Reviewing knowledge of human resource measurement models: comparing and identifying the strengths and weaknesses

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Abstract--- Introduction: Today, the knowledge of how human resources is noticed as a strategic and valuable resource also an asset and providing products and services with good quality and economic, without proper use of this valuable resource is difficult and sometimes impossible. Knowledge is supposed as a strategic asset which can help organizations keep their own competition ability in a mutilated environment, in addition Knowledge and tools to measure it improve the competence of the organization. Purpose: the researchers in this study sought to measure and evaluate the various models of human resources, to compare them and identify the strengths and weaknesses of each. Approach: This article was conducted in 2017 by reviewing domestic and foreign sources and articles in the field of measuring human resource knowledge. The research based on objective is applied research component, based on the nature and methods is the descriptive study, and based on reasoning is inductive approach.. The present study consisted of four stages of implementing the search strategy, collecting articles and their initial review, final review and selection of studies and analysis of articles. Finding: By comparing the measured models, it seemed each of the models dealt with some effective factors on evaluation of knowledge and identified indices measuring knowledge with their certain approaches. Studying indicators presented in a variety of models, and interviews with experts, strengths and weaknesses of each model can be identified which are presented in this research. Conclusion: During studying different models of measuring knowledge indices of each were extracted and then semi-structured interviews with experts, strengths and weaknesses were identified. None of the methods had the ability of identifying reasons and weakness in knowledge status of organization and during measuring process we cannot realize what process improved or declined the final result.

Keywords--- Knowledge, Knowledge measurement, human resources.

I. INTRODUCTION

In the knowledge-based economy, wise investment significantly takes precedence of physical and financial capital. In these systems, knowledge creation and knowledge turn to a major factor in the survival and growth of organizations in competitive conditions (Ramazan and Hosnavi, 2011). When procedures of human resource management are coordinated with organizational knowledge, organizations can improve their knowledge (Moberazi et al., 2014). By movement of traditional knowledge economy to knowledge-based economy, knowledge has been proposed as the underlying asset, and it seems inevitable and urgent. (Salimi et al., 2012, p. 269). On the other hand, with the emergence of the knowledge

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economy, all organizations will have to assume knowledge management and evaluation as an integral part of their performance. Knowledge generated is effective in guiding the organization to make informed decisions, so it is necessary to determine to achieve the positive effects of comprehensive knowledge in organizations (Gupta et al., 2015a). In the new economy, knowledge exchange and information products and services increased promotion of organizations, so with this process determining the standards and principles for valuing knowledge as a key asset, which has gained special importance h. (Abtahi, 2006). Due to the efficiency and effectiveness of knowledge assets according to issues related to return of investment in such assets is quite obvious. Of course, the most important issue in this context is that after identification of intangible assets and knowledge assets, we can conceptualize, understand, measure and evaluate them. In general, students have to measure all indicators and assets indicating a set of functionality and capabilities for competitive power, knowledge development, and quality of education can be quantitative (Esmailzadeh and Pourserajian, 2013a). So with regard to the status and necessity of measuring knowledge assets, the researcher measured the models of knowledge, compared them and identified the strengths and weaknesses of each one.

II. LITERATURE REVIEW

Researchers and management experts have noticed on significance of knowledge and call it a new discussion. Scientists are focusing on the relationship between knowledge and organizational learning (Jamalzadeh, 2012) As knowledge's achieving more strategic position in the organization, organizations are also looking to use more knowledge (Chen et al., 2015). In general, this implies that countries that have rich knowledge assets and intellectual capital, are better in to achieving high levels of growth (Soltani et al., 2014). Most of recent international studies on growth and economic performance were formed based on accounting or information technology and communication. Also most of these studies noticed structural inputs such as investment in IT and communication for their own measurement. (Salis, 2008). Fortunately, awareness on the role of knowledge capital and its evaluation as intangible assets has increased. However, it is important that projects measuring knowledge to be completed with process of knowledge discovery. This process begins with identifying jobs with their credibility and continues with discovery and understanding of data. Knowledge discovery and knowledge processing models meant to provide guidelines to knowledge discovery processes. (Sharma et al., 2012) Despite some significant limitations that Sharma et al (2012) have in that process the basic problem is that despite the complexity of the system, identification and knowledge of assets as intangible assets have numerous difficulties and complexities. On the other hand, Pomeda et al. (2002) consider lack of a comprehensive framework the main obstacle for most models to measure knowledge which analyzes information present in input-output level. In addition, Klein (2000) identifies another problem in this regard, which is comparing various systems of countries based on various criteria of quality and content data - which leads to a contradiction of comparing and analysis. Therefore, considering many problems that have been reported by scientists in measuring the knowledge, using and applying an appropriate model would be more important.

