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Studying the Relationship between the Knowledge Management Processes and Intellectual Capital in a Knowledge-Based Research Center

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ABSTRACT

***Purpose:** The purposes of this study is to measure the effect of knowledge management processes on the intellectual capital components in a knowledge-based research center.*

***Design/ methodology/ approach:** The questionnaire has been applied for this survey and its reliability was estimated as 95% by using the Cronbach's alpha method. The statistical population of the research has been a knowledge-based research center and the sample volume was obtained as 384 individuals according to Cochran's formula.*

***Findings:** The obtained results revealed that the knowledge sharing and transfer are not of a meaningful effect on the human capital and also, knowledge acquisition does not have a significant influence on the structural capital. Moreover, it was disclosed that other knowledge management processes have significant impact on the intellectual capital components and in order to enrich the intellectual capital, knowledge management processes while changing their dimensions can be effectively employed.*

***Originality/value:** In this research, the effect of different processes of knowledge management on different components of intellectual capital has been comprehensively investigated. In addition, by taking them into account simultaneously, the way to create competitive advantage for organizations is described.*

Keywords: *Knowledge management, intellectual capital, knowledge management processes.*

INTRODUCTION

Nowadays, the importance of intangible assets, including the intellectual capital and knowledge management, is higher than the other conventional assets, such as money, land, machinery, etc. The value of any knowledge refers to the decision, which is to be made based on that knowledge (Gerami, 2010). The managers at various organizations need to avoid seeing assets from a single dimension. In other words, they must re-consider about the level and value of each of their assets. In the other hand, the recent decade has been the age of the growth in immaterialism in the field of strategic resources of the firms. The globalization of markets has directed firms to reposition towards obtaining the competitive advantage through creating their internal intangible assets, which would not be easily imitable for other organizations. Today, knowledge and intellectual capital are used to create and increase the organizational value and as a result, the success of an organization is dependent on its ability to manage this scarce resource. Since the nature of this knowledge is intangible and insensible, it can be measured with none of the traditional financial accounting methods. Added to that, it should be mentioned that intellectual capital can be utilized to create and apply knowledge for increasing the organization's value. Thus, in order to align with other organizations and to amplify the competitive power, organizations need to exploit knowledge management and make use of their intellectual capitals in the internal and global arenas. In this way, the current paper has attempted to evaluate the effect of the relationship between knowledge management processes (knowledge acquisition, application, sharing, creation, stabilization, and efficient utilization of knowledge) and intellectual capital factors (structural, human, and social) in a research center.

LITERATURE REVIEW

Knowledge Management

Since various authors from different specialized fields have scrutinized the knowledge management subject based on their different perspectives and stimulations, diverse definitions have been presented. These definitions cover the formation of knowledge, plans, procedures, and also the methods by which the organizations analyze their circumstances and communicate with others. Gold and his co-workers (2001) expressed the effective knowledge management subjects from the viewpoint of organizational capabilities. This perspective indicated that the knowledge foundation, including the technology, structure, and culture, along with the processes of acquisition, conversion, and application of knowledge are accounted as the prerequisite for the effective knowledge management, which are necessary for supporting the organizational resources.

Cui et al. (2005) stated that knowledge management is consisted of three interdependent processes: knowledge acquisition, conversion, and application. Knowledge is not only an important source for a company, but it can be also employed as the main source of competitive advantage. Hence, the knowledge management capabilities can reflect the knowledge management processes through which the organization can develop and apply its knowledge effectively (Liao and Wu, 2009). In table 1, some of the knowledge management definitions have been provided from the perspectives of different scholars.

Table1. *The definitions of knowledge management by different researchers*

Researcher	Knowledge management definitions
Liebeskind (1996)	Knowledge management is the system of handling, collecting, revising, and distributing all forms of knowledge in an organization.
Chait (1999)	Knowledge management is a multi-dimensional process, which requires the effective and concurrent management of the four dimensions of content, culture, process, and infrastructure.
Civi (2000)	Knowledge management includes the acquisition, sharing, and application of the knowledge inside an organization and involves the learning processes and the management information system.
Watson (2003)	Knowledge management includes the acquisition, storage, retrieval, application, creation, and review of the knowledge of an organization via a controlled method.
Sousa and Hendriks (2006)	Knowledge management encompasses the policies, strategies, and techniques, which by optimizing the conditions, increase the efficiency, creativity, and coordination between the employees to support the competitiveness in an organization.
Mahdavi (2001)	Knowledge management is composed of learning, storing, retrieving, applying, and producing knowledge and involves controlling the valuable knowledge of an organization.
Afrazeh (2007)	Knowledge management is the process of discovery, acquisition, development and creation, sharing, maintenance, assessment, and application of the appropriate knowledge at the right time and by the right person in the organization. This process can be pursued via linking between the human resources, information and communications technology, and construction of the suitable structure to achieve the organizational objectives.

From the resource-based perspective of a firm, knowledge is considered as the vital resource for an organization. Alavi and Leidner (2001) believed that the organizations that are aware of their knowledge resources, are of valuable and unique resources that are intricately imitable and exploitable by others for gaining a sustainable competitive advantage. Therefore, it should be mentioned that the tools required to access, preserve, and improve the knowledge resources can aid the success of organizations to a great extent.

According to the definitions and models, knowledge management is rooted in the cognitive sciences, linguistics, information systems, database technologies, library communication science, education, sociology, psychology, and communication science (Hallouche and Sultan, 2008). A variety of changes and differences in knowledge management definitions may be related to the paradigm of knowledge management. For instance, computational paradigm is system- and technology-based and it only applies the explicit knowledge mechanically and statically for optimization. The other paradigm is agonic, which according to its organizational-social dimensions, is only human-based and strives for maximization dynamically and also by using the implicit and explicit knowledge (Hazlett et al., 2011).

Knowledge Management Processes

Various researchers have presented different classifications of the knowledge management process that some are presented in the following:

- **Knowledge acquisition:** It is the initial process of knowledge management, which particularly values the individual knowledge capabilities in an organization. Whenever a knowledge is obtained, it could be beneficial to the organization. Knowledge acquisition needs to be compatible with the organizational requirements and consistent with the standpoint of the organization's strategies.
- **Knowledge creation**: Gold et al. (2001) expressed that knowledge creation is to generate the knowledge, which is new and in relation with the motivation, attitude, expertise, and wisdom of the employees. Nonaka and Takeuchi (1995) declared that knowledge creation should be performed via a person who is aware of the taught lessons and also through the synergies among the staffs who are working together. Knowledge creation implies the knowledge interaction between the implicit and explicit knowledge, which is known as SECI model.
- **Knowledge storage**: Gold and his co-workers (2001) stated that the created knowledge should be stored and systematically classified to be easily retrievable. In order for knowledge to be storable, it requires to be purified in order to become more valuable and beneficial to the organization.
- **Knowledge application**: It is the final stage of the knowledge management process, where the effectiveness of knowledge management in the organization is improved and it represents the knowledge transfer and utilization. Adel and Grison (1998) proposed another model for knowledge management shown in figure 1. This model is based on two chief principles.
- **Knowledge creation and identification** can be done through many methods and involves the identification of useful knowledge available in the organization's processes, working procedures, and actions.
- **Collection** can be performed as soon as the useful knowledge is recognized.
- **Organization** of knowledge mostly involves the knowledge processing activities. In this stage, knowledge is transformed into its appropriate configuration.
- **Distribution** is accomplished after knowledge organization, in which knowledge should be distributed amongst a number of individuals. In this step, by using the suitable tools and arrangements, the stored knowledge should become accessible to the individuals, who require that knowledge.
- **Adjustment** of this model has to be done prior to knowledge application, because in this stage, the acceptability and correctness of the knowledge is assessed and adjusted. This special task should be carried out by the professional staff inside the organization.
- **Knowledge application** must be performed because knowledge could not be enriched and enhanced, unless it is frequently utilized. In this step, the knowledge is flowed in the working and decision-making processes of the organization.

