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Formulating and Elaborating a Model for the Recognition of Intellectual Capital in Iranian Universities

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Absract: No doubt the present period is different from the previous ones in many aspects. The shift from industrial economy toward science oriented economy, fading physical and material economy, the focus on intangible assets such as human, scientific, intellectual and social capital are the important elements of this period which are most interested by the researchers. In the present study, first through an exploration study, the elements and items of intellectual capital are identified based on which the primary model for recognition of intellectual capital in Iranian universities is formulated. In this model four major items: human, relational, structural capital and intellectual property are considered and each item is divided into minor variables and some of their indicators are defined. In the next stage the items, variables and indicators of the model are evaluated and tested for reliability through Delphi method during three times of going and returning the questionnaire. Using Kendal agreement coefficient, the amount of agreement coefficient of each stage is calculated. After the elites' relative agreement on the items, variables and indicators of the executed Delphi model, in the next stage the model was tested by a measurement. Finally, the relationship between the items and indicators of the model were verified and some indicators for evaluating intellectual capital in Iranian universities were suggested.

Key words: Intellectual capital · Human capital · Structural capital · Relational capital · Intellectual property

INTRODUCTION

Contrary to past decades, which machinery, equipment and financial sources were included in making capital and wealth, the present economic system sets the most productive wealth sources in knowledge and skilled parts of organizations. In the era of knowledge-based economy, for enterprise to retain and improve competitive advantage, knowledge has become a vital capital [1]. A natural move to the suggestion is that organizational knowledge can lead to competitive opportunities [2].

Intangible wealth become an important determinant for competitive advantages of firms, under new economy era. The market value of organizations is equal to their financial capital in addition to their intellectual capital [3]. Nowadays from making wealth aspect educational and skilled sources, intellectual capital of organization becomes more important in comparison with other sources. One of the major assets of a firm is intellectual capital, since it promotes competitive advantages that are the base of value generation. Intellectual capital improvement means an increase of the knowledge base of the organization [4]. Because of this, Druker, a famous management scientist, asserts that we are entering the age that its main economic sources are not based on natural sources but its main source is knowledge. Twenty first century is knowledge-based economics [5]. One of the most important challenges of modern organization in the country is to determine and recognize the elements as well as indexes of intellectual capitals for evaluation [6, 7]. The competitive impact of the firm's intellectual capital is undisputed; however, it is very difficult to accurately measure intellectual capital [8].

Payame Nour University as one of the most significant state university, has 488 centers and units which has about one million students and scholars, recognizing and evaluating these intellectual capitals helps a lot in future decisions and in investing capitals at

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Payame Nour Universities [9]. The purpose of this project is to demonstrate a method for recognizing and evaluating elements and indexes of intellectual capital at Payame Nour University.

Theoretical Bases: Various sources and texts examine the literature of intellectual capital and always try to give a comprehensive definition of intellectual capital. Done studies show that there is no comprehensive definition of intellectual capital. And most of the given definitions are different from each other. Done researches give following results for definition of intellectual capital [10-13].

- There is no comprehensive definition of intellectual capital.
- "Giving value" is a meaning that is used a lot in definition of intellectual capital. It means that intellectual capital is not used unless it makes value in some aspects organization.
- Basically most of the definitions of intellectual capital include the same words such as: knowledge, skill, experience, hidden capitals, information, process and making value and etc.
- Division between human capital, organizational capital and consumer capital are somehow acceptable in these definitions. Some models divide the components of intellectual capital. Into three groups: external capital (relating to consumer), internal capital (structural) and human capital. This definition is used largely in intellectual capital and is used in different organizations for making decisions about organizational values [14].

Definitions of Intellectual Capital: Generally, there is no an accepted definition of intellectual capital. The expressions 'intellectual capital' and 'intangible capital' are used interchangeably as they all represent a non-physical claim to future benefits [15]. Academics and experts propose a number of definitions for intellectual capital [16]. Some of the most significant definitions of intellectual capital are as follows:

A collection of hidden capitals and their processes are called intellectual capital [17].

Difference between clerical value of organization and things a person is ready to pay for it is called intellectual capital [18].

Hidden capitals which are not often in balance sheet are called intellectual capital [19].

A collection of members' knowledge in organization which is changed into elements like trading signs, invention rights, winners and etc is intellectual capital [20].

Intellectual sources (knowledge, information, spiritual possession) which can be used for making wealth are called intellectual capital [21].

Intellectual capital is intellectual material (knowledge, information, intellectual property, experience) that can be used to create wealth-collective brainpower [10].

Elements and Components of Intellectual Capital: In 1990 a considerable interest has been shown in intellectual capital. The reason for the interest is the increase in market value of knowledge organizations. Hidden capitals are recognized as protection source for competitive advantages of knowledge organizations [22].