Unlike physical assets that may be limited due to their application knowledge assets will be remained forever theoretically. in order to measure knowledge successfully, it is necessary to understand, assess and measure knowledge. Since measuring knowledge is a new issue and on the other hand due to intangibility of some sectors of capital, so far there have not been much researches on this type of capital. In this regard, Nazemi et al, 2014 reviewed culture which is based on assessing knowledge capital as a tool for cooperative advantage. Their articles were among review scientific articles and data were collected with library method. The results showed that finally since each model has some deficiencies, directors can use knowledge chain model and Nortun and clapan scoring card mode along with models of assessing knowledge capital. Ghezel et al. (2014) presented a framework which was based on value for assessing knowledge of personnel. Their research was qualitative and based on case study. The proposed framework of their

research determined the value of each organization's knowledge workers based on their share in the added value. Esmailzadeh and Poursarajian (2013) presented a model in order to compare small and medium enterprises in terms of their knowledge assets. Their research method was qualitative and statistical population were faculty members and university professors at Imam Javad University. Their research led to the five stage model for the assessment of small and medium enterprises. In a study John Wack (2015) used balanced scorecard to measure knowledge work in the UK in one of the small and medium companies. The research method used was a case study. The main result of this study showed that the scorecard itself was not an appropriate way to manage knowledge workers, but it is an important mechanism to ensure balance between organizational strategic objectives and action taken regarding it. Gupta et al. (b2015) conducted a research called indices of research in higher education institutions in India. Their research was descriptive and survey. The results of their research showed that due to intangible and vague nature of knowledge resources, the criteria used to measure knowledge are quite distinct from each other. Ragab and Arisha (2013) studied knowledge management and measuring with a critical approach. Their research was review and scientific and data were collected in library method. The results indicated knowledge management can be classified into 5 groups: knowledge information and knowledge management, knowledge management systems, role of IT, social and management concepts and knowledge measurement.

The objectives of the study

The main objective research: studying different types of measurement models of knowledge human resources secondary target of research: Comparing and identifying the strengths and weaknesses points of measurement models of knowledge human resources

III. METHODOLOGY

This article was conducted in 2017 by reviewing domestic and foreign sources and articles in the field of measuring human resource knowledge.The research based on objective is applied research component, based on the nature and methods is the descriptive study, and based on reasoning is inductive approach.. The present study consisted of four stages of implementing the search strategy, collecting articles and their initial review, final review and selection of studies and analysis of articles. The search strategy included studies conducted in the field of measuring human resource knowledge. In order to conduct this study, documents in real spaces (traditional methods) and virtual spaces (use of Internet networks and information technology), which include searches in specialized books, dissertations, scientific and specialized articles, citation databases, and digital libraries at Emerald Springer, Science Direct, Sage, Proquest, Magiran, Civilica checked out. It started by determining keywords and search for literature and research background. It continued with using libraries and specialized websites and use of primary and secondary sources. The researcher emphasized on first-hand references which includes reported literature by researchers or those who mentioned main ideas for the first time. But the researcher would use second hand references for discovering literature and to determine scope of information about research. The authors by searching the library resources mentioned, would gain a comprehensive understanding of the literature and a variety of models to measure knowledge. In the initial search, 250 articles were obtained, and in the second stage, articles were collected and their initial review was performed. Out of the total number of articles obtained, 50 articles had topics related to the present research. In the final review stage and selection of studies, the researcher would send the models investigated for 17 experts, including faculty members of management in order to identify their characteristics and parameters of each model. In an interview would try to identify strengths and weaknesses of each model and compare them with each other.

IV. RESULT

Researchers have studied all models of knowledge measurement by studying articles and books in the field of knowledge measurement and they would regard to theoretical adequacy in this regard. In next stage, they would compare the types of models and extract the strengths and weaknesses of each model by opinions of experts. The results are listed below.

Variety of knowledge measurement models

In general, methods of measurement regarding the intangible assets and knowledge can be put into two groups: the first group includes some people who determined the subject in form of indices and some others along with indices introduction, communication and the method of calculation mentioned them within framework of formula. (Afrazeh, 2010, p. 86; Ahmadi & Salehi, 2011)

In the following, the most important examples of methods and tools to measure knowledge will be introduced.

Sveiby method

Sveiby is a pioneer in knowledge management that has many activities on the development of intangible assets. He aims to develop intangible assets and notice three main indices of assets:

A) The external structure B) the internal structure C) competence of people. He also determined three scales for intangible assets in the framework of the measures as follows (Liebowitz and Wright, 1999): growth / renewal, efficiency and sustainability.

Using Sveiby method regarding the total value of assets owned by the organization's knowledge is appropriate, but, it is less used at lower levels to measure knowledge assets (Liebowitz and Wright, 1999).

Liebowitz method and Wright

Liebowitz and Wright (1999) identified a list of factors affecting the development of human capital and used them in the formula 1

They are addressing the factors that contribute to the growth of human capital limitations which are as follows:

- Formal education of employees
- The cost of R & D of organization
- formal education of employees (for example their level of education)
- Motivation (income, compensations, conferences, travel, time, education, etc.)
- Guidance and training for staff
- research skills
- Creativity and ingenuity
- entrepreneurial skills and spontaneous, industrial competitiveness, half-life of Information Industry, supply and product demand, level of staff memory
- industrial competitiveness
- Half-Life Information Industry
- supply and demand of goods
- Staff memory
- Knowledge transfer methods (e.g., education on the basis of information tables or experimental facilities, which is official in organization)
- informal knowledge transfer methods (lectures for senior managers, senior managers and assistants and assistants of senior managers and attention to current events of the company and rumors)

- motivation and stimulant (e.g. interaction, responsibility and authority of staff, strengthening staff)
- the internal atmosphere of environment (reasonable demands of the employees and management ...)
- the short term (two to four years) and long term (five years or more) perspective of employees on the growth and survival of the organization.

If these factors have a positive growth, developing human capital will happen. The above cases are divided in five groups of education T & E, skills S, internal and organizational culture I & OC, outside pressures and influence & environmental impacts OP & ET and psychological PI. Designers showed relationships and correlations affecting the development of human capital (HCG) in the form of Formula 1 (Liebowitz and Wright, 1999)

Formula 1:

$$HCG = T \& D + S + OP \& EI + I \& OC + PI$$

George Hammon Metod

George Harmon expressed quantitative method to measure the value of information that could be used in relation to knowledge, as proposed formula 2:

Formula 2:

$$I_v = (A_t - A_n) - (L_t - L_n) - (I_g + I_f + I_r + I_d + I_t + I_s + I_u)$$

Shannon and Weaver model of human ability

One of quantitative methods was presented for measuring the value of the information exchanged between people and human performance potential, based on the formula 3, by Shannon and Weaver (1963)

Formula 3:

$$I = H = -\sum_{i=1}^{N} p_i ld P_i$$

They sought to communicate a relationship between value of knowledge information with humans in this formula.

Balance Scorecard Model

This method is one of the conventional methods developed in America for measuring organizational productivity, and a method of measuring with high compliance knowledge management. The major advantage of this approach is that it expresses a close relationship between organizational learning and knowledge management. In 1992 (Khadivar et al. 2007. P. 5) a balanced scorecard was founded, by Professor Robert Kaplan as a tool to measure organizational performance (Kaplan, 1992, pp. 71-79) and in 1996, it was developed by him and his colleague Norton. The procedure is on the basis of four main criteria in the following order: the customer perspective, perspective, financial perspective, the perspective of learning and development. So far it has been used in many big organizations and today in this method it is used in assessing knowledge management. (Kaplan and Norton, 1996)

For each of these perspectives we need to determine strategic objectives, size and operational objectives and the way of taking the necessary measures to be specified. In addition, each organization must determine conceptual framework in these methods, which itself is a set of concepts and measures (Afrazeh, 2010, p. 97).

Knowledge Management Maturity Model (KMMM)

The model is similar to Stwart in which other indices are used for measuring and presenting knowledge management in organization and it does focus on knowledge in organization. Knowledge management is based on three main indices of process knowledge, and knowledge management projects based knowledge management system and for each of them some rations are considered which are as follows:

strategies goals, processes and organizational roles, technological infrastructure, forms and structures of knowledge, leadership in organizational support, cooperative culture, capabilities of colleagues, partners and media organizations. (Frost & Langen, 2001)

Structured interview

Structured interview is another tool in measuring knowledge, which can be designed and applied in special forms. The formation process is as follows:

1. For the purpose of measuring knowledge of the relevant measures we need to adopt appropriate group.

1. appropriate scales are required for measurement.

2. Some cases are required such as the amount, depending on the type of knowledge (explicit / implicit), the updating and other cases on this for clarification.

3. The individual profile (self-evaluation), interviewer (Evaluation), history, etc. are to be mentioned. Also among the issues that must be considered in this context, justification and knowledge of those involved with the issue, identifying indicators and ratios, preparing various forms are important. (Trauner and Lucko, 2001)

Stwart method

The method introduced by the Stwart (1997) with the title "displaying intellectual capital" seeks to measure human capital and structural capital, and displays the measured current status of the organization within framework of intangible assets and based on indices related to customer capital. Indices of knowledge as well as related assets can be applied according to the terms of the agreement and objectives of organization condition regarding indices selected will be determined. (Stwart, 1997).