Knowledge Management Providers

The second principle constituting this model includes the factors playing a critical role in the formation of knowledge management in an organization. These factors are categorized into for segments:

- **Leadership**: The leadership or management support in the organization for the knowledge management activities is amongst the most important and effective factors in the formation of knowledge management. Several experts including Davenport, Lee, and Choi, have recognized the senior management support as a necessary and central factor.
- **Culture**: Knowledge management cannot be executed successfully without an appropriate cultural and a trustful platform. Unlike information management, knowledge management regards about the values and beliefs. Therefore, since culture involves such factors, it plays an imperative role in the knowledge management.
- **Technology**: Technology, by using the suitable tools and arrangements, can play a critical role, particularly for storage of the organizational knowledge.

- **Knowledge measurement**: The knowledge measurement and assessment helps realize how close the organization is to the management's objectives. On the other hand, knowledge measurement and evaluation can disregard the old and obsolete knowledge of the organization (Grayson and O'Dell, 1998).

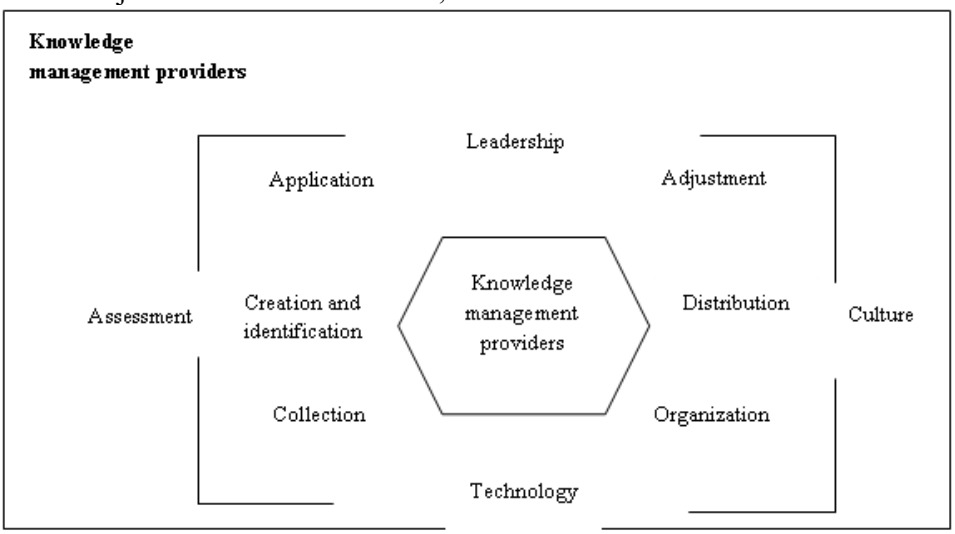


Fig1. *The model based on the knowledge management processes and providers (Grayson and O'Dell, 1998)*

In this paper, five knowledge management processes are described, which have many overlaps with the previous models for the knowledge management processes, in order to explore the relationship with the intellectual capital components.

Knowledge creation and generation: It presents the level of creation and development of knowledge resources by the organization alongside its operational and functional boundaries. Knowledge creation demands the ability to produce new applications from the available knowledge and to exploit the new potential skills, which have not discovered yet (Liao et al., 2010). Sedera and Gable (2010) indicated that the stage of knowledge creation and generation is fundamentally related to the planning and implementation stages of the organizational systems' life cycle, where the knowledge creation and generation are considered as interconnected to the knowledge application.

Knowledge retention: It shows the placing of knowledge in the knowledge reservoir to guarantee some kind of endurance during the time. This knowledge reservoir can be whether an intelligent individual or system. The stored knowledge of the individuals can be increased through their observations, experiences, and actions (Sedera and Gable, 2010). Having identified the important and vital knowledge for the past and future of the organization by them, this knowledge can be stored in a reasonable and accessible way for the organization's staffs (Kongpichayanond, 2009).

For the knowledge storage system, several factors are essential, including the structure for rapid and correct presentation of information, the data classification in accordance with the learning requirements, the ability of providing the accurate and transparent information, the timely, precise, and accessible content, the processes to replace the obsolete knowledge and to analyze the errors and failures in the organization (Liao and Wu, 2009).

Knowledge sharing: It includes the sharing of information, ideas, suggestions, and specialties amongst an organization's staff (Nayir and Uzuncarsili, 2008). It indicates the level of knowledge resource sharing inside the functional and operational boundaries, and this capability can essentially change the business processes. Information sharing can not only facilitate the inter-functional interactions, but also can lead to share the knowledge reservoir between the participants in the organizational processes. This could direct people to take part in the organizational processes and this would provide a high participation and a deep realization of the processes (Liao et al., 2010).

Knowledge distribution and knowledge transfer: They can be often replaced with each other and they describe the business processes, which transfer and distribute the knowledge between an organization's members and colleague groups. In this stage, it needs to be

noticed that the distributed knowledge should be presented appropriately, usefully, and interpretably (Kongpichayanond, 2009).

Knowledge exploitation and application: This stage reflects the application of the shared knowledge in the organization, which allows collect the referrals and references to the knowledge resources (Liao et al., 2010). This knowledge management process implies the knowledge application in the new conditions, in which users can learn new things and create the knowledge (Kongpichayanond, 2009). On the other hand, as the key point in the knowledge management, the efficient utilization of the introduced knowledge in the organization is of high importance, which requires the support for decision making and problem solving to effectively respond to the knowledge requirements (Allameh et al., 2011) (Uzuncarsili, 2010).

Moreover, many believe that the competitive advantage is not relied in the available knowledge in the organization, but is relied in the application of that knowledge, which can create an advantage for the organization (Sedera and Gable, 2010). Furthermore, they think that this stage of knowledge management has the highest impact on the life cycle of organizational systems and their success in a business. The important point in this stage is that the transferred knowledge to the organization and the people needs to be integrated with goods, services, and organizational processes. In fact, it should be viable of generating a shared concept for both the receiver and transferor of knowledge (Nayir and Uzuncarsili, 2010). Finally, it is worthwhile to state that knowledge has been regarded as the key source for the organizations in long term and the effective management of knowledge is essential for its success (Nevo and Chan, 2007).

Intellectual Capital

With respect to the intellectual capital, many definitions have been proposed by different scholars. Bontis (1996) believed that intellectual capital is volatile and as soon as it is discovered and utilized, it can help the organization compete by using a new resource in the environment. Roos and his colleagues (1997) expressed that intellectual capital involves all the processes and assets, which were not normally and traditionally shown in the balance sheet. It also includes the intangible assets such trademarks, symbols, patents, etc., which are taken into account by the new accounting routines, in which the intellectual capital is the total knowledge of an organization's members and the conversion of their knowledge into practical applications.

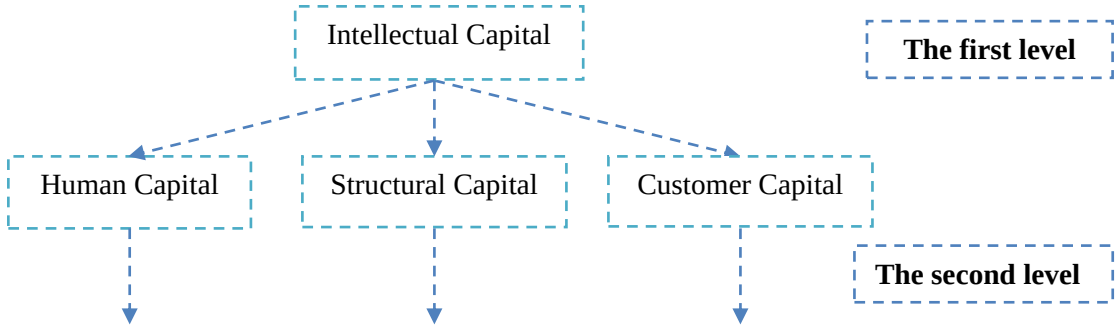
Seetharaman et al. (2002) accomplished a survey in which they concluded that the intellectual capital is the difference between a company's market value and the replacement costs of its assets. According to Gupta (2001), intellectual capital is a unique set of intangible and tangible resources of the company and is called to the changes and evolutions of these tangible and intangible resources. Stewart (1997) indicated that intellectual capital includes the intellectual materials such as knowledge, information, intellectual property, and experience that generate wealth and there is no universal definition for that. In addition, Bontis (1998) presented a similar definition and stated that intellectual capital is to search and strive for effective utilization of knowledge (produced goods) by using the unprocessed information (raw material). Klein et al. (1994) considered intellectual capital as an intellectual material, which is collected, structured, and used to produce a more valuable asset. From Edvinsson viewpoint (1997), intellectual capital refers to the practical information and knowledge that is used to create value for the company. Mouritsen (1998) mentioned that intellectual capital is a wide-ranging organizational knowledge that is specific and unique for each firm and allows it to constantly change itself and conform to the changing and evolutionary conditions. Based on Haanes et al. (1997), the available knowledge in the organization is called intellectual capital that is expressed at two individual and organizational levels. The individual level engages the knowledge, skills, aptitudes, etc., while the organizational level refers to some issues like the distinctive database of each customer, technology, organizational processes and methods, culture, etc.