Employees and researchers try to define and evaluate intellectual capitals which are hard to be measured. Writers classify intellectual capital in different ways. The subject that all of them are agreed on is that these capitals show hidden values which are believed their evaluation is really hard. They are agreed that intellectual capital contains all hidden capitals. It contains knowledge (part of human capital), structural capital, communicational capital, organizational capital, internal capital and external capital. Knowledge is considered as the most important element which influences on organizational value [23].

Nowadays evaluating intellectual capital is one of the challenges in organizations. For evaluating these organizational capitals, they should be recognized and classified and then their indexes should be determined. Different models have been shown by researchers to determine and evaluate these capitals which each one of them emphasizes on special parts [24, 25].

Research Method: In this project, at first, elements of these capitals are recognized and based on the exploration study and then an exploratory model has designed.

- Observatory study and bringing out the primary model
- Performance of Delphi method and certification of model.

Library Analysis of Exploratory Interview with Knowledgeable People: In this step, at first, by extensive library research and surfing internet major components and elements of intellectual capital have been recognized. From some reliable sites like Emerald, Elsevier and ScienceDirect some essays, relating to intellectual capital, have been downloaded and studied. Different elements

Table 1:

	Panel Members' Characteristics	Num
1	To be scientific group member in accounting and management course at Payame Nour University and to be familiar with intellectual capital.	8
2	To be scientific group member at other universities	4
3	To publish or take part in publication of scientific essays, books and other scientific work in relating to intellectual capital, hidden capital	8
4	To have teaching record and to hold seminars in accord with intellectual capital, hidden capital knowledge management.	10
5	To be teacher in accounting and management course and to have experiences in managing centers, units and sections of Payame Nour University and to be familiar with intellectual capital	4

and principles of intellectual capital have been recognized and studied. Then with the bosses of Payame Nour University and knowledgeable people in intellectual capital field an interview has been done. Finally a primary model has been designed to determine the elements of intellectual capital at Payame Nour University.

Performance Process of Delphi and Certifying Research Model: The performance process of exploratory study and the performance of Delphi can be seen in Table 1. Based on different ways of non probability sampling and researcher's knowledge, what can help in performing the project and increase project quality is the use of judgment non probability sampling in the first step. In next step, chain sampling is used. It means that at first the researcher selects some experienced, knowledgeable and professional people in the field of intellectual capital. Then by their help and by a questionnaire some other people, who have knowledge of intellectual capital, are invited to participate in Delphi panel. Among these people some were selected for the performance of Delphi.

Number of Intellectuals and the Way of Their Selection for Performing Delphi: In view of the fact that in the performance of Delphi for studied matters, which the unity of thought is necessary, the amount of participated intellectuals can have a determined role. The increase in number of members can make the unity of thought difficult and the decrease of them hurts the reliability of the project.

Based on Powell's and Talyor's view the number of participators in Delphi panel not only is determined base on the aims but also is depended on variety of aimed population. Based on these researchers' view, 10 or 15 are enough if they are not many and various. According to done studies the members of Delphi panel are 16 intellectual people, with mentioned characteristics, who are selected by non probability method [26].

First Step: Forming Delphi Panel: According to above mentioned discussion about the selection of Delphi panel members and the primary analysis of this project, it has been determined that the following characteristics should be considered in selecting panel members:

Second Step: Performing the First part of Delphi giving a model to members and gathering their ideas.

In this step 16 questionnaires are distributed among intellectuals which all of them answer the questions. Descriptive statistics of variants such as mean, standard deviation, variance and the maximum and minimum of answers achieved in the first step are shown in Table 5.

Measurement of Kendall Coefficient Concordance in the First Step of Delphi: Kendall coefficient concordance is one of the statistic methods which is used for measuring concordance rate for different subjects between members of a statistic sample. This coefficient is used for studies about inter judge reliability and interest reliability. It is considered as a solution to determine complete agreements between K collections of grades. It is shown with W and is measured as follows:

Third Step: Performing the Second part of Delphi: After performing the first part of Delphi, some suggestions have been mentioned by panel members. In the second step, these suggestions have been applied in questionnaires. In addition of suggestions for changing questions, six indexes have been added for human capital and communicational capital. The indexes are as follows:

- The rate of employees' courage to tell their ideas.
- The amount of new organizations founded by students.
- The amount of performed ideas in the organization.
- The amount of accepting university graduates in the organization.
- The rate of accepting university graduates in finishing course.

- The amount of essays by members of scientific group which are published in scientific and research magazines.

In addition of above indexes the averages of panel members' answers are informed in a separated table. The researcher wants them to tell their suggestions about given indexes for the questionnaires of the second step. After delivering the questionnaire between 16 members, 15 questionnaires have been collected Kendall coefficient concordance is shown in Table 3.