Knowledge Map

Knowledge maps are the main components and instruments for measuring knowledge management and are appropriate tools for measuring. They are also, a series of indices, graphical maps bearers of knowledge, locations of knowledge, knowledge resources, knowledge structure or consumers, (users) by which scientists, place of knowledge, the structure of knowledge and its application can be recognized. The maps as evident information help identify and displace knowledge resources and with such maps it will be possible to make a communication between various components and integration, and to display and to make organizational processes virtual. (Collin, 1996)

Also in terms of measurement, knowledge maps provide maps of view, structure, quality and knowledge-providing organizations in addressing. This in one hand determines strength and weakness points of knowledge in an organization and in condition of working areas and on the other hand knowledge maps as tools for knowledge management are effective and are used for establishing information systems and knowledge. Also the maps used to analyze current status and modeling of knowledge.

Afrazeh (2004) expresses the process of creating knowledge maps according to Figure 1:
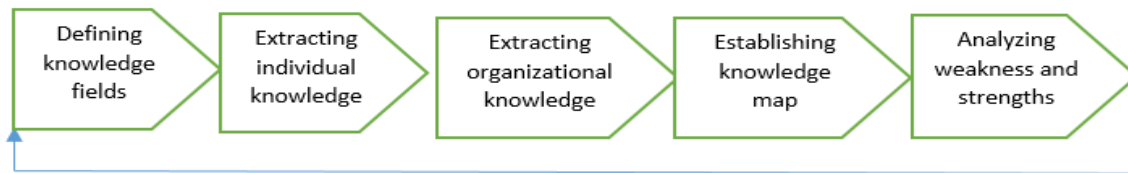
Figure 1- The process of creating knowledge maps (Afrazeh, 2004, p. 107)

above-mentioned steps are as follows:

A) defining the areas of knowledge-based processes (aims) Main Institute

B) Extracting (determine) local knowledge: specific knowledge to determine the extent of existing knowledge and updating it

C) knowledge extraction in the institution and outside it: team`s structure, licenses, and royalties and patents and ...

D) creating knowledge maps: Graphical representation of data

E) assessment of the current situation (analysis of strengths and weaknesses) compared to what it should be, evolving of gaps and facilities.

KP3 method

This method is not used directly in measuring knowledge, but also shows that to what extent knowledge is effective in improving organizational performance. In this method there are four main factors including: process and improvement-where product and process are considered as two mediating factors leading to financial improvement or organizational improvement. In this method Knowledge is shown with 11 number between zero and one which shows range of knowledge from complete unawareness (0) to world-class expertise (1). The method uses various matrices for measuring indices and finally demonstrates ratio of interference of each type of knowledge including hidden knowledge of product, hidden knowledge of process, evident knowledge of product and evident knowledge of process in improving financial and non-financial performance of organization. (Ahn & Cheng, 2004, pp. 4-2)

KMPI method

KMPI approach or knowledge management performance indicator is applied for evaluating the performance of an organization's knowledge management at one point of time. It is Supposed organizational goal has always been saving and using knowledge in order to reach economic value and competitive advantage. So Lee et al (2005), defined KMPI as a logistics function that has five sections and can be used to determine process knowledge circulation (KCP). process includes knowledge creation, knowledge storage, knowledge sharing, knowledge utilization and knowledge internalization. When KCP efficiency increases, KMPI increases too finds that enables organizations to Compress knowledge. also increases the stopped. In order to prove the method KMPI, Cheng Ling et al (2010) conducted a study on 101 Korean companies and its relationship with three financial indices: shareholder value, the rate of value, and costs of research and development was proved. The results of the study indicated that despite effectiveness of three indices in financial performance, KMPI method can demonstrate efficiency of KCP. (Lee et al., 2005, 482-469)

Saaty intangible resource allocation method

with the concern that intangibles cannot directly enter mathematical models, in 2003 Saaty sought to make intangibles in quantitative form through ratios. In resource allocation, intangibles weights along with scale-normalized, tangible

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resources in one linear programming model are used with relative coefficients. resource Weight for intangibles are used for allocating monetary values for weights of each intangible resource.

According to this process mathematical model LP coefficients can be obtained with weight relative sizes (pairwise comparisons). The results obtained indicate that if there is a scale of measurement, relative linear programming model answer RLP (single and normalized coefficients and weights from pairwise comparisons) and answer LP model absolute (typical sizes of the physical scale model) will be the same which have been in constant multiplication. It is also possible to only use LP models for optimizing the allocation of resources relative sizes of optimization allocation of intangible resources. When it includes tangibles, we can deal with one unit through, through variable weights. Without single unit, absolute meaning of each component of the answer cannot be explained, and we have only their relative values in weight form (Lev, 1999, S35-21)

Torrisi and Gambardella method

Gambardella and Torrisi (2000) reviewd knowledge capital's effect on the performance of 500 electronic, chemical in North America, Europe and Japan during 1997 to 1993. In addition to the development of innovation and research firms, their level of investment knowledge was measured through evaluation of their technical communication with other firms (license, correlation technology, minority participation in technology-based small firms). Linear model used in this study to the market value is shown in Formula 4:

Formula 4:

$$V_{it}(A_{it}, K_{it}) = \gamma_t (A_{it} + \gamma K_{it})^{bt}$$

Where letter A represents the physical capitals and K represents knowledge capital in firms I during T time. In this study, the effects of knowledge capital and technological networks on market value obtained another form of equation: Formula 5 (Gambardella and Torrisi, 2000)

Formula 5:

logVit = logqt + logAit, + log (1+☐ tKit /Ait)

US-Navy

In a knowledge management project implementation which was in US Navy, in a separate phase knowledge was assessed and measured. In order to measure the benefits of knowledge management framework for measuring arrangements merits of knowledge management, KCO1 framework applied three structures: the standards of income, output standards and system standards. Income standards measures the general characteristics including increased productivity and income. Output standards measure characteristics of the project: the effectiveness, usefulness, functionality and accountability of KMT. Standards of system include cases such as response time, the percentage of the total workforce of the system, number of users, and so on. (Wennergren, 2005)

Model of Esmailzadeh and Poursarajian

With the aim of using personnel's knowledge as a key asset of organization, Model of Esmailzadeh and Poursarajian (2013b) presented an applied model for measuring knowledge and to compare small and medium enterprises in terms of their knowledge assets.

Nilipour et al. (2014) reported a conceptual model for measuring knowledge. Thus, five stages were proposed for measuring knowledge:

Step 1: meetings and interviews with professors and faculty members of the Institute to determine the parameters of
evaluation:
Major indices used to measure the knowledge of the various models were introduced in the different model among which Liebowitz and Wright expressed, are more comprehensive. (Esmailzadeh and Poursarajian, 2013b. Nilipour et al. 2014). different indices were reviewed to measure knowledge during meetings with professors and faculty members and the most important indices for assessing knowledge were listed below:

Training and education

Skill

The outer structure and environment interaction

The internal environment

Psychological conditions

knowledge transfer

It should be noted that in order to investigate the subject more accurately, for each of the aforementioned indices, some examples were defined in order to reach to useful results.

Step 2: designing a questionnaire to collect information needed for prioritizing above-mentioned criteria:
Indices and sub-indices above each have a different degree of importance, hence it is essential to be compared with each other and to determine their priorities. For this purpose, a questionnaire was designed and completed by professors and experts with the necessary information to compare paired criteria.

Step 3: Using hierarchical analysis software (Expert Choice) and a paired comparison in order to determine the weight of each factor:
At this point the information obtained from questionnaires were completed in software by experts and the output was presenting appropriate weight in each factor.

Step 4: Determining knowledge size table and quantifying state of knowledge of each employee and university professors:
In this step, a table for assessing knowledge was designed, where each indices and sub-indices, along with their own weights were listed. Next status of each list was reviewed. Knowledge level of employees in each indicator is assessed a number between 0 and 7 where multiplied by the weight of index , knowledge of each employee in respect of any relation is quantified with each index.

Step 5: Gaining knowledge measurement of the organization:
In the final step the knowledge size index of organization is measured using knowledge level of each employee from the previous stage. Hence level of knowledge is institute is expressed through number one and can be applied as an applied index. It can also basis of comparing different institutes in terms of level of knowledge.

Comparing knowledge measurement models

By comparing the measured models, it seems to mention some points: Unfortunately, each of the models dealt with some effective factors on evaluation of knowledge and identified indices measuring knowledge with their certain

approaches (Shaemi Barzegari, 2005). In addition, these indices are relatively straightforward and do not necessarily specify the kind of knowledge that maximum added value. (Shaemi Barzegari, 2005, p. 11).

Studying indicators presented in a variety of models, and interviews with experts, strengths and weaknesses of each can be identified which are presented in Table 1 and 2 below.

Table 1- Comparing models to assess and measure knowledge

Model name	Year	Strengths	weaknesses
Sveiby method	1997	-Relying on knowledge development model. -According to the index of the external structure, internal structure, human competence	-lack of communication as one of the assets Intangible assets. -Mentioning only three scale of development and reconstruction, effectiveness, and sustainability for indices knowledge assets.
Liebowitz and Wright method	1999	-Careful attention to the factors influencing the growth of human capital. -Simple formulas	-Limiting factors in the development of human capital in five categories of education, skills, internal environment and corporate culture, external pressure, psychological conditions and in consideration of other important factors, including: the cost of research and development, innovation, knowledge transfer, experience, skills and technology with technology, and so on. -Using Swieby method on the total value of assets owned by the organization's knowledge is appropriate, but at lower levels to measure knowledge assets have less usage.
George Harmon method	1994	-Suggesting a quantitative method for measuring the value of information in the organization	-This model focuses only on factors including: the added value of information assets, the cost of creating, sending, storing, organizing information. -Fundamental gap in the lack of attention to other indices in measuring knowledge
Kreft Model from Shannon and Weaver	2001	-Its contact between the value of the owner of the human information means	-Noticing due to the value of exchanging information between people and human performance potential. -According to Shannon, the information that are repeated much, don't have the value to reduce the effectiveness model
Balance Scorecard Model (Kaplan & Norton)	1996	-Noticing the strategic objectives, determining the size and operational objectives and actions. -Identifying different components of intangible assets and providing indices for them -Close relationship between organizational learning and other measures	-Attention to just Customer's perspective, process perspective, financial perspective, the perspective of learning and development (training and development) in the assessment of knowledge and lack of attention to other factors. -Ability to effectively use intellectual capital measurement and failure to use in the measurement of human resources (Antola et al, 2005)
Structured interview (Trauner & Lucko)	2001	-Providing simple forms of knowledge assessment -Noticing the scale and weight for knowledge assessment indicators	-Focusing purely on four customer perspective of process, finance, learning and development in the assessment of knowledge and lack of attention to the scientific method of weight to each indicator in the assessment of knowledge. - Acting on personal opinion
Stwart method	1997	-Emphasis on intellectual capital in the assessment of staff knowledge	-Presenting a model based on indicators of intellectual capital, human capital and structural capital (can be used in measuring intellectual capital) and lack of attention to factors affecting the measurement of human resources
Knowledge management growth (Frost and Langen)	2001	-Expressed three main indices: process knowledge, knowledge management and knowledge management system model	-Emphasis on knowledge management and lack of model comprehensiveness: Knowledge management is only one of factors mentioned in measuring knowledge of human resources and other indices were not noticed such as: Education, skills, internal structure, the structure of environmental, psychological conditions
Knowledge map (Collin)	1996	-Simple diagnostic in: knowledge workers, place of knowledge, the knowledge and its application. - Detection of an organization's knowledge assets for all employees	-The ability to capture knowledge and inability to understand and detect quantitative and numerical knowledge
KP3 (Ahn and Cheng)	2004	-four basic building blocks of knowledge, products, processes and improvement	- Lack of direct application in the measurement of knowledge and only reflecting the impact of knowledge on improving organizational performance

KMPI(Lee et al.)	2005	-Helping organizations to achieve business value and competitive advantage	-Its main use is to evaluate the performance of an organization's knowledge management and the measurement of human resources
Saaty method	2003	-Entering the intangible in mathematical models -Quantifying the intangible, through scale	-Without a single unit, absolute meaning of every component of answer cannot be described, only their relative values are obtained in the form of weights.
Gambardella and Torrisi	2000	-Identifying the effects of knowledge capital and technological network on the market value	- Determining the amount of capital constraints due to model organizational knowledge through the assessment of their technical communication with other companies
Us navy (Vennergren)	2005	-attention to standards of income, output standards and standards measured in knowledge.	-lack of human capital as one of the pillars of intellectual capital
Model of Esmailzadeh and Poursarajian	2013	-Quantifying knowledge and expression in a number of asset size -A comparison of different institutions in terms of knowledge	-It just can be used in small and average corporations -No application in large institutions, universities and higher education institutions

Table 2- Comparison of methods based on eight indicators of measurement (Khadivar et al., 2007)

Authors	Covering three areas of knowledge management	Monitoring possibility	Contingency	Predictability and scenario building	Cost analyzing	Being based on model	Suggestion for improvement	Possibility of being public
Sveiby	1	0	1	0	0	1	0	0
Liebowitz and Wright	1	0	1	1	0	1	0	0
George Harmon	0	0	0	0	1	0	0	0
Shannon and Weaver	0	0	0	0	1	0	0	0
Balance Scorecard Model	1	1	1	0	0	1	0	1
Stwart	0	0	1	0	0	1	0	0
Knowledge management growth	1	1	0	0	0	1	0	0
Knowledge map	0	1	0	0	0	1	0	1
KP3	0	1	1	0	0	1	0	1
KMPI	1	1	0	0	0	1	0	1
Saaty	0	0	1	1	1	0	0	0
Gambardella and Torrisi	0	0	0	1	1	0	0	0
US navy	1	1	1	0	0	1	1	0

V. CONCLUSION

Knowledge assets identifies national competencies and capabilities that will be essential for economic growth, competitive advantage, human development, and improving the quality of life. It is clear that economics is moving from the era of competitive advantage based on information to the era of competitive advantage based on knowledge creation. From a resource-based perspective, the strategic assets of the organization should be valuable, unique and irreplaceable, and in this regard, organizational knowledge, more than any other factor, play a main role in gaining a competitive advantage of organizations. Knowledge is assumed to be a strategic asset that can help organizations maintain their competitiveness in a turbulent environment and is recognized as a key and valuable asset that is the foundation of sustainable development and the key to an organization's ongoing competitive advantage. As knowledge is gaining a more strategic position in the organization, organizations are also seeking to make greater use of knowledge. Knowledge is effective in guiding informed decision making in the organization, Therefore, measuring knowledge is a necessity to achieve comprehensive positive effects in the organization. On the other hand, until something is not measured, we cannot talk about being desirable or not. So, studying human resource knowledge measurement models, comparing and identifying their strengths and weaknesses is a research necessity. In order to conduct this study, we tried to use all the studies conducted in the field of knowledge measurement models and reviewed various types of knowledge measurement

models, Indicators of each extracted, and after semi-structured interviews with experts, the strengths and weaknesses of these models were identified. None of the methods had the ability of identifying reasons and weakness in knowledge status of organization and during measuring process we cannot realize what process improved or declined the final result. Another consequence is that the method which is acceptable in several indices, does not have an interesting condition in other indices. In other words, other criteria were not met. Maybe the major reason that the models are not public is that various aspects that are expected from system measurement are not met. A combination of method to measure was used. Although it makes measurement and comparison difficult, in some cases it was recommended. In addition, each of the models to some extent reviewed factors which are effective in evaluating knowledge and sought to identify indices for measuring knowledge and this makes them not to notice all the factors affecting knowledge measurement. On the other hand, often quantifiable indices were noticed, these indices are relatively straightforward and do not necessarily specify the kind of knowledge that creates maximum added value. Also some assumptions may be considered evident while they don't not exist in reality. So presenting a model that can measure knowledge of human resources in an organization, is great scientific interest. Especially if it does rely on strengths and eliminates the shortcomings of the existing models.

REFERENCES

[1]   Abtahi, H. (1385). Knowledge Management In The Organization. Tehran: Peyvande-no
[2]   Afrazeh, A. (2004). Knowledge maps. The First International Conference on Information and Communication Technology Management, Tehran, 4 November 2004, summit of Islamic countries.
[3]   Afrazeh, A. (2010). Knowledge management, concepts, models, measure and implement (Third Edition). Tehran: Moallef publication.
[4]   Ahmadi, A., Salehi, A. (2011). Knowledge Management. Tehran: publication of PNU.
[5]   Ahn, J.H., & Chang, S.G. (2004). Assessing the Contribution of Knowledge to Business Performance: the KP3 Methodology. Journal of Decision Support Systems, 36(4), 403-416.
[6]   Chen, S., Chuang, Y. W., & Chen, P. Y. (2015). Behavioral intention formation inknowledge sharing: Examining the roles of KMS quality, KMS self-efficacy, and organizational climate. Journal ofKnowledge-Based Systems, 31, 106-118.
[7]   cheng Ling, T., & Aizzat Mohd, N. (2010). Knowledge management effectiveness and technological innovation: An empirical study in the Malaysian manufacturing industry. Journal of Mobile Technologies, Knowledge and Society. (JMTKS), DOI: 10.5171/2010.428053.
[8]   Collin, E. (1996). Designing organizational memory; preserving intellectual assets in a knowledge economy. Wasshington: Group Decision Support System.
[9]   Esmailzadeh, M., & Poursarajian, D. (2013a). Providing conceptual concept of knowledge management in small and medium-sized businesses with a dynamic approach.. Journal of management improvement, 7(2), 53-31
[10]   Esmailzadeh, M., & Poursarajian, D. (2013b). Presenting the functional model assessment index for compareing knowledge of personnel as an index for comparing knowledge of personnel. The Sixth Conference on Knowledge Management, Tehran, March 2013, the Center International conferences of Shahid-beheshti
[11]   Frost B., & Langen M. (2001). Meriken in wissen management. Siemens AG, GTICI Muenchener Kreis.
[12]   Gambardella, A., & Torrisi, S. (2000). The economic value of knowledge and inter-firmtechnological linkages: An investigation of science-based firms. Dynamo TSERProject (contract no. SOE1-CT97-1078).
[13]   Ghezel A., Heidary Dahooei, J., & Zolghadr Shojai, A. (2014). A value-based framework for the assessment of knowledge workers. VINE: The Journal of Information and Knowledge Management Systems,44(2), 295 – 318.
[14]   Gupta,P., Mehrotra, D., & Sharma, T.K. (2015a). Identifying knowledge indicators in higher education organization. Journal of Procedia Computer Science, 46, 449 – 456.
[15]   Gupta,P., Mehrotra, D., & Sharma, T.K. (2015b). Identifying knowledge indicators in higher education organization. Proceedings of the International Conference on Information and Communication Technologies (ICICT), Bolgatty Palace & Island Resort, Kochi, India, 3-5 December 2014.
[16]   Jamalzadeh, M. (2012). The relationship between knowledge management and learning organization of faculty members at Islamic Azad University, Shiraz branch in academic year. Journal of Procedia - Social and Behavioral Sciences, 62, 1164 – 1168.

[17]   John Wake, N. (2015). The use of the balanced scorecard to measure knowledge work. International Journal of Productivity and Performance Management, 64(4), 590 – 602.

[18]   Kaplan, R.S. (1992). Measure that drive performance. Journal of Harvard Business Review, 7(1), 71-79.

[19]   Kaplan, R.S., & Norton D.P. (1996). The Balanced Scorecard: Translating Strategy into Action. Boston: Harvard Business School Press.

[20]   Khadivar, A., Elahi, S., & Nezafati, N. (2007). Reviewing, classifying and comparing the models of measurement. Fifth International Conference on Industrial Engineering, Tehran, July 2007, University of Science and Technology.

[21]   Klein, P.A. (2000). National statistics, portrait of the value floor. Journal of Economy Issues, 34, 445-452.

[22]   Kreft, D. (2001). How to measure human potential and how to use it on Smartcards. Netherlands:Helsinki-ECAT.

[23]   Lee, K.C., Lee, S., & Kang, W. (2005). KMPI: measuring knowledge management performance. Journal of Information & Management, 42, 469–482.

[24]   Lev, B.(1999). R&D and capital markets. Journal of Applied Corporate Finance, 11(4), 21-35.

[25]   Liebowitz,J., & Wright. (1999). Alook toward valuating human capital. London: in liebowitz(ed). Knowledge management CRC press.

[26]   Mobarezi, A.,Hamdianpour, F., Ranjbar, M., & Kamarkhani, H. (2014). Assessment and interrelationships of human resource management and knowledge management and the introduction of effective mechanisms in applying them. International Conference on Accounting and Management, Tehran, Jan, 2014. Mehr Eshragh institute. Center of conferences in Tehran University.

[27]   Nazemi, S. A., Shiezadeh, E., & Seyyed Hoseini, S. (2014). Culture of knowledge-based capital assessment tool to gain competitive advantage. International Management Conference, Tehran, Nov 2014, the Institute of cultural ambassadors.

[28]   Nilipour, Tabatabai, A., Esmailzadeh, M., & Poursarajian, D. (2014). Model measured to determine employees' knowledge and organizational knowledge. The First International Conference on Economics, Management, Accounting and Social Sciences, Rasht, June 2014, university of entrepreneurial company in Anzali Free Zone.

[29]   Pomeda, J.R., Moreno, C.M., Rivera, C.M., & Martil, L.V. (2002). Towards an intellectual capital report of Madrid: new insights and developments.The International Conference ofTransparence Enterprise, the Value of Intangibles, Madrid, 25-26 November 2002.

[30]   Ragab, M.A.F., & Arisha, A. (2013). Knowledge management and measurement: a critical review. Journal of Knowledge Management, 17(6), 873 – 901.

[31]   Ramazan, M., & Hosnavi, R. (2011). Productivity of Knowledge (printing). Tehran: Atinegar.

[32]   Saaty, T. L. (2003). Decision making with the AHP: Why is the principal eigenvector necessary?. European Journal of Operational Research, 145(1), 85-91.

[33]   Salimi, E., VahdatZad, V., & Abdi, F. (2012). Key dimensions to deploy a knowledge management system in an Iranian firm, a case study. Journal of Procedia Technology, 1, 268 – 274.

[34]   Shaemi Barzgari, A.(2005). Knowledge management and intellectual capital measurement indicators. Proceedings of the Third International Conference on Management, Tehran, Nov, 2005. Sanati-sharif University

[35]   Shannon, C., & Weaver, W. (1963). The mathematical theory of communication. The United State of America: University of Illinois Press, ISBN 0-252-72548-4.

[36]   Sharma,S., Bryson -Osei,K.M., & Kasper, G.M. (2012). Evaluation of an integrated Knowledge Discovery and Data Mining process model. Journal of Expert Systems with Applications, 39, 11335-11348.

[37]   Soltani, I., Esmailzadeh, M., & Khadem Astaneh, R. (2014). The dynamic model of knowledge management practices in small and medium-sized enterprises to gain competitive advantage. Arth Prabhand: A Journal of Economics and Management, (3)1, ISSN 2278-0629.

[38]   Stwart, T. (1997). Intellectual capital: The new wealth of organization. London: Nicholas Brealey Publishing.

[39]   Sveiby, K.E. (1997). The new organization wealthy: managing and measuring knowledge-based assets. San Francisco: Berrett-Koehler publisher.

[40]   Trauner, B., & Lucko, S. (2001). MKMK-Measuring and Bilanzierung von intellectual capital. Vortrag.

[41]   Wennergren, D. M. (2005). The United State navy knowledge management strategy. Department of the United State Navy, DON CIO Memo. Retrieved from http://www.doncio.navy.mil/ContentView.aspx?id=424.