Some others have considered the intellectual capital as the competencies of a firm, which are mainly related to the experience and expertise of the people inside the organization. In fact, this knowledge and experience of the firm's internal people can produce value and this can be done through knowledge transfer processes as well as new knowledge creation processes. It should be noticed that these competencies are not necessarily and only produced by using the individuals inside the organization, but they can

be sometimes created by the aid of the organization's environment, for example by use of the cooperative networks between the companies in a specific area (Prahalad and Hamel, 1994). Intellectual capital is known as the knowledge flow inside a company (Dierickx and Cool, 1989). It is defined as a collection of the knowledge assets, which are specific to an organization and accounted as its characteristics and can considerably improve the competitive situation of the organization by adding value to the organization's key beneficiaries (Marr, 2004).

Intellectual Capital Components

Bontis (1998) indicated the three types of human, structural, and customer capitals. Two years later in 2000, he altered his categorization into human, structural, relational capitals, and the intellectual property. Human capital refers to the individual knowledge level of an organization's staffs that is typically implicit. Structural capital relates to all the non-human assets or organizational capabilities, which are used to fulfill the market requirements. The relational capital reflects the entire knowledge existing in an organization's relations with its surroundings including the customers, suppliers, academic unions, etc. From their perspective, the most important component of relational capital is the customer capital since an organization's success is interrelated to its customer capital. Intellectual capital refers to that part of intangible assets, which has been supported and recognized by the law, such as copy right, invention right, and patent (Bontis, 1998; Bontis et al., 2000). According to Bontis, amongst these intellectual capitals, human capital is of significant importance because it is the source of innovation and strategic renewal and can be obtained through a brain-storming session, or by thinking of dreams and aspirations in the office, or by eliminating the obsolete files by the employees, or through improving the personal skills, etc.



Nature	Human intelligence or thoughts	Organizational routines	Market relations
Scope	Inside the people's minds	Inside the organizational relationships	In the organizational relationships with the external environment
Measurement parameters	Volume suitability	Efficiency and accessibility	Stable period
Coding problems	High	Medium	The highest level, and without coding

Fig2. *Conceptualization of the intellectual capital (Bontis, 1998)*

In addition, Bontis et al. (2000) believed in a series of reciprocal relationships between the components of intellectual capital in a way the even if an organization has a proper human capital but an inappropriate structural capital, it will be unable to make use of the knowledge embedded in its individuals and consequently cannot respond to its customer capital.

Human Capital

The 20th century can be known as the "human capital" era since earlier than the 19th century, the investments in human capital were not respected and the employment on-service costs were not attended properly. Later, training, skills, and knowledge were converted to the factors determining the nations' and individuals' efficiency. Human capital exhibits the knowledge inventory of an organization's staff (Bontis, 2002). Human capital is called to the capabilities, skills, and expertise of the human members of an organization (Malcom, 2002). It should be considered that human capital benefits from thoughtfulness of the individuals. The primary objective of human capital is to innovate in goods and services, and to improve in commercial processes (Mouritsen, 2001).

Additionally, according to Roos et al. (1997), intellectual capital is produced through competences, attitudes, and intellectual agility.

Simon Kuznets, winner of the Economics Nobel Prize in 1971, believed that the concept of capital, which only includes the physical capital, is imperfect and unclear. Thus, both human and physical capitals should be taken into account. He stated that a country's human capital cannot be presented by its advanced industry or industrial tools, but the gathered and stored knowledge from numerous experiments as well as the skillfulness of its people to make use of the knowledge, can form the human capital (Sobhani, 1992: 76).

Structural Capital

Structural capital covers all the non-human reservoirs of knowledge including the databases, organizational figures, executive instructions of processes, strategies, operational plans, and overall, anything that its total value to the organization is higher than its material value (Roos J.R., 1997). The structural capital refers to the knowledge remained in the end of each working day in the organization, which belongs to the entire organization, and can be re-produced and shared with others (Mouritsen, 2001). This type of capital can be created by using the competitive advantages of a company in addition to its staff's abilities. Structural capital including the company's reputation, experience, products, services, and production methods (Rodov and Leliaert, 2002). From Bontis perspective (1999), if an organization is of weak working procedures and systems, the overall intellectual capital cannot reach its maximum potential ability, while the organizations with strong structural capital have a supportive culture that enables their employees do new and innovative things, fail, and learn. Chen and his co-workers added that structural capital is the function of human capital. In fact, structural and human capitals while interacting with each other help the organizations to smoothly form, develop, and apply the customer capital (Chen et al., 2005). The structural capital includes technologies, data network, publications, processes, and the organization. The structural capital actually facilitates the usage of knowledge capital and creates the roadmap and instruction for the intellectual capital assets (Brown, 2002).

Relational Capital

Stewart mentioned that the main subject in the customer capital refers to the available knowledge in the marketing channels and customers' relationships. Customer capital represents the potential ability of an organization as a result of its external intangible factors (Stewart, 1998). In new definitions, the concept of customer capital has been extended into the relational capital, which includes the available knowledge in all the relationships that an organization holds with the customers, competitors, suppliers, trade unions, and the government. The growth of relational capital depends on the support for the human and structural capitals and overall, the relational capital, as a bridge and intermediary in the process of intellectual capital, can be known as the main determinant in converting the intellectual capital to market value and untimely to a higher performance in the entire organization (Chen et al., 2005).

The relational capital includes the external dependences, such as customers' loyalty, the organization's sense of reputation, and the company's relationships with the suppliers. This case is defined according to the perceived value of a customer from trading with the organization (Malcom, 2002). The customer capital covers several items including the value of patents owned by the firm, its relationships with people, the related organization for customer relationships, market share, customer retention and loss rates, and the net profit per customer (Mouritsen, 2002). In fact, development is linked to the customer capital, which includes the knowledge existing in all the relationships with customers, competitors, suppliers, trade unions, and the government. The growth of customer capital depends on the support for the human and structural capitals (Ghelichli and Moshabbaki, 2006).

Intellectual Capital and Knowledge Management

According to several researchers, intellectual capital and knowledge management can affect each other and their relationship is of a very significant importance for the organization's efficiency (Hsu & Sabherwal, 2012; Kianto, Ritala, Spender, & Vanhala, 2014; Abualoush, Masa'deh, Bataineh, & Alrowwad, 2018). Intellectual capital in the knowledge management is a fundamental source to gain the competitive advantage and improve the organizational performance (Nonaka et al., 2000; Marr et al., 2004; Curado, 2008; Shih et al., 2010). On the other hand, the environmental challenges have urged the organizations to apply knowledge management and intellectual capital (Shih et al., 2010). A number of researchers believe that knowledge management and

intellectual capital are interdependent and they include an extensive spectrum of the intellectual activities, from knowledge creation to knowledge diffusion (Nonaka et al., 2000; Huang and Wu, 2010; Zhou and Fink, 2003). Dumay stated (2009) that it seems that knowledge is very critical to the organizations. Huang and Wu (2010) discovered that the intellectual capital components are of a positive and significant relationship with the knowledge productivity in the Taiwanese construction industry. Moreover, Shih and his colleagues (2010) disclosed the positive and meaningful relationship between knowledge management and intellectual capital. Furthermore, the studies on knowledge management have principally focused on the separate knowledge management processes to try identifying and comprehending their characteristics (Syed-Ikhsan and Rowland, 2004). As a result, some investigations have been carried out regarding the complexity of the relationship between intellectual capital and management, and its criticality for the simple and easy understanding of the concepts. Intellectual capital originates from a broad cognition of the knowledge, which is important to the organization (Dumay, 2009).