Fourth Step: Performing the third part of Delphi: After collecting and analyzing panel members' answers in the second step, the average of them has been calculated. Members' suggestions about questionnaire have been collected and the third questionnaire has been informed to panel members. In this step 14 members answer the received questionnaire. After analyzing their answers the following information is gained:

Kendall Coefficient Concordance in the Third Step: This coefficient has improved in the third step. As can be seen in the following table, it is 0.550. In comparison with the tables in the first and second steps, the coefficient has increased in the third step. It is somehow applicable in survey step.

Comparing Descriptive Statistics of Human Capital Variant in Third-step Performance of Delphi Model: In the following table, the descriptive statistics of human capital in every step have been shown. As can be seen in Table 5, in the first step 16 members answer the questions but in the second it reduced to 15 members and in the third step to 14 members.

The Results of the above Table Show That: From the first step to the third one, standard deviation, the range of observed variants and standard error of mean have a falling process. It demonstrates that observed variants decreased from the first step to the third one. It means that the participators' suggestions in the second step, in comparison with the first step, have lead increasingly toward central tendency measures and in the third step it has been increased more than the second step. In a way that standard deviation in the first, second and third steps are in order 0.93, 0.54, 0.47. The range variants in every step are in the table and the decrease of taken measures from the first step to the last one is easily analytical. (This matter shows the decrease in observed variants from the first step to the third one).

Table 2: Kendall Coefficient Concordance in the first step

N	16
Kendal wa	.1720
Chi-square	88.071
Asymp.sig	.1100

Table 3: Kendall Coefficient Concordance in the second step

N	15
Kendal wa	.3040
Chi-square	561.183
Asymp.sig	.890

Table 4: Kendall Coefficient Concordance in the third step

N	14
Kendal Wa	.5500
Chi-square	579.284
Df	78
Asymp. Sig	0.000

As can be seen in Table 5 quantities mean from the first step to the third one are in order 6.51, 6.41, 6.15.

Comparing Descriptive Statistics of Communicational Capital Variant in Third-step Performance of Delphi Model: As can be seen in the Table 5, the descriptive statistics of communicational capital in every step have been shown. As can be seen in the Table 5, in the first step 16 members answer the questions but in the second it reduced to 15 members and in the third step to14 members.

From the first step to the third one, standard deviation, the range observed variants and standard error of mean have a falling process. It demonstrates that observed variants decreased from the first step to the third one. It means that the participators' suggestions in the second step, in comparison with the first step, have lead increasingly toward central tendency measures and in the third step it has been increased more than the second step. In a way that standard deviation in the first step is 1.00, in the second step is 0.86 and in the third step decreased to 0.78.

Comparing Descriptive Statistics of Infrastructural Capital Variant in Third-step Performance of Delphi Model: In the Table 5, the descriptive statistics of relational capital in every step have been shown. As can be seen in the Table 5, in the first step 16 members answer the questions but in the second it reduced to 15 members and in the third step to 14.

Table 5:

Descriptive statistics of human capital

Steps of performing				
Third Step	Second Step	First Step		
14	15	16	Number of observations	
1.92	2.35	3.23	Range of Variations	
5.28	5.06	5.23	Minimum	
7.20	7.41	8.46	Maximum	
6.1512	6.4535	6.5189	Amount	Mean
0.12758	0.14609	0.21937	Standard error	
0.47735	0.54660	0.93070	Standard Deviation	
0.228	0.299	0.866	Variance	
0.125	-0.971	0.556	Amount	Skewness
0.597	0.597	0.536	Standard error	coefficient

The considerable point is that in this step like the other steps, from the first step to the third one, standard deviation, the range of observed variants and standard error of mean has a falling process. It demonstrates that observed variants decreased from the first step to the third one. It means that the participators' suggestions in the second step, in comparison with the first step, have lead increasingly toward central tendency measures and in the third step it has been increased more than the second step. In a way that standard deviation in the first, second and third steps are in order 0.96, 0.75, 0.64. Quantities mean in every three steps do not have considerable difference and Quantities mean from the first step to the third one are in order 6.4, 6.2, 6.3.

Comparing Descriptive Statistics of Spiritual Capital Variant in Third-step Performance of Delphi Model: As it has been shown in Table 5, from the first step to the third one, standard deviation, the range observed variants and standard error of mean has a falling process. It demonstrates that observed variants decreased from the first step to the third one. It means that the participators' suggestions in the second step, in comparison with the first step, have lead increasingly toward central tendency measures and in the third step it has been increased more than the second step, but the decrease in the range of standard deviation in this variant is lesser than the other variants. