicators. In order to prioritize the criteria in terms of importance and the role they play in the organization, a questionnaire distributed and collected among senior managers of knowledge management field has been used.

**Keywords:** Knowledge Management, Dynamic Capability, Knowledge Management Process Capabilities, Sustainable Competitive Advantage.

## 1. Introduction

In the current era, competitive state of firms depends less on traditional factors such as property, land, and labor (Nielsen, 2006, pp. 59-71). Dynamic capabilities concept more emphasizes on the processes and approaches of organization based on developing and renewing organizational skills (Teece and Pisano, 1994, pp. 537-556; Teece et al., 1997, pp. 509-533; Wheeler, 2002, pp. 46-125). To achieve this, we should follow the interconnected dynamic capabilities continuously. In today's dynamic markets, due to the rapid and unpredictable changes, dynamic capabilities is introduced as more complex organizational processes that provide sufficient and necessary conditions for change and renewing business assets of firms (Lopez, 2005, pp. 661-669) and is considered the main cause of the sustainable competitive advantage in the organization. In this situation, achieving sustainable competitive advantage emphasizes on developing processes and organizational capabilities of the firm focused on delivering desired goods and services (Nielsen, 2006). In fact, the effective use of available resources in the organization and applying organizational different features and also creating a useful and productive relationship between these capabilities and organizational dynamic capabilities are key factors in continuous success and growth of the organization. In current turbulent environment, the organizations are competing with each other not only because of the amount of their abilities to use the available resources, but also their abilities to renew and develop of these resources and proper utilization of organizational capabilities are considered as the most important factors to achieve sustainable competitive advantage. Thus, knowledge management processes that involve change, innovation and the application of knowledge-based resources in the organization are presented as an integrated set of dynamic capabilities (Nielsen, 2006). The concept of dynamic capabilities, as the ultimate source of sustainable competitive advantage (Teece et al. 1997, pp. 509-533) is leading all the concepts discussed to increase organizational performance

(Cepeda et al. 2004, pp. 50-131). The dynamic capabilities approach of strategic management (Eisenhardt & Martin, 2000, pp. 1105-1122; Teece et al. 1997, pp. 509-533) seeks to explore the issue of why some organizations are more successful than others in gaining competitive advantage in dynamic markets (Easterby-Smith & Prieto, 2008, pp. 235-249) When the organizational assets are properly used, enhancing the dynamic capabilities and business value will be encountered (Helfat, 1997). Dynamic Capabilities concept suggests that organizations not only are trying to use their organizational capabilities and resources, but also are competing to gain the ability to apply and re-change process and organizational capabilities (Teece et al.1997). Dynamic capabilities pay specific attention to the organization's ability to integrate and reconfigure of organizational resources, the use of internal and external competencies of the organization, and also providing the condition for optimal use of organizational tacit and explicit knowledge in today's dynamic world. Supporting this issue, Eisenhardt and Martin (2000) state that dynamic capabilities is a strategic organizational approach by which organizations offer plans to expand the use of existing resources in order to achieve long-term competitive advantage and also use new resources in order to gain short-term advantages in dynamic markets. Due to rapidly changing market conditions, organizations need to update their knowledge and technology in their market (Grunbaum & Stenger, 2013) so, to achieve this purpose they need to develop their dynamic capabilities that enable them to create a balance between the use of technology, current resources and proper utilization of new resources (Teece and Psano, 1994; Teece, 2007). In knowledge management, dynamic capabilities are considered as a guideline for the development, evolution, and optimal use of process capabilities of knowledge. Knowledge management as a strategic approach is the most important sustainable competitive advantage sponsor of organization (Grant, 1996). While the dynamic capabilities perspective is focused on renewing organizations resources by providing conditions for creating competencies and new resources (Teece et al., 1997), knowledge management is often stressing a solution for create, retain, transfer and apply an enterprise's explicit and tacit to managers (Cepeda & Vera, 2005). Dynamic capabilities are directly related to the organization's capabilities and

point out how and to what extent organizations can achieve success by applying their skills and capabilities in today's competitive world. The main purpose of this paper is to contribute to the explanation of the connection between dynamic capabilities and knowledge management to clarify the concept of dynamic capabilities and assess their effect on the organization's sustainable competitive advantage. This paper will present insights into the combination of dynamic capabilities and knowledge management by utilizing a knowledge-based approach. This shows that dynamic capabilities can be considered an appropriate method used in providing reputable knowledge management activities. To this end, we describe knowledge management processes related to the dynamic capabilities and finally prioritize them. Knowledge management is often described as an essential approach for managing knowledge that focuses on creating, capturing, sharing, integrating, and applying explicit and tacit knowledge assets. Because the creation and evaluation of dynamic capabilities processes depend directly on the formulation, implementation and applying knowledge management processes in an organization, these two processes are intimately intertwined (Zollo & Winter, 2002). Therefore, in this article first, the concept of capabilities is described and the relationship of this concept with process capabilities of the organization is studied and after identifying these variables, capabilities based on their level of importance are prioritized in four industrial organizations of Iran. This article follows three main goals: 1. Being familiar with the concept of capabilities and reviewing process capabilities knowledge management process capabilities. 2. Identifying the relationship between process capabilities of knowledge management and dynamic capabilities. 3. Prioritizing dynamic capabilities based on their level of importance in the organization.