Intellectual capital and knowledge management involve different goals including the limits and ranges of the intellectual activities from knowledge creation to the investments on knowledge (Zhou and Fink, 2003). Ramirez and his colleagues introduced intellectual capital and knowledge management as a set of managerial activities, which aim to identify, evaluate, and value the organization's knowledge assets and invest on assets through knowledge creation and sharing new knowledge (Ramirez, 2007).

Knowledge management activities were primarily employed to extend, develop, and maintain the intellectual capital to create the competitive advantage (Seleim and Khalil, 2007). In other words, when the intellectual capital is used correctly and appropriately, it can be exploited well, which increases the organizational absorption capacity that ultimately, facilities the knowledge management processes. In addition, Cortini and Benevene declared that knowledge is viable of increasing the organization's value through the intangible assets (Cortini and Benevene, 2010). Zhou and Fink (2003) expressed that knowledge management and its processes affect the intellectual capital and can extend, develop, and accumulate the intellectual capital. The relationship between intellectual capital and knowledge management as well as the effect of these two variables on each other can finally impact on the competitive advantage. In fact, knowledge management includes some concepts such as organizational learning, innovation, competence, expertise, and capability, which are applied for extension and development of the intellectual capital (Rastogi, 2000). The objective of knowledge management can be defined as the effective construction and exploitation of intellectual capital. Huss () added that the collective intellectual capital is achievable from the daily decisions and experiences occurring in the working processes as well as the trainings, instructions, forms, and shapes that all create the knowledge management mechanisms.

Research Hypothesis

According to the main hypothesis of this study, it has been claimed that there is a significant relationship between the knowledge management processes (knowledge acquisition, application, sharing, creation, stabilization, and efficient utilization of knowledge) and the intellectual capital factors (structural, human, and social).

Research Methodology

This study is a quantitative research in terms of the data nature, and is a practical research in terms of the main objective. The research methodology, considering the data collection, is amongst the descriptive surveys (correlational). Moreover, from the data collection perspective, this paper is considered as a field study. The statistical population is 500 surveyors of a knowledge-based research center, and the obtained sample volume according to the Cochran formula, was estimated as 384 individuals.

In this paper, the simple random probability sampling method has been utilized. In order to collect the data and information, the developed questionnaire by the researcher has been applied. The reliability of tools was calculated by using the Cronbach's alpha method, which is equal to 0.95. Furthermore, since the questionnaire has been verified by the elites, it can be expressed that the tools are of the required validity.

According to the above-mentioned points and facts indicated in the introduction and literature review sections, a conceptual model presented in figure 3 has been employed for this research.

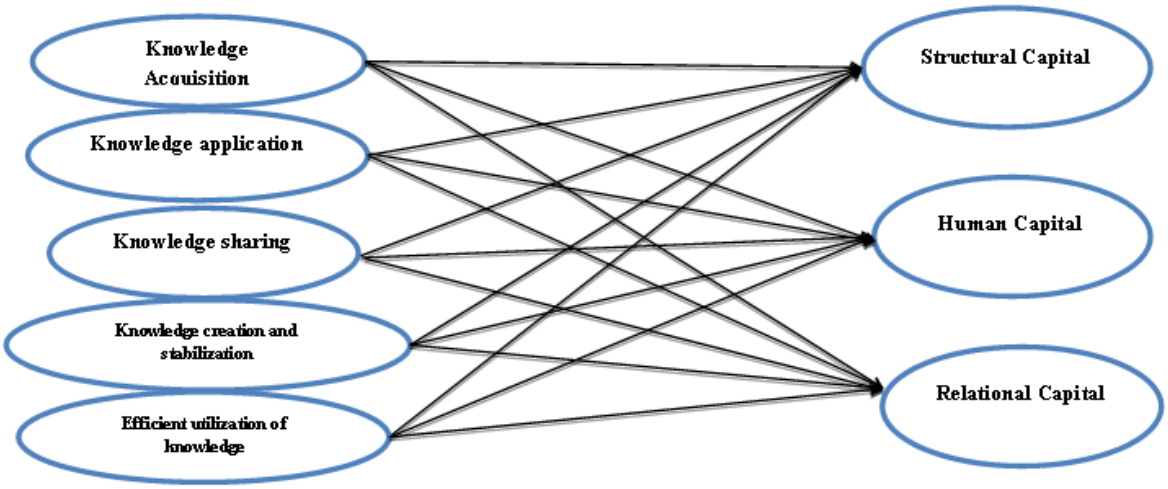


Fig3. *The research conceptual model*

ANALYSIS OF THE RESEARCH FINDINGS

Table4. *Cronbach's alpha coefficients and the covariance matrix between the latent variables (sample volume: 384)*

	Relational capital	Structural capital	Human capital	Knowledge acquisition	Knowledge application	Knowledge sharing	Knowledge creation	Knowledge utilization	Cronbach's alpha
Relational capital	0.99								0.954
Structural capital	0.94	0.99							0.945
Human capital	0.89	0.93	1						0.948
Knowledge acquisition	0.53	0.55	0.6	1					0.952
Knowledge application	0.54	0.56	0.55	0.82	1				0.953
Knowledge sharing	0.60	0.69	0.61	0.74	0.68	1			0.948
Knowledge creation	0.64	0.71	0.68	0.67	0.59	0.8	1		0.949
Knowledge utilization	0.77	0.84	0.80	0.71	0.74	0.81	0.96	1	0.954

Table 4 presents the co-variance matrix between the latent variables. The last column of this table presents the Cronbach's alpha coefficients for the variables, which signifies that all the coefficients are above 0.7 showing the reliability and validity of the measurement tools. In addition, the total Cronbach's alpha coefficient is 0.956. It is even higher than 0.7 and therefore, demonstrates that the overall reliability and validity of the measurement tool (questionnaire) is acceptable and perfect.

The Fitness Test for the Conceptual Framework

In this section, the research conceptual framework is drawn in the format of a diagram. Afterwards, by using different methods, its fitness has been assessed. The complete model of the structural equation truly presents a combination of the confirmatory factor analysis (CFA) and the path diagram.

Interpretation of the Evaluation Results of the Model's Fitness

In general, while working with the LISREL software, each of the obtained indices for the model cannot lonely verify the fitness or lack of fitness of the model, and therefore, these indices have to be interpreted jointly. The achieved values for these indices show that the framework is not in a suitable position for explanation and fitness and thus, the model requires some amendments. Having made the required modifications, the fitness indices of the model are in a good position and thus, the research hypotheses can be answered well. All the obtained results are briefly described in table 5.

Table5. *The model fitness indices*

Indices title	The obtained value	Allowable limit
Chi-square	2.82	lesser than 3
Goodness-of-fit index (GFI)	0.90	higher than 0.9
Root mean square error of approximation (RMSEA)	0.344	lesser than 0.1
Comparative fit index (CFI)	0.93	higher than 0.9
Adjusted goodness-of-fit index (AGFI)	0.83	higher than 0.8
Normed fit index (NFI)	0.90	higher than 0.9
Non-normed fit index (NNFI)	0.91	higher than 0.9

Measurement Equations

In order to analyze the internal structure of the questionnaire and explore the constituting factors of each construct or latent variable, the confirmatory factor analysis (CFA) tool is applied. The CFA of the research constructs are exhibited in below:

Table6. *The results of the confirmatory factor analysis including the factor loadings*

Knowledge acquisition	Factor loading	Knowledge application	Factor loading	Knowledge sharing and transfer	Factor loading	Knowledge creation and stabilization	Factor loading	Efficient utilization of knowledge	Factor loading
Q1	0.7	Q9	0.73	Q16	0.84	Q21	0.82	Q31	0.81
Q2	0.73	Q10	0.77	Q17	0.89	Q22	0.82	Q32	0.78
Q3	0.82	Q11	0.84	Q18	0.88	Q23	0.94	Q33	0.81
Q4	0.86	Q12	0.77	Q19	0.90	Q24	0.79	Q34	0.84
Q5	0.89	Q13	0.87	Q20	0.94	Q25	0.77	Q35	0.75
Q6	0.85	Q14	0.74			Q26	0.75	Q36	0.73
Q7	0.81	Q15	0.55			Q27	0.83	Q37	0.7
Q8	0.69					Q28	0.84	Q38	0.72
						Q29	0.83		
						Q30	0.74		
Human capital	Factor loading	Structural capital	Factor loading	Relational capital	Factor loading				
Q39	0.88	Q46	0.89	Q53	0.86				
Q40	0.94	Q47	0.84	Q54	0.81				
Q41	0.96	Q48	0.89	Q55	0.85				
Q42	0.90	Q49	0.84	Q56	0.88				
Q43	1.19	Q50	0.91	Q57	0.92				
Q44	0.8	Q51	0.93	Q58	0.91				
Q45	0.86	Q52	0.88						

***P < 0.01, *P < 0.05*

The results obtained from the confirmatory factor analysis demonstrated that the constructs under study are of high credit with respect to the validity and the factor loadings are significant at the confidence level of 99% and they have a meaningful effect on measurement of the respective construct. The obtained validity implies that the measurement tool is able to measure the related properties and characteristics. In this paper, the importance of validity is under emphasis since the unsuitable and insufficient measurements can invalidate any research.

Answering the Research Hypotheses by Using the Structural Equations

The research hypotheses are listed as follow:

Knowledge acquisition significantly effects on the human capital.

Knowledge acquisition does not significantly influence on the structural capital.

Knowledge acquisition significantly impacts on the relational capital.

Knowledge application has a significant effect on the human capital.

Knowledge application significantly affects the structural capital.

Knowledge application has a significant impact on the relational capital.

Knowledge sharing and transfer is not influential on the human capital significantly.

Knowledge sharing and transfer affects the structural capital significantly.

Knowledge sharing and transfer has a significant impact on the relational capital.

Knowledge creation and stabilization has a significant effect on the human capital.

Knowledge creation and stabilization influences significantly on the structural capital.

Knowledge creation and stabilization has a significant effect on the relational capital.

Efficient utilization of knowledge affects the human capital significantly.

Efficient utilization of knowledge is of a significant impact on the structural capital.

Efficient utilization of knowledge is significantly effective on the relational capital.

Table7. *The results of studying the hypotheses*

	Hypotheses	Path coefficient (β)	T-statistics	Coefficient of determination (R^2)	Results
1st hypothesis	Knowledge acquisition → Relational capital	0.75	3 **		confirmed
2nd hypothesis	Knowledge application → Relational capital	- 1.25	- 4 **		confirmed
3rd hypothesis	Knowledge sharing and transfer → Relational capital	3.45	5.87 **	0.9	confirmed
4th hypothesis	Knowledge creation and stabilization → Relational capital	- 2.57	- 4.88 **		confirmed
5th hypothesis	Efficient utilization of knowledge → Relational capital	3.65	6.03 **		confirmed
6th hypothesis	Knowledge acquisition → Structural capital	0.49	1.95		rejected
7th hypothesis	Knowledge application → Structural capital	- 1.19	- 3.78 **		confirmed
8th hypothesis	Knowledge sharing and transfer → Structural capital	0.23	3.48 **	1	confirmed
9th hypothesis	Knowledge creation and stabilization → Structural capital	- 2.72	- 5.06 **		confirmed
10th hypothesis	Efficient utilization of knowledge → Structural capital	3.77	6.14 **		confirmed
11th hypothesis	Knowledge acquisition → Human capital	0.56	2.17 *		confirmed
12th hypothesis	Knowledge application → Human capital	- 1.18	- 3.65 **		confirmed
13th hypothesis	Knowledge sharing and transfer → Human capital	0.13	1.64	0.9	rejected
14th hypothesis	Knowledge creation and stabilization → Human capital	- 2.8	- 5.04 **		confirmed
15th hypothesis	Efficient utilization of knowledge → Human capital	3.82	6 **		confirmed

$^{**}p < 0.01$, $^{*}p < 0.05$

The first hypothesis examined the impact of knowledge acquisition on the human capital. Considering the path coefficient and t-statistics, it can be mentioned that knowledge acquisition can affect the human capital positively at 99% confidence level. The path coefficient (β) indicates that if knowledge acquisition changes by 1 unit, the human capital will positively change by 0.75 of a unit.

The second hypothesis tested the effect of knowledge application on the human capital. Based on the path coefficient and t-statistics, it can be stated that knowledge application negatively affects the human capital at 99% confidence level. The path coefficient (β) implies that if knowledge acquisition changes by 1 unit, the human capital will inversely change by 1.25 unit.

The third hypothesis scrutinized the effect of knowledge sharing and transfer on the human capital. Considering the path coefficient and t-statistics, it can be expressed that knowledge sharing and transfer will significantly affect the human capital at 99% confidence level. The path coefficient (β) signifies that if knowledge sharing and transfer changes by one unit, the human capital will change by 3.45 units positively.

The fourth hypothesis assessed the effect of knowledge creation and stabilization on the human capital. According to the path coefficient and t-statistics, it can be declared that knowledge creation and stabilization is negatively influential on the human capital at the confidence level of 99%. The path coefficient (β) indicates that if knowledge

creation and stabilization changes by a unit, the human capital will change by 2.57 units negatively.

The fifth hypothesis investigated the impact of efficient utilization of knowledge on the human capital. Based on the path coefficient and t-statistics, it can be claimed that the efficient utilization of knowledge at the confidence level of 99% influences on the human capital positively. The path coefficient (β) suggests that if the efficient utilization of knowledge changes by 1 unit, the human capital will change by 3.65 units in the positive direction.

The value of multiple coefficient of determination (R^2) has been equal to 0.9. This coefficient studies the capability of predicting the dependent variable by using the independent variable. Hence, the variable of knowledge management processes is viable of predicting 90 percent of the human capital variations. The remained 10 percent relates to the prediction error.

The structural equation for the first five hypotheses related to the human capital is shown in the below:

y1 = 0.75*x1 - 1.25*x2 + 3.45*x3 - 2.57*x4 + 3.65*x5

The sixth hypothesis of this research examined the impact of knowledge acquisition on the structural capital. According to the path coefficient and t-statistics, it can be mentioned that knowledge acquisition is not of a meaningful effect on the structural capital and as a result, the related hypothesis is not confirmed.

The seventh hypothesis of this study explored the effect of knowledge application on the structural capital. Considering the path coefficient and t-statistics, it can be stated that knowledge acquisition impacts on the structural capital negatively at 99% confidence level. The path coefficient (β) denotes that if the knowledge acquisition changes by one unit, the structural capital will change by 1.19 in the opposite direction.

The eighth hypothesis of this study assessed the influence of knowledge sharing and transfer on the structural capital. According to the path coefficient and t-statistics, it can be said that the knowledge acquisition affects the structural capital positively at 99% confidence level. The path coefficient (β) indicates that if knowledge acquisition changes by a unit, the structural capital will positively change by 0.23 of a unit.

The ninth hypothesis of this research investigated the effect of knowledge creation and stabilization on the structural capital. Based on the path coefficient and t-statistics, it can be declared that knowledge acquisition at the confidence level of 99% impacts negatively on the structural capital. The path coefficient (β) signifies that if knowledge acquisition changes by one unit, the structural capital will change in the negative direction by 2.72 units.

The tenth hypothesis tried the effect of efficient utilization of knowledge on the structural capital. Considering the path coefficient and t-statistics, it can be expressed that knowledge acquisition is influential on the structural capital positively at the confidence level of 99%. The path coefficient (β) denotes that if knowledge acquisition changes by 1 unit, the structural capital will positively change by 3.77 units.

The structural equation for the second five hypotheses related to the structural capital are provided in the following:

y2 = -1.19*x2 + 0.23*x3 - 2.72*x4 + 3.77*x5

The multiple coefficient of determination (R^2) has been obtained equal to 1. This coefficient evaluates the ability of predicting the dependent variable by use of the independent variable. Therefore, the variable of knowledge management processes is capable of forecasting all the structural capital changes.

The eleventh hypothesis of this study scrutinized the impact of knowledge acquisition on the relational capital. Based on the path coefficient and t-statistics, it can be indicated that knowledge acquisition affects the relational capital positively at the confidence level of 99%. The path coefficient (β) implies that if knowledge acquisition changes by one unit, the relational capital will change by 0.56 of a unit in the positive direction.

The twelfth hypothesis checked the effect of knowledge application on the relational capital. According to the path coefficient and t-statistics, it can be mentioned that knowledge application influences negatively on the relational capital at 99% confidence level. The path coefficient (β) shows that if knowledge application changes by 1 unit, the relational capital will change in the reverse direction by 1.18.

The thirteenth hypothesis of this study examined the influence of knowledge sharing and transfer on the relational capital. Based on the path coefficient and t-statistics, it can be asserted that

knowledge sharing and transfer does not impact on the relational capital significantly.

The fourteenth hypothesis of this paper assessed the influence of knowledge creation and stabilization on the relational capital. Considering the path coefficient and t-statistics, it can be affirmed that knowledge creation and stabilization negatively impacts on the relational capital at the confidence level of 99%. The path coefficient (β) denotes that if knowledge creation and stabilization changes by one unit, the relational capital will change by 2.8 units in the negative direction.

The fifteenth hypothesis of this research analyzed the effect of efficient utilization of knowledge on the relational capital. According to the path coefficient and t-statistics, it can be expressed that the efficient utilization of knowledge affects the relational capital at the confidence level of 99 percent positively. The path coefficient (β) shows that if the efficient utilization of knowledge changes by a unit, the relational capital will change positively by 3.82 units.

The multiple coefficient of determination (R^2) has been calculated 0.9. This coefficient is viable of forecasting the dependent variable by use of the independent variable. Therefore, the variable of knowledge management processes predicts 90 percent of the relational capital variations. The remained 10 percent reflects the prediction error.

The structural equation for the third five equations related to the relational capital is given as follows:

$$y3 = 0.56*x1 - 1.18*x2 - 2.80*x4 + 3.82*x5$$

Discussions and Conclusions

In this paper, the relationship between the knowledge management processes and intellectual capital was analyzed and appraised. The results of this survey demonstrated that knowledge sharing and transfer does not have a meaningful impact on the human capital and knowledge acquisition does not affect the structural capital significantly. In addition, a meaningful relationship between the knowledge management processes and intellectual capital was observed in this knowledge-based research center. According to the obtained findings of this study, this relationship can be interpreted in this way that amongst the knowledge management processes, knowledge application is of the highest impact, which has led the organization benefit from a desirable competitive advantage. Moreover, the knowledge productivity has been valued in the organization and an effective support has been made for decision making and problem solving in the organization. These findings are in line with several studies (Sedera and Gable, 2010; Nayir and Uzuncarsili, 2010; Allameh et al., 2011; Ehlen, Klink, Roentgen, Curfs, & Boshuizen, 2014).

On the other side, the factor of knowledge application has led the users and employees to learn new things and generate new knowledge, which is compatible with the performed studies by Kongpichayanond (2009). The gained results of this paper express that knowledge sharing is positioned in the second place, which reflects the level of development or creation of knowledge resources by the organization alongside the operational and functional boundaries. Moreover, it can be declared that the organization needs the aptitude and ability to produce new applications from the existing knowledge and exploit the un-discovered new and potential talents. This result is compatible with the performed researches done by Liao et al. (2010). It should be stressed that the organization has comprehended that the creation and generation of knowledge needs to be performed along with the planning and implementation in order to help it survive in the competition arena. In addition, it has believed that knowledge acquisition and creation requires the knowledge application. It is worth to state that these are in line with the investigations by Sedera and Gable (2010) and Richards and Duxbury (2014). The results obtained from this study demonstrate that in this research center, the employees are valued as the knowledge assets and their knowledge are employed towards the persistence of the organization. The studies by Gable and Sedera (2010) confirmed these findings as well.

On the other hand, this approach of the organization has caused that knowledge identification to be considered as a vital and important stage for the past and future of the organization. Then, the identified knowledge is plausibly stored to be accessible for staffs. Kongpichayanond (2009) also confirmed the similar findings. Furthermore, the performed studies implied that the knowledge management studies have fundamentally concentrated on the knowledge management separate processes to try towards identifying and realizing their

characteristics (Syed-Ikhsan and Rowland, 2004). The obtained results of this research indicated that there is a meaningful and positive relationship between knowledge management and intellectual capital. Furthermore, intellectual capital is the base of the knowledge employed in the organization that is in line with the studies performed by Dumay (2009). It can be also expressed that knowledge management and intellectual capital are interconnected and include a broad spectrum of the intellectual activities from knowledge creation to knowledge diffusion, which has been verified by several studies (Nonaka et al., 2000; Huang and Wu, 2010; Zhou and Fink, 2003).

In addition, the findings by Shih et al. (2010) and, Huang and Wu (2010) stated that there is a positive and significant relationship between knowledge management and intellectual capital, which is compatible with the results of the present research. On the other hand, the relationship between intellectual capital and knowledge management includes different objectives such the intellectual activities, knowledge creation, and investment on knowledge, which has been stressed by Zhou and Fink (2003). The fact that has developed and flourished this organization is the exploitation of intellectual capital management and knowledge management as a set of managerial activities to identify, assess, and value the organization's knowledge assets, and invest on assets through knowledge creation and sharing new knowledge. Whenever the knowledge management activities are used for developing, extending, and maintaining the applied intellectual capital, it will be considered as a source to create the competitive advantage, which has been also confirmed by Seleim and Khalil (2007). In other words, when the intellectual capital is employed appropriately and exploited correctly, it can increase the organizational absorption capacity and finally, facilitate the knowledge management processes. Accordingly, this point can be emphasized that knowledge can heighten the organization's value through intangible assets that Cortini and Benevene (2010) have asserted on that as well.

The effect of competitive advantage is the most critical point with regard to the relationship between the intellectual capital and knowledge management, which can be exposed by using knowledge management in the organizational learning, innovation, competence, expertise, and capability to extend and develop the intellectual capital. The investigations by Rastogi (2000) and Obeidat, Tarhini, Aqqad and Masadeh (2017) have also confirmed similar findings. Considering the current changes in the business arena, knowledge has been increasingly attended by many organizations. The business competitive environment has directed the organizations towards knowledge management in order to benefit from its pluses. Knowledge management has been applied to identify and leverage the accumulated knowledge in the organization and reinforce it in the competitive atmosphere. It can be claimed that in modern organizations, knowledge is known as a strategic source, which must be created towards the survival and maintenance of the competitive advantage. It is believed that managing such a strategic source enables the organization to obtain special benefits, including the cost reductions, innovation in products and services, development procedures of goods and services, quality improvement, etc. The combination of the mentioned dimensions of knowledge management can lead to the effectiveness of knowledge management, which may be reflected in the organization's performance. Consequently, it increases the efficiency, compatibility, and innovation in the organization and also amplifies the learning ability in the organization.

In the ultra-competitive era amongst the organizations, the attributes of the new environment include the increased complexity, globalization, and dynamism. Therefore, in order for the organizations to sustain and establish themselves, they need to take more emphasis on the development and reinforcement of their internal talents and capabilities to avoid the novel challenges. This needs to be performed through the bases of organizational knowledge and intellectual capital that organizations use them to reach a better performance in the business world. Knowledge and intellectual capital have been recognized as the sustainable strategies to acquire and maintain the competitive advantages of the organizations. Thus, in the present knowledge-based world, organizational capabilities are based on the knowledge and intellectual capital and therefore, managers should understand that which capabilities are essential to sustain the competitive advantage. Companies should not only produce products and services, but they also need to create the added value to stay in the new economy. In this era, the major challenge

of the managers regards about the suitable environment to grow and culture the people's mind in the knowledge-based organization.

The knowledge management and intellectual capital have been converted to a critical talent of the managers in these organizations. In the current economy, the competitive advantage of firms is based on the intangible assets and intellectual capital. By providing the appropriate communications with customers, obtaining the required experience in this way, and relying on the knowledge, organizational techniques, and specialized skills, this goal can be fulfilled. Organizations have succeeded to convert the knowledge and processes existing in the knowledge management to the intellectual capital. As firms move from the industrial to knowledge economy, they face with great challenges such dynamism, uncertainty, and complexity. Hence, in such situations, it is highly required to acquire more awareness with respect to the intellectual capital and its immediate control. Thus, this issue has caused to a situation in which, companies identify and manage their intangible assets more seriously.

The findings of this study should be attractive and applicable for both the academics and practitioners, who need to investigate the intangible assets of the intellectual capital and knowledge management. In the first place, the researcher has tested the employed model. Afterwards, having checked the sufficient fitness of the model, it has been attempted to examine the hypotheses. The study results to some extent have verified the relationship between knowledge management processes and intellectual capital. The findings of the present study should be applied along with the previous related works to enhance the future investigations to create a complex model and a new paradigm in the relationship between knowledge management processes and intellectual capital. In practice, two variables of knowledge management and intellectual capital should be taken into account as the competitive advantages in the companies. It should be expressed that knowledge management is not the target by itself and today's organizations cannot sustain without knowledge management. Organizations through knowledge management and intellectual capital should try to increase the value by selling the competitive goods and services with high qualities.

The strategies, organizational decisions, and human resource development need to be compatible with each other in order to increase the interactions between knowledge management and intellectual capital. The research results should urge the organizations to try increase and improve the intellectual capital and create and flow the knowledge in their organizations. According to the verified hypotheses, knowledge management processes are effective on the intellectual capital. Therefore, in order for the knowledge-based research center to enrich the intellectual capital, it requires to reinforce the knowledge acquisition and efficient utilization of knowledge. The related points in this regard are provided in the recommendations section.

RECOMMENDATIONS

Recommendations on the Knowledge Acquisition Stage

- The personnel and working groups should constantly document the information related to their skills and share them with others.
- The physical and electronic locations for data storage should contain the latest up-to-dated data.
- The objective of training the new professions and systems is to utilize them to increase the performance of personnel and working groups.
- Specific individuals should be assigned for identifying, gathering, categorizing, outlining, and disseminating the organizational knowledge.
- When people are searching for special information, identification and introduction of specialized groups to them, should be available without difficulty.
- Experts need to play a critical role in identifying the important information for the information users and questers.
- The operational methods should be employed for documentation of the information, and providing them to others in the organization.

Recommendations on the Knowledge Application Stage

- All people should be able to present their ideas and viewpoints freely.
- Collaboration with the competitors should be taken into account by the senior managers as an appropriate approach for growth of the organization.

- The people with interesting ideas should be supported in order to help them pursue their ideas and ambitions.
- The working environment has to be designed in a way that innovative ideas can be easily flowed between working groups.
- In case of need and urgency, job changes in the organization's working environment should be done with the lowest possible effort.
- The constant participation between the organization's members and the other organizations has to be made in order to improve the evaluation of the presented plans.
- The related reports should be outlined based on the specific works, for which people need such reports.

Recommendations on the Knowledge Sharing and Transfer Stage

- Participation of individuals in the working groups can facilitate the transfer of knowledge to all the organization's divisions.
- The people avoiding to share their knowledge should be banned from accessing some of the organizational benefits.
- Knowledge sharing should be officially and openly acknowledged.
- People need to concentrate their knowledge sharing activities based on the pivotal information of their tasks.
- Support for the knowledge sharing processes should be performed by the special roles in the organization including the knowledge manager or the knowledge coordinator.

Recommendations on the Knowledge Creation and Stabilization Stage

- The information technology systems should connect people to their required information sources.
- A person or a team should direct the affairs related to the knowledge management in the organization.
- It should be tried to retain the people who have special skills to perform tasks.
- Senior managers need to ask all the managers to consider knowledge management in their professional plans.
- The product improvement process has to take the customer into account apparently and seriously.
- It should be believed that knowledge management is the task of all the people in the organization.
- People should know when they do not need to share their information with others.
- An official executive plan should be performed to ensure that the ideas and information are being shared between groups and individuals.

Recommendations on the Stage of Efficient Utilization of Knowledge

- Whenever the jobs are fully completed or when the people are no longer required, they should be treated with respect and courtesy.
- People should be sent to various organizations and centers in order to be trained to obtain new skills and specialties.
- In order to recognize the demand for acquisition of the new knowledge and to take the necessary decisions in this regard, it is required to consult with the industrial research teams.
- Prior to acceptance of any new project and order, it should be deliberately deemed whether the created knowledge for the organization can be achieved via any other way.
- In order to preserve the individuals who possess the strategic and important knowledge, the supportive and encouraging methods should be taken and additionally, such routines have to be revised continuously.
- Prior to revocation of the people's contract, it should be pondered whether their skills and knowledge can be applied in other parts of the organization.

Suggestions for Future Studies

By reviewing the results of the current paper, the following suggestions seem necessary for future studies:

- Studying the methods and styles of knowledge management and the effectiveness of each method on the innovation increase in organizations.

- Investigating the internal dimensions and components constituting the knowledge management and also other variables, and specifying the relationship between these components in more detail.
- Extending the presented model of this paper, and adding some other variables to the research model including the knowledge management infrastructures (organizational culture, organizational structure, etc.).
- Exploring the relationship between knowledge management and intellectual capital in other production and service organizations, which can help generalize the obtained findings of this research.

REFERENCES

[1] Afrazeh, Abbas. (2007). Knowledge management (concepts, models, measurements, and implementation), *Amir Kabir University of Technology Publications.*

[2] Ghelichli, Behrouz., & Moshabbaki, Asghar. (2006). The role of social capital in creation of the organization's intellectual capital (case study: two Iranian automobile manufacturers), *Management knowledge seasonal journal, Year 19, No. 75.*

[3] Sobhani, Hassan. (1992). Educational investment efficiency, *Journal of Economic Research, No. 45, pp. 76.*

[4] Mahdavi, Mohammad Taghi. (2001). The descriptive culture of technology, *Chapar publications, Tehran, 1st Edition.*

[5] Abualoush, S., Masa'deh, R., Bataineh, K., & Alrowwad, A. (2018). The Role of Knowledge Management Process and Intellectual Capital as Intermediary Variables between Knowledge Management Infrastructure and Organization Performance, *Interdisciplinary Journal of Information, Knowledge, and Management, 13, pp. 279-309.*

[6] Alavi, M. S., & Leidner, D. E. (2001). Knowledge management and the knowledge management systems, *MIS Quarterly, pp. 107-136.*

[7] Allameh, S.M., Zare, S.M., & Davoodi, S.M.R. (2011). Examining the Impact of KM Enable on Knowledge Management Process, *Procedia Computer Science, No. 3, pp. 1211-1223.*

[8] Arora, A., & Gambardella, A. (1990). Complementarity and external linkages : the strategies of the large firms in biotechnology, *Journal of Industrial Economics, Vol. XXX V III, pp. 361-379.*

[9] Bontis, N., Crossan, M., & Hulland, J. (2002). Managing An Organizational Learning System By Aligning Stocks And Flows, *Journal Of Management Studies, 39(4), pp. 437-466.*

[10] Bontis, N. (1998). Intellectual capital: an exploratory study that develops measures and Models, *Management Decision, Vol. 36, No. 2, pp. 63-76.*

[11] Bontis, N., Keow, W.C.C., & Richardson, S. (2000). Intellectual capital and Business performance in Malaysian Industries, *Journal of Intellectual capital, Vol. 1, No. 1, pp. 85-100.*

[12] Bontis, N. (1998). Managing Organizational Knowledge by Diagnosing Intellectual Capital: Framing and Advancing the State of the Field, *International Journal of Technology Management, Vol. 18, No. 5/6, pp. 433-462.*

[13] Brown, Ch. J. (2002). Factors That Affect The Successful Commercialization Of Intellectual Capital, *Thesis For The Award Of The Degree Of Doctor Of Business Administration of The Curtin University of Technology, Vol. 1, pp. 38-39.*

[14] Chait, L.P.C. (1999). Rating a successful knowledge management system, *The Journal of business Strategy, pp. 23.*

[15] Chen, M. & Chen, A. (2005). Integrating Option Model and Knowledge Management Performance Measures: An Empirical Study, *Journal of Information Science, 31(5), pp. 381-393.*

[16] Civi, E. (2000). Knowledge management as a competitive asset, *Marketing Intelligence and Planning. pp. 166-174.*