## **2. Literature Review**

The concept of dynamic capabilities was first introduced by Teece and Pisano in 1994 and expanded further in 1997, in order to overcome the limitations related to comprehension on how companies create and improve competitive advantage (Grunbaum & Stenger, 2013). In Teece and Pisano's article it stated that in a dynamic environment an organization's competitive advantage will depend on the firm's internal

processes that enable the firm to renew and change its stock of process capabilities; thereby making it possible to deliver a constant stream of new products and services to customers (Nielsen, 2006). For better understanding of the dynamic capabilities nature first, various definitions that active researchers propose in this context have been expressed: Teece (1998) defined capabilities as follows:

Dynamic capabilities can be defined as an approach which provides the conditions for development of organizational capabilities by creating widespread changes in the internal resources of the organization (Eisenhardt & Martin, 2000). Griffith and Harvey (2001) stated that, dynamic capabilities are combination of organizational resources and establishing effective coordination between intra-organizational relationships that create a competitive advantage for the organization. It can be stated as a source of sustainable competitive advantage in rapidly changing market (Lee et al., 2002). Wang and Ahmed (2007) describe dynamic capabilities as ‘a firm’s focus on integrate, reconfigure, renew and recreate its resources and capabilities and improve these capabilities in response to the changing environment to reach and sustain competitive advantage’. Helfat et al. (2007) have argued dynamic capabilities provide opportunities in organizations which have led to the creation, development, or medication of its resources. These definitions reflect the idea that dynamic capabilities totally can be used as the organizational processes and play their role well in changing company’s resources. According to the mentioned definitions, sustainable investment in effective creating and applying dynamic capabilities is considered as one of the successful ways to achieve organizational goals and numerous economic benefits in competitive environment of the 21th century (Leonard-Barton, 1992). Dynamic capabilities today it is considered as one of the necessary needs to improve organizational performance and achieve sustainable competitive advantage. To use dynamic capabilities properly and fully understand of them, it is necessary to examine “dynamic” and “capabilities” separately. Regarding the term “dynamic” it should be said that due to today’s competitive level, organizations must be flexible and use innovative methods. They must be able to deal with competitors, respond to high demand in the market, and also move along with technology

advancement, as a result, being flexible and dynamic is one of the success factors. Also, in addition to the fact that organizations must have the ability to predict the changes, they must also have the ability to adapt with environmental changes and the realization of all these factors depend on being a dynamic organization. Capability is another term that must be explained in dynamic capabilities. It include adoption, integration, and reconfiguration organizational skills and resources (Sher & Lee, 2004).

Collis in 1994 explains four groups for capabilities, the first group, influences on the ability to perform basic activities of the firm (e.g. distribution logistics, and marketing campaigns) (Cepeda & Vera, 2005). The second category focuses on dynamic improvements to the activities of the organization. Third group focuses on the ability to participate in developing their strategies to gain sustainable competitive advantage before competitors (Collis, 1994). The fourth category relates to the learning capabilities. According to the hierarchies, it can be concluded that dynamic capability is the first and the most important factor in the organization that has a great impact on organizational performance. In addition, based on Helfat and Peteraf's statement dynamic capability does not affect directly on the output but also affects output indirectly through the impact on the operational capabilities (Helfat & Peteraf, 2003). Due to the complex nature of knowledge capabilities, organizations need to pay attention to combine resources at various levels of the organization to enhance their ability to apply knowledge capabilities adequately (Emadzade et al., 2012). Considering dynamic capability views on the knowledge-based approaches, Nielsen (2006) expresses the relationship between the knowledge management processes and dynamic capability that involves change, renew and apply the knowledge-based resources.

This paper will stated that dynamic capabilities utilize knowledge management process capabilities to change the situation of the firm's knowledge-based resources. In the following sections, the author will discusses these different knowledge management process capabilities.

Cepeda and Vera's (2005) definition of dynamic capabilities. According to their statement dynamic capabilities as organizational processes

involves a process of change on the knowledge of the firm and creating a new framework for the designation and production of goods and provision of services. Knowledge management processes focuses not only on creating new knowledge, but also on changes of sources situation.

The process capabilities of knowledge management cover all the vital steps from knowledge creation to knowledge application. A large number of articles have mentioned knowledge management processes. they divide knowledge management into several processes (Lee & Lee, 2007, pp. 21–41; Alavi & Leidner, 2001, pp. 107-136; Bhat, 2002, pp. 31–39; Delong, 1997; Gold, et al.2001, pp. 185–214; Lee & Yang, 2000, pp. 783–793;Nonaka & Takeuchi, 1995; Ruggles, 1998, pp. 80–89; Skyrme & Amidon, 1998, pp. 20–24; Spender, 1996, pp. 45– 62; Teece, 1998, pp. 55–79) knowledge acquisition, knowledge conversion, knowledge application and knowledge protection which are linked to the firm's knowledge process capability (Alavi and Leidner, 2001, pp. 107-136; Gold et al., 2001, pp. 185-214; Emadzade et al. 2012, pp. 81-102). Capture, transfer, and use; acquire, collaborate, integrate, experiment (Leonard-Barton, 1995) creating, acquiring, documenting, transferring, and applying knowledge and exploiting opportunities (Sambamurthy & Subramani, 2005, pp. 1-7; Zack, 1999, pp. 46-125) create, transfer, and use (Skyrme & Amidon, 1998, pp. 20–24; Spender, 1996, pp. 45– 62).

Knowledge acquisition refers to identify internal and external knowledge of organization. In other words, this process refers to collecting knowledge and innovations, which previously did not exist in the organization (Ahmadi & Salehi, 2011) and dealing with the extent to which the company develops its knowledge resources in operational boundaries (Emadzade et al. 2012 ). This process involves the creation of knowledge and the development of new knowledge as well as crystallizing and connecting it to the knowledge of the organization. Quinstas et al. (1997) state that Knowledge acquisition is knowledge management process is seeking to meet the needs, identifying and effective use of existing and acquired knowledge assets and developing new opportunities in the organization.

Knowledge Conversion is the converting process of acquired knowledge using internal and external sources of organization to the form applicable

in the organizations, which leads to improve efficiency and increase performance (Abdel Nasser et al. 2012).

Knowledge conversion is made possible by applying of the processes and activities of synthesis, refinement, combination (Emadzade et al. 2012, pp. 81-102 ; Sandhawalia & Dalcher, 2011, pp. 313-328), coordination, distribution (Gold et al.2001, pp. 185-214; Sandhawalia & Dalcher, 2011, pp. 313-328; Emadzade et al. 2012, pp. 81-102 ), organization, structure (Gold et al.2001, pp. 185-214), and restructuring of knowledge (Sandhawalia & Dalcher, 2011, pp. 313-328; Emadzade et al. 2012, pp. 81-102). Availability of knowledge does not just transferring it; it is the most important factor but does not ever guarantee knowledge usage.

This process comprises of knowledge broadcasting, searching, retrieval, teaching, knowledge sharing, distributed organizational knowledge base (Gourova, 2010). Knowledge integration is a process through which the organization offers the statements of new knowledge to its operating environments and abandons the previous statements of the knowledge. The integration includes all types of knowledge transfer such as training, knowledge sharing, and other social activities that makes either understanding of prior organizational knowledge in knowledge workers or integrating new knowledge. Knowledge integration can lead to the creation of new organizational capabilities (Grant, 1996, pp. 122-199). In addition, this capability in itself is a source of new knowledge in the organization (Nielsen, 2006).

Many researchers defined this process as the utilization of organizational knowledge in order to achieve higher performance within organizations. Ghahramani and Mousakhani (2012) refers this process as a situation which the firm applies the knowledge resources throughout the organization to achieve this purpose (Emadzade et al. 2012).

It should be noted that organizational and individual knowledge within an organization depends on using this knowledge in the first stage (Grant, 1996; Spender, 1996). For example, knowledge assets are valuable when these assets are used to create products, provide services, and being sold or traded in the markets (Wiig, 1999). Without the use of organizational and individual knowledge in an effective manner, all knowledge management process will just repeat without obtaining any



results. Hence, it is through knowledge application by acquired knowledge can be transformed from a potential capability into a dynamic capability, impacting the organizational performance (Cohen & Levinthal, 1990; Seleim & Khalili, 2007; Shaker & George, 2002) and gain sustainable competitive advantage. Above explains knowledge processes as dynamic and intertwined methods that provide effectiveness and efficiency. Essentially knowledge helps create and maintain dynamic capabilities that flow within organizations (Sher & Lee, 2004). Previously research has shown that knowledge capability plays an undeniable role in enhancing organizational performance (Nonaka & Takeuchi, 1995; Hult et al. 2003, pp. 541–556; Pagell, 2004, pp. 459–487; Cousins, 2006, pp. 851-863; Choo et al. 2007, pp. 918-931; Modi & Mabert, 2007, pp. 42–64; Paiva et al. 2008, pp. 115–132; Fugate et al. 2009, pp. 247–264).

According to the arguments presented in the previous sections the paper will continue an analyze on the relation between the different knowledge management process capabilities and dynamic capabilities.

Since the key role of dynamic capabilities in organizations' success and gaining sustainable competitive advantages been proved in today's competitive environment, different point of views have been shaped about different types of dynamic capabilities. By examining researches have been carried out on this subject, different researchers' point of views in this field have been collected and described briefly. Zollo and Winter (2002) presented a conceptual description of the knowledge evolution cycle that is also named "knowledge evolution cycle". Knowledge evolution cycle consists of three sections knowledge accumulation, knowledge articulation, and knowledge codification. The main objective of this cycle is to increase application of dynamic capabilities in organization and describes the pathway of developing dynamic capabilities and organizational performance (Cepeda & Vera, 2005).

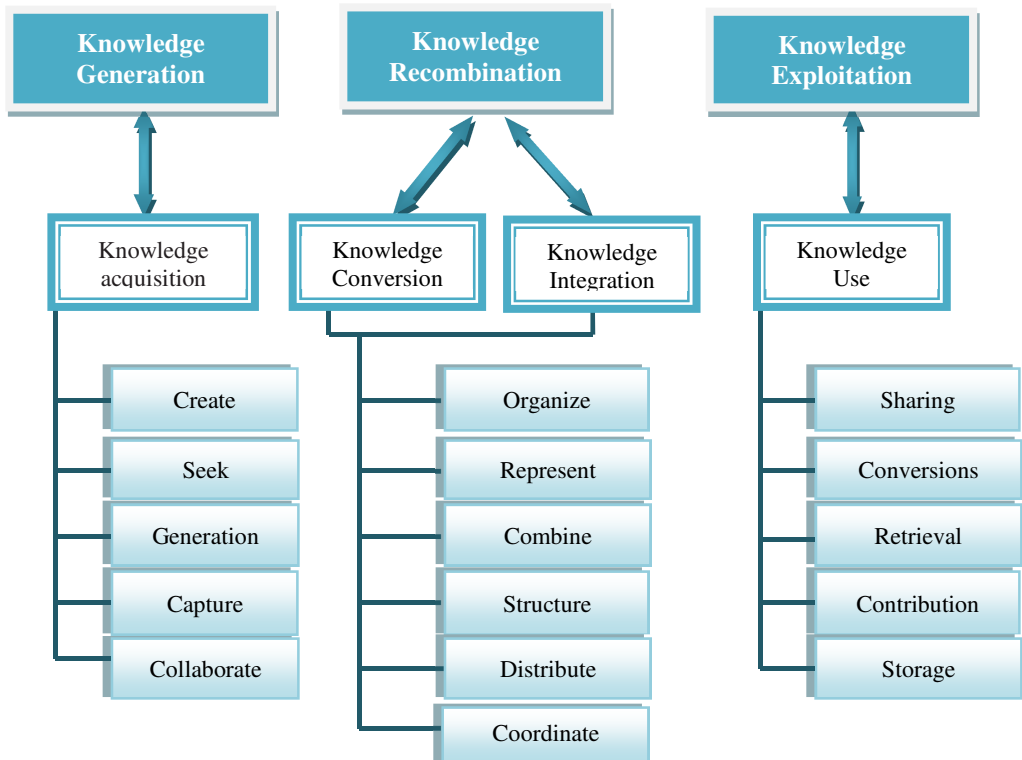
Wang and Ahmed (2007) determine three groups of dynamic capabilities named adaptive, innovative, and absorptive capabilities. These capabilities enable organization to coordinate their knowledge and capabilities according to dynamic and the constantly changing market.

Eisenhardt and Martin (2000) state dynamic capabilities are composed of reputable knowledge management processes development, evolution, and use of knowledge; they are the most important aspects in this area.

Teece et al. (1997), Verona and Ravasi (2003), Dougherty et al. (2004) describe dynamic capabilities as a collection of create, integrate and reconfigure tacit and explicit knowledge in external and internal environment of the organization. Nielsen (2006) defined that dynamic capabilities are the key to knowledge creation or knowledge acquisition in an organizational environment that divided into three groups: knowledge development, knowledge (re)combination and knowledge application.

According to all divisions that have been offered, the author is going to continue her studies based on perfect division. This division in addition of having comprehensive overview on knowledge capabilities, encompasses all process capabilities of knowledge management and knowledge development cycle. Base on this view, dynamic capabilities are divided into three main sections generation, recombination and exploitation of knowledge and the relationship between these dynamic capabilities and knowledge management process capabilities will be explained. The first category of dynamic capability is knowledge generation; this capability can be related to the knowledge acquisition. Many processes have been used to describe the knowledge acquisition namely create, seek, capture, collaborate and development (Gold et al. 2001, pp. 185–214). These processes are the main source of generation and acquisition of new knowledge in organization that are leading the development of organizational knowledge. The second capability related dynamic capability is knowledge recombination. This capability is directly related to the conversion. There are many activities in organizations that can be classified in this category such as organize (Davenport & Klahr, 1998, pp. 195-208; Gimenez & Rincon, 2003, pp. 703-711; O'Dell & Grayson, 1998, pp. 74-154), represent (Marshall et al. 1996), combine, structure, coordinate (Miller & Friesen, 1984; Moor, 1996; Sanchez & Mahoney, 1996, pp. 63-76), distribute (Davenport & Klahr, 1998, pp. 195-208; Davenport et al. 1996. pp. 53-65; Zander & Kogut, 1995, pp. 76-92) and reconfigure knowledge. Due to this, firms need to reconfigure their knowledge and capabilities in order to integrate

newly generated or acquired knowledge based on rapid changes in the market. Dynamic capability provides the conditions to restructuring, reengineering, post-merger integration (Teece, 2007, pp. 1319-1350; Zollo & Winter, 2002, pp. 339-351) and recombination existing knowledge of organizations to create more possibility for the create, conversion and integration of new knowledge.



**Figure 1.** Dynamic and process capabilities of KM

The third dynamic capability is knowledge exploitation. This capability is main source of knowledge application (Gold et al. 2001, pp. 185-214; Bhatt, 2001, pp. 68-75). Knowledge application has been related with storage, retrieval, contribution, sharing (Almeida, 1996, pp. 155-165; Appleyard, 1996, pp. 54-137) and usage of knowledge. Exploitation of knowledge causes that the total produced and acquired knowledge, to be integrated, recombined and reach to the application process and be applied practically to obtain superior competitive advantage and achieve

greater organizational performance. Figure 1. generally indicates the relationship among dynamic capabilities, process capabilities of knowledge management, and processes that are mentioned as the subset of knowledge management process capabilities.

### 3. Methodology

This paper in addition of examining and identifying process and dynamic capabilities of knowledge management and creating relationship between them, follows another goal which is the prioritization of the importance level of the dynamic capabilities. As mentioned before, dynamic capabilities have been divided into Knowledge generation, recombination, and exploitation. In this section, we are going to prioritize these capabilities based on their level of importance in the organizations. To achieve this goal, the AHP FUZZY method was used and then a questionnaire was designed based on this method and was distributed among 12 experts of knowledge management in the organizations that use dynamic capabilities and knowledge management process capabilities specifically in Iran, Shiraz and then obtained results were analyzed.

The conceptual model of the research also has been designed based on AHP method (Figure 2). In this method, we must use hierarchical decision tree in which “the prioritization of the dynamic capabilities” has been determined as the goal and three variables generation, recombination and exploitation of knowledge have been determined as the main criteria. The purpose of presenting this model is to determine the significance of these capabilities in order to apply them in the organizations to achieve higher organizational performance and successful use of the sustainable competitive advantage in today’s competitive environment.

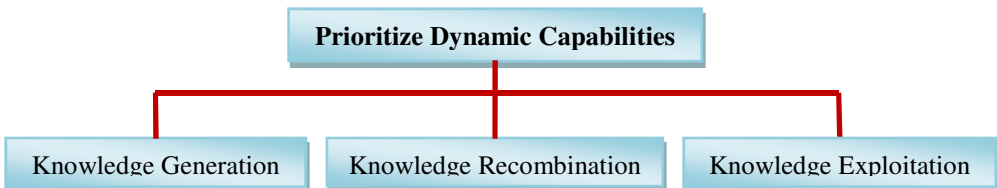


Figure 2. Prioritize dynamic capabilities of KM

Analytic hierarchy process (AHP) is a decision-making tool to analysis complex, unstructured, and multi attribute problems (Azadeh & Izadbakhsh, 2008, pp. 143–154)

When the researcher faces complex situations and alternatives, AHP is the most appropriate technique for decision-making (Daneshvar R & Erman E, 2012, pp. 923-929). In this technique, in order to prioritize the options, paired comparisons are used so that the options are mutually compared and weighted based on the questionnaire and the importance of each is determined. This process involves six steps (Vahidnia et al. 2009, pp. 3048-3056):

- 1) Describing the Complex problem,
- 2) Determine criteria and alternatives,
- 3) Pair wise comparisons between decision elements,
- 4) Predicting the weights of the decision elements by using the eigenvalue method
- 5) Calculating the weighted numbers in the Decision Matrix
- 6) Collecting the weighted decision elements.

In this method, for weighing the options and determining the priorities, the 1-9 -scale will be used which, as observed in Table 1. the importance of each scale has been explained separately.

**Table 1.** Definition of 1-9 scale.

Importance intensity	Definition
1	Equal importance
3	Moderate importance of one over another
5	Strong importance of one over another
7	Very strong importance of one over another
9	Extreme importance of one over another
2, 4, 6, 8	Intermediate values

The fuzzy analytic hierarchy process (AHP) is the most common (Cheng et al.2008, pp. 131-141) method that have been used to measurement fuzzy comparison matrices (Wang et al. 2008, pp. 735–747; Serbest & Vayvay, 2008, pp. 487–505).

FAHP method is put forward as an advanced Analytical Hierarchy Process compared to AHP method (Mehendran et al. 2014, pp. 2149 – 2161). The difference between these two methods is that the AHP method is not able to make the correct decisions in some of the decision makers' information because of the uncertainty and ambiguity; while FAHP is recommended in many researches due to paired comparisons and also triangular numbers (Amirnejad et al. 2013, pp. 27- 61). Chang provided a simple method for extending analytical hierarchy process to fuzzy space. The method developed using the arithmetic mean of experts' opinions, the triangular fuzzy numbers and using paired comparisons and was welcomed by researchers. Meanwhile, the same method has been used in this research (Kahraman et al. 2004, pp. 171–184; Chang, 1996, pp. 655-649).

#### 4. Findings

Chang's analysis depends to the feasibility of each measure. Considering the answers in the questionnaire, the triangular fuzzy values are defined for each criterion and each of them is compared in pairs (Mehendran et al. 2014, pp. 2149 – 2161). According to the type of responses in the questionnaires, linguistic variables can be used to pair wise comparison (Table 2).

**Table 2.** Fuzzy Number

linguistic variables	Fuzzy number
Equally important	(1, 1, 1)
Slightly important	(1, 3, 5)
Strongly important	(3, 5, 7)
Very strongly important	(5, 7, 9)
Extremely important	(7, 9, 9)

The table 3 indicates the mean of pair wise comparisons than prioritizing dynamic capabilities of knowledge management. In this table, arithmetic means of experts' opinions have been calculated and in the last column, the sum of the rows has been shown. 1 and 2 formulas respectively have been used to calculate these variables.

$$\tilde{a}_{ij} = \frac{\sum_{k=1}^{p_{ij}} a_{ijk}}{p_{ij}}; \quad i, j = 1, 2, \dots, n \quad (1)$$

$$\tilde{s}_i = \sum_{j=1}^n \tilde{a}_{ij}; \quad i = 1, 2, \dots, n \quad (2)$$

This table also includes the normalized variables that can be calculated through formula 3.

$$\tilde{M}_i = \tilde{s}_i \otimes \left[ \sum_{i=1}^n \tilde{s}_i \right]^{-1}; \quad i = 1, 2, \dots, n \quad (3)$$

Table 4 calculates the preference degree of determined criteria than prioritizing dynamic capabilities of knowledge management in which final higher degree and normalized weights have been calculated formulas 4 and 5 have been used to calculate them.

$$\tilde{M}_i = \left( \frac{l_i}{\sum_{i=1}^n u_i}, \frac{m_i}{\sum_{i=1}^n m_i}, \frac{u_i}{\sum_{i=1}^n l_i} \right) \quad (4)$$

$$V(M_2 > M_1) = \text{Sub}_{y \geq x} \left[ \min \left\{ \mu_{M_1}(x), \mu_{M_2}(y) \right\} \right] \quad (5)$$

Finally, the final weight of criteria has been calculated through formula 6.

$$\tilde{U}_i = \sum_{j=1}^n \tilde{w}_i \tilde{r}_{ij}; \quad \forall i \quad (6)$$

**Table 3.** Normalized variables.

Prioritize	Knowledge Generation	Knowledge Recombination
Knowledge Generation	(1,1,1)	(0.539,0.746,1.041)
Knowledge Recombination	(3.926,5.762,7.1)	(1,1,1)
Knowledge Exploitation	(2.089,2.787,3.224)	(1.349,1.879,2.152)
Sum		

**Table 3.** (Cont.) Normalized variables.

Prioritize	Knowledge Exploitation	Sum	Normalized
Knowledge Generation	(2.87,4.209,5.224)	(4.409,5.955,7.265)	(0.159,0.255,0.422)
Knowledge Recombination	(3.452,4.963,6.024)	(8.378,11.725,14.124)	(0.302,0.502,0.82)
Knowledge Exploitation	(1,1,1)	(4.438,5.666,6.376)	(0.16,0.243,0.37)
Sum		(17.225,23.346,27.765)	

**Table 4.** Preference degree.

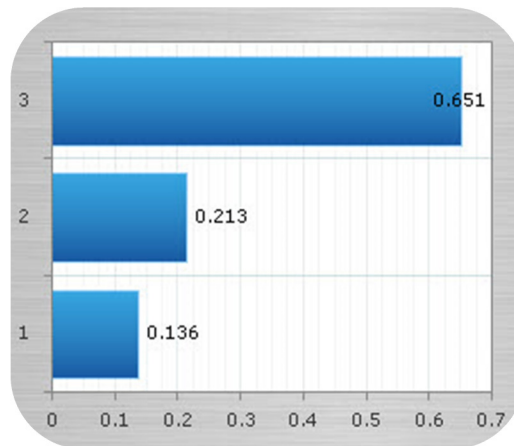
Prioritize	Knowledge Generation	Knowledge Recombination	Knowledge Exploitation	preference degree	Normalized weights
Knowledge Generation		0.327	1	0.327	0.213
Knowledge Recombination	1		1	1	0.651
Knowledge Exploitation	0.945	0.209		0.209	0.136
sum				1.535	1

Table 5 indicates the matrix of criteria final weights than prioritizing dynamic capabilities that has been calculated through formula 6.