[17] Cortini, M., & Benevene, P. (2010). Interaction between structural and human capital in Italian NPO: leadership, organizational culture and human resource management, *Journal of Intellectual Capital, Vol. 11, No. 2, pp. 123-39.*

[18] Curado, C. (2008). Perceptions of knowledge management and intellectual capital in banking industry, *Journal of Knowledge Management, Vol. 12, pp. 141-55.*

[19] Dierickx, I. & Cool, K. (1989). Asset stock accumulation and sustainability of competitive advantage, *Management Science.*

[20] Dumay, J.C. (2009). Reflective discourse about intellectual capital: research and practice, *Journal of Intellectual Capital, Vol. 10, No. 4, pp. 489-503.*

[21] Edvinsson, L. (1997). Developing Intellectual Capital at Skandia. *Long Range Planning, 30(3), pp. 307.*

[22] Ehlen, C., Klink, M. V., Roentgen, U., Curfs, E., & Boshuizen, H. (2014). Knowledge productivity for sustainable innovation: Social capital as HRD target, *European Journal of Training and Development, 38(1/2), pp. 54-74.*

[23] Gerami, M. (2010). Knowledge Management, *International Journal of Computer Science and Information Security, 7(2), pp. 234-238.*

[24] Gold, A. H., Malhotra, A., & Segars, H. (2001). Knowledge Management: An Organizational

Capabilities Perspective, *Journal of Management Information Systems 18(1), pp. 185-214.*

[25] Gupta, O. & Roos, G. (2001). Mergers and acquisitions through an Intellectual capital perspective, *Journal of Intellectual capital, Vol. 2, No. 3, pp. 297-309.*

[26] Haanes, K. & Lowendahl, B. (1997). The unit of activity: towards an alternative to the theories of firm, in Thomas H. et al., strategy, structure and style, *John Wiley & Sons, New York, NY.*

[27] Hallouche, F., & Sultan, A. (2008). Knowledge Management: Assessment of Strategies and Innovative Technologies, *Proceedings of the World Congress on Engineering and Computer Science 2008 WCECS 2008, San Francisco, USA.*

[28] Hamel, G., & Prahalad, C.K. (1994). Competing for the Future, *Harvard Business School press, Boston, M A.*

[29] Hazlett, S-A., Mcadam, R., & Gallagher, S., (2011). Theory Building in Knowledge Management: In Search of Paradigms, *Journal of Management Inquiry, 14, pp: 31-42*.

[30] Hsu, I., & Sabherwal, R. (2012). Relationship between Intellectual Capital and Knowledge Management: An Empirical Investigation, *Decision Sciences, 43(3), pp: 489-524.*

[31] Huang, Y. & Wu, Y.J. (2010). Intellectual capital and knowledge productivity: the Taiwan biotech industry, *Management Decision, Vol. 48, No. 4, pp. 580-99.*

[32] Kianto, A., Ritala, P., Spender, J., & Vanhala, M. (2014). The interaction of intellectual capital assets and knowledge management practices in organizational value creation, *Journal of Intellectual Capital, 15(3), pp. 362-375.*

[33] Klein, D.A. & Prusak, L. (1994). Characterizing intellectual capital, *Center for Business Innovation, Ernst & young LIP working paper.*

[34] Kongpichayanond, P. (2009). Knowledge Management For Sustained Competitive Advantage In Members And Acquisitions, *Advantage In Developing Human Resources, 11, pp. 375-387.*

[35] Liao, C., Chuang, S-H., & To, P-L. (2010). How Knowledge Management Mediates The Relationship Between Environment And Organizational Structure, *Journal Of Business Research, Article In Press, Elsevier.*

[36] Liao, S-H., & Wu, C-C., (2009). The Relationship among Knowledge Management, Organization Learning, and Organization Performance, *International Journal of Business Management, 4 (4), pp. 64-76.*

[37] Liao, Shu-H. , Wu, chi-c. (2010). System perspective of knowledge management, organizational learning, and organizational innovation. *Expert Systems with Applications, pp. 1096–1103.*

[38] Liebeskind, T.P. (1996). Knowledge, strategy, and the theory of the firm, *Strategic Management Journal, 17(winter special issue), pp. 93-107.*

[39] Lim, L.L.K. & Dallimore, P. (2004). Intellectual capital: management attitudes in Service Industries, *Journal of Intellectual capital, Vol. 5, No. 1, pp. 181-194.*

[40] Marr, B. (2004). Measuring and Benchmarking Intellectual, Benchmarking, *an International Journal, Vol. 11, No. 6, pp. 559-570.*

[41] Mouritsen, J. (1998). Driving growth: economic value added versus Intellectual capital, *Management accounting Research, Vol. 9, pp. 461-482.*

[42] Nayir, Z.D., & Uzuncarsili, U., (2008). A Cultural Perspective on Knowledge Management: The Success Story of Sarkuysan Company, *Journal of Knowledge Management, 12(2), pp. 141-155.*

[43] Nevo, D., & Chan, Y.E. (2007). A Delphi of Knowledge Management Systems: Scope of Requirements, *Information & Management, 44(6), pp. 583-597.*

[44] Nonaka, I. (2000). A Dynamic Theory Organization Knowledge Creation, *Organization Science, 5(1), pp. 14-37.*

[45] Obeidat, B. Y., Tarhini, A., Aqqad, N. O., & Masadeh, R. (2017). The impact of intellectual capital on innovation via the mediating role of knowledge management: A structural equation modelling approach, *International Journal of Knowledge Management Studies, 8(3/4), pp. 273.*

[46] O' Dell, C., & Grayson, C. J. (1998). Only we know: Identification and Transfer of Internal Best Practice, *California management review, Vol. 4, No. 3, pp. 154-174.*

[47] O'Dell, C., & Grayson, C.J.J. (2006). If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice, *The Free Press, New York, NY.*

[48] Rastogi, P. N. (2000). Knowledge Management and Intellectual Capital: the New Virtuous Reality of Competitiveness, *Human Systems Management, 19 (1), pp. 39-49.*

[49] Richards, G. S., & Duxbury, L. (2014). Work-Group Knowledge Acquisition in Knowledge Intensive Public-Sector Organizations: An Exploratory Study, *Journal of Public Administration Research and Theory, 25(4), pp. 1247-1277.*

[50] Roos, J., Roos, G., Dragonetti, N.C., & Edvinsson, L. (1997). Intellectual Capital: Navigating In the New Business Landscape, Macmillan, Houndmills, and Basingstoke.

[51] Sedera, D., & Gable, G.G. (). Knowledge Management Competence for Enterprise System Success, *Journal of Strategic Information System, 19, pp. 296-306.*

[52] Seetharaman, A., Sooria, H.H.B.Z., & Saravanan, A. S. (2002). Intellectual capital accounting and reporting in the knowledge economy, *Journal of Intellectual Capital, Vol. 3, No. 2, pp. 128-148.*

[53] Seleim, A., & Dan Khalil, O. (2007). Knowledge Management and Organizational Performance in the Egyptian Software Firms, *International Journal of Knowledge Management, Vol. 3, No. 4, pp. 37-66.*

[54] Shih, K., Chang, C. & Lin, B. (2010). Assessing knowledge creation and intellectual capital in banking industry, *Journal of Intellectual Capital, Vol. 11, No. 1, pp. 74-89.*

[55] Souse, C.A.A., & Hendriks, P.H.J. (2006). The Diving Bell And The Butterfly, The Need For Grounded Theory in Developing a Knowledge Based View of Organizations, *Organizational Research Methods, 9 (3), pp. 315-339.*

[56] Stewart, T. A. (1998). La Nueva Riqueza De Las Organizaciones: El Capi Tal Intellectual, *Barcelona: Granica, pp. 70-72.*

[57] Syed-Ikhsan, S.O.S. & Rowlands, F. (2004). Benchmarking knowledge management in a public organization in Malaysia. *Benchmarking- an international journal, Vol. 11, No. 2, in press.*

[58] Watson, Lan. (2003). Applying Knowledge Management: Techniques for Building corporate Memories. *Morgan Kaufmann Publishers.*

[59] Zhou, A.Z., & Fink, D. (2003). Knowledge management and intellectual capital: an empirical examination of current practice in Australia, *Knowledge Management Research & Practice, Vol. 1, No. 2, pp. 86-94.*

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