**Table 5.** Final weight.

Variables	Final weight of the variables
Knowledge Generation	0.213
Knowledge Recombination	0.651
Knowledge Exploitation	0.136

Finally, according to the calculations and results obtained from Table 5, the chart of criteria final weights than prioritizing dynamic capabilities of knowledge management is presented as follows (Figure 3).

**Figure 3.** Result of AHPF



As you can see, the above chart determines the effect of dynamic capabilities of knowledge management on increasing organizational performance and productivity of knowledge management in the organizations. According to the obtained results the importance of, knowledge generation, knowledge recombination, and knowledge exploitation are respectively 136%, 213%, and 651%. This paper has stated that there is a relation between knowledge management process and dynamic capabilities and has focus on three important types of dynamic capabilities: generation, recombination, and exploitation of knowledge-based resources. We have stated that there is a close relationship between process and dynamic capabilities of knowledge management and the organizations are required to paying sufficient attention to the knowledge management capabilities and combining them with dynamic capabilities of knowledge management to gain sustainable competitive advantage in turbulent market. Dynamic capabilities of knowledge management encompass process capabilities, they can be extended to process capabilities, and all three capabilities are interdependent. Therefore, the organization by paying no attention to even one of these capabilities cannot increase its organizational performance and achieve the desired goals. Although it was stated that the significance level of these capabilities and their combination with process capabilities of knowledge management in the organization is the same and all of these capabilities have the same effect on promoting organizational performance, but according examining and analyzing which have been done in this paper, it can be concluded that “recombination” has higher importance. According to chart 1, prioritizing level of the recombination of knowledge than other capabilities is 0.651; this result refers to the high importance of innovation and recombination in the organizations. Knowledge recombination can develop dynamic capabilities in organization, and lead to more flexibility according to rapid changes in an unpredictable environment (Sher & Lee, 2004, pp. 933–945). Knowledge recombination is the ability to transform knowledge obtained from the organization. In other words, this process is referred to as innovation in products and services, and in general is the method of using knowledge within the organization. The organization needs to organize, restructure and

recombine its existing knowledge in order to proper implementation of this process. Based on the concept of dynamic capabilities, knowledge recombination is in relation with the renewal or creation of organizational capabilities and knowledge (Nielsen, 2006, pp. 59-71). According to Eisenhardt & Martin (2000), dynamic capabilities is a process in which organizations provide the ability to integrate, reconfigure, gain and release resources to match or overcome difficult market conditions (Ambrosini & Bowman, 2009, pp. 29–49).

## 5. Conclusion

The purpose of this study is to analyze the relationship between dynamic capabilities and knowledge management process capabilities, comparing them in order to gain a sustainable competitive advantage. Thus, we explain the concept of dynamic capabilities and KM process capabilities and state relationship between them due to analyze of their influence to get sustainable competitive advantage in variable market. This article identifies knowledge management process capabilities that support dynamic capabilities. They are acquisition, conversion, integration and application of Knowledge. First, we explained capabilities process separately, then examined their relationship with dynamic capabilities of knowledge management including generation, recombination, and exploitation, finally, prioritized these variables based on their level of significance in the organizations by using AHPF method. According to the obtained results, recombination with 651% is extraordinary important, as result, it can be concluded that the innovation, integration, and reuse of resources along with initiative and creativity, have an influencing effect on gaining sustainable competitive advantage in today's turbulent and competitive environment and result in gaining greater economic benefits. Recombination of knowledge has a mutual interaction with integration and conversion. On the other hand, according to the mentioned discussions, integration and conversion knowledge are subset of knowledge management process and includes all activities such as synthesis, refinement, combination, coordination, distribution, organization, structure and restructuring of knowledge that each of them can have a great influence on the reuse of existing knowledge in the organizations.

## References

- [1] Abdel Nasser, Z. H., Gawaher, H. S., & Mohamed, H. M. (2012). The Role of Knowledge Management in Enhancing Organizational Performance. *I.J. Information Engineering and Electronic Business*, 5, 27-35.
- [2] Ahmadi, A., & Salehi, A. (2011). *Knowledge Management*. Iran, Tehran: Payam Noor University Press.
- [3] Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly*, 25(NO 1), 107–136.
- [4] Almeida, P. (1996). Knowledge sourcing by foreign multinationals: Patent citation analysis in the US semiconductor industry. *Strategic Management Journal*, 17, 155-165.
- [5] Ambrosini, V., & Bowman, C. (2009). Dynamic capabilities: an exploration of how firms renew their resource base. *International Journal of Management Reviews*, 11 (Issue 1), 29–49.
- [6] Amirnejad, G., Gheitani, A., M Goordagooni, I., & Ahmadifard, M. (2013). Prioritizing critical success factors of knowledge management using FAHP: A case study in Refah Bank branches of Iran. *European Online Journal of Natural and Social Sciences*, 2 (No 3), 27- 61.
- [7] Appleyard, M. (1996). How does knowledge flow? Interfirm patterns in the semiconductor industry. *Strategic Management Journal*, 17, 54-137.
- [8] Azadeh, A., & Izadbakhsh, H. R. (2008). A multi-variate/multi-attribute approach for plant layout design. *International Journal of Industrial Engineering: Theory Applications and Practice*, 15 (NO 2), 143–154.
- [9] Bhat, G. D. (2002). Management strategies for individual knowledge and organizational knowledge. *Journal of Knowledge Management*, 6(NO 1), 31–39.

- [10] Bhatt, G. D. (2001). Knowledge management in organisations: Examining the interaction between technologies, techniques, and people. *Journal of Knowledge Management*, 5 (NO 1), 68-75.
- [11] Cepeda, G., & Vera, D. (2005). Knowledge management and firm performance: examining the mediating link of dynamic capabilities. *4th International Meeting of the Iberoamerican Academy of Management*. Lisbon, Portugal.
- [12] Cepeda, G., Galan, J. L., & Leal, A. (2004). Identifying key knowledge area in the professional services industry: a case study. *J Knowl Manag* (8), 50–131.
- [13] Chang, D. Y. (1996). Applications of the extent analysis method on fuzzy AHP. *European Journal of Operational Research*, 95, 649-655.
- [14] Cheng, A. C., Chen, C. H., & Chen, C. Y. (2008). A fuzzy multiple criteria comparison of technology forecasting methods for predicting the new materials development, ", vol., pp., . *Technological Forecasting and Social Change*, 75(NO 1), 131–141.
- [15] Choo, A., Linderman, K., & Schroeder, R. (2007). Method and context perspectives on learning and knowledge creation in quality management. *Journal of Operations Management*, 25 (NO 4), 918–931.
- [16] Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35 (No 1), 52-128.
- [17] Collis, D. J. (1994). Research note: how valuable are organizational capabilities? *Strategic Management Journal*, 15, 143–152.
- [18] Cousins, P. (2006). Creating supply chain relational capital: the impact of formal and informal socialization processes. *Journal of Operations Management*, 24 (NO 6), 851–863.
- [19] Daneshvar R, B., & Erman E, T. (2012). SELECTION OF ACADEMIC STAFF USING THE FUZZY ANALYTIC HIERARCHY PROCESS (FAHP): A PILOT STUDY. *Tehnički vjesnik* 19, 4, 923-929.

- [20] Davenport, T. H., & Klahr, P. (1998). Managing customer support knowledge. *California Management Review*, 40 (NO 3), 195-208.
- [21] Davenport, T. H., Jarvenpaa, S., & Beers, M. (1996). Improving knowledge work processes. *Sloan Management Review*, 37, 53-65.
- [22] DeLong, D. (1997). Building the knowledge-based organization: How culture drives knowledge behaviors (working paper). Boston: Ernst & Young's Center for Business Innovation.
- [23] Dougherty, D., Barnard, H., & Dunne, D. (2004). Exploring the everyday dynamics of dynamic capabilities. *3rd Annual MIT/UCI Knowledge and Organizations Conference*. Laguna Beach, California.
- [24] Easterby-Smith, M., & Prieto, I. (2008). Dynamic Capabilities and Knowledge Management: an Integrative Role for Learning? *British Journal of Management*, 19, 235–249.
- [25] Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, 21 (NO 10/11), 1105-1122.
- [26] Emadzade, M. K., Mashayekhi, B., & Abdar, E. (2012). Knowledge management capabilities and organizational performance. *INTERDISCIPLINARY JOURNAL OF CONTEMPORARY RESEARCH IN BUSINESS*, 3 (NO 11), 81-102.
- [27] Fugate, B., Stank, T., & Mentzer, J. (2009). Linking improved knowledge management to operational and organizational performance. *Journal of Operations Management*, 27 (NO 3), 247–264.
- [28] Ghahramani, D., & Mousakhani, M. (2012). Knowledge management capabilities and SMEs'organizational performance. *Journal of Chinese Entrepreneurship*, 4 (No 1), 35-49.
- [29] Gimenez, A. O., & Rincon, M. (2003). Knowledge in the developing countries: An empirical approach in search of limitations and opportunities. *Proceedings of the Fourth European Conference on Knowledge Management*, Oxford, England, 703-711.

- [30] Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, 18(NO 1), 185–214.
- [31] Gourova, E. (2010). Knowledge management strategy for Small and Medium Enterprises. *Proceedings of the International Conference on Applied Computer Science*.
- [32] Grant, R. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17 (Winter special issue), 122–199.
- [33] Griffith, D. A., & Harvey, M. G. (2001). A resource perspective of global dynamic capabilities. *J Int Bus Stud*, 32(NO 3), 597–606.
- [34] Grunbaum, N. N., & Stenger, M. (2013). DYNAMIC CAPABILITIES - ARE THEY PROFITABLE? *Annual International Interdisciplinary Conference*, Azores, Portugal, 24-26.
- [35] Helfat, C. E. (1997). Know-how and asset complementarity and dynamic capability accumulation: the case of R&D. *Strategic Management Journal*, 18, 339–360.
- [36] Helfat, C. E., & Peteraf, M. A. (2003). The dynamic resource-based view: capability lifecycles. *Strateg Manage J*, 24, 997–1010.
- [37] Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D., et al. (2007). *Dynamic Capabilities: Understanding Strategic Change in Organizations*. London: Blackwell.
- [38] Hult, G., Ketchen, D., & Nicholas, E. (2003). Organizational learning as a strategic resource in supply management., . *Journal of Operations Management*, 21 (NO 5), 541–556.
- [39] Kahraman, C., Cebeci, U., & Ruan, D. (2004). Multi-attribute comparison of catering service companies using fuzzy AHP: the case of Turkey. *International Journal of Production Economics*, 87 (NO 2), 171–184.
- [40] Lee, C. C., & Yang, J. (2000). Knowledge value chain. *Journal of Management Development*, 19(NO 9), 783–793.

- [41] Lee, J., Lee, K., & Rho, S. (2002). An evolutionary perspective on strategic group emergence: a genetic algorithm-based model. *Strategic Manage J*, 23(NO 8), 46-72.
- [42] Lee, S. K., & Lee, Y. C. (2007). Capabilities, Processes, and Performance of Knowledge Management: A Structural Approach. *Human Factors and Ergonomics in Manufacturing*, 17 (NO 1), 21–41.
- [43] Leonard- Barton, D. (1992). Core capabilities and core rigidities. *Strategic Management Journal*, 13, 26-111.
- [44] Leonard-Barton, D. (1995). *Wellsprings of Knowledge: Building and Sustaining the Source of Innovation*. Boston: Harvard Business School Press.
- [45] Lopez, S. V. (2005). Competitive advantage and strategy formulation: The key role of dynamic capabilities. *Management Decision*, 43 (NO 5), 661-669.
- [46] Marshall, C., Prusak, L., & Shpilberg, D. (1996). Financial risk and the need for superior knowledge management. In: Prusak, L. (Eds.). *Knowledge in Organisations* .
- [47] Mehendran, P., K Moorthy, M. B., & Saravanan, S. (2014). A Fuzzy AHP Approach for Selection of Measuring Instrument for Engineering College Selection. *Applied Mathematical Sciences*, 8 (NO 44), 2149– 2161.
- [48] Miller, D., & Friesen, P. (1984). *Organisations: A Quantum View*. Englewood Cliffs. Prentice Hall, New Jersey.
- [49] Modi, S. B., & Mabert, V. A. (2007). Supplier development: improving supplier performance through knowledgetransfer. *Journal of Operations Management*, 25 (NO 1), 42–64.
- [50] Moor, J. (1996). *The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems*. Harper Collins. New York.

- [51] Nielsen, A. P. (2006). Understanding dynamic capabilities through knowledge management. *JOURNAL OF KNOWLEDGE MANAGEMENT*, 10 ( NO. 4), 59 -71.
- [52] Nonaka, I., & Takeuchi, H. (1995). *The knowledge creating company*. New York: Oxford University Press.
- [53] O'Dell, C., & Grayson, C. (1998). If only we knew what we know: Identification and transfer of internal best practices., . *California Management Review*, 40 (NO 3), 74-154.
- [54] Pagell, M. (2004). Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics. *Journal of Operations Management*, 22 (NO 5), 459–487.
- [55] Paiva, E., Roth, A., & Fensterseifer, J. (2008). Organizational knowledge and the manufacturing strategy process: a resource-based view analysis. *Journal of Operations Management*, 26, 115–132.
- [56] Quinstas, P., Lefrere, P., & Jones, G. (1997). Knowledge management: a strategic agenda. *Long Range Planning*, 30, 91-385.
- [57] Ruggles, R. (1998). The state of the notion: Knowledge management in practice., , . *California Management Review*, 40(NO 3), 80–89.
- [58] Sambamurthy, V., & Subramani, M. (2005). Special issue on information technologies and knowledge management. *MIS Quarterly*, 29 (No 1), 1-7.
- [59] Sanchez, R., & Mahoney, J. T. (1996). Modularity, flexibility, and knowledge management in product and organisation design. *Strategic Management Journal*, *Special Issue (17)*, 63-76.
- [60] Sandhawalia, B. S., & Dalcher, D. (2011)., Developing knowledge management capabilities: a structured approach. *JOURNAL OF KNOWLEDGE MANAGEMENT*, 15 (NO 2), 313-328.
- [61] Seleim, A., & Khalili, O. (2007). Knowledge management and organizational performance in the Egyptian software firms. *International Journal of Knowledge Management*, 3 (No 4), 37-66.
- [62] Serbest, G. N., & Vayvay, Q. (2008). Selection of the most suitable distribution channel using fuzzy analytic hierarchy process in



Turkey. *International Journal of Logistics Systems and Management*, 4 (No 5), 487–505.

- [63] Sher, P. J., & Lee, V. C. (2004). Information technology as a facilitator for enhancing dynamic capabilities through knowledge management. *Information & Management*, 41, 933–945.
- [64] Skyrme, D. J., & Amidon, D. M. (1998). New measures of success. *Journal of Business Strategy*, 19 (No 1), 20–24.
- [65] Spender, J. C. (1996). Making knowledge the basis of a dynamic theory of the company. *Strategic Management Journal*, 17, 45–62.
- [66] Teece, D. (1998). Capturing value from knowledge assets: The new economy, markets for knowhow and intangible assets. *California Management Review*, 40 (No 3), 55–79.
- [67] Teece, D. (2007). Explicating Dynamic capabilities: The Nature and Microfoundations of (sustainable) Enterprise Performance. *Strategic Management Journal*, 1319-1350.
- [68] Teece, D., & Pisano, G. (1994). The dynamic capabilities of firms: an introduction. *Industrial and Corporate Change*, Vol. 3 (No. 30), 537-556.
- [69] Teece, D., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal* (17 (Winter special issue)), 509–533.
- [70] Vahidnia, M. H., Alesheika, A. A., & Alimohammadi, A. (2009). Hospital site selection using AHP and its derivatives. *Journal of Environmental Management*, 90, 3048-3056.
- [71] Verona, G., & Ravasi, D. (2003). Unbundling dynamic capabilities: an exploratory study of continuous product innovation. *Industrial and Corporate Change*, 12 (No. 3), 577-606.
- [72] Wang, C., & Ahmed, P. (2007). Dynamic capabilities: a review and research agenda. *International Journal of Management Reviews*, 9, 31–51.

- [73] Wang, Y. M., Luo, Y., & Hua, Z. (2008). On the extent analysis method for fuzzy AHP and its applications. *European Journal of Operational Research*, 186 (NO 2), 735–747.
- [74] Wheeler, B. C. (2002). NEBIC: a dynamic capabilities theory for assessing net-enablement. *Information Systems Research*, Vol. 13 (No. 2), 46-125.
- [75] Wiig, K. M. (1999). *Introducing knowledge management into the enterprise, Knowledge Management Handbook*. Boca Raton, FL: CRC Press.
- [76] Zack, M. (1999). Developing a knowledge strategy. *California Management Review*, 41 (No. 3), 46-125.
- [77] Shaker, A.Z., & George, G. (2002). Absorptive capacity: a review, reconceptualization, and extension. *Academy of Management Review*, 27 (No. 2), 185-203.
- [78] Zander, D., & Kogut, B. (1995). Knowledge and the speed of the transfer and imitation of organisational capabilities: An empirical test. *Organisation Science*, 6 (No. 1), 76-92.
- [79] Zollo, M., & Winter, S. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization Science*, 13, 339–351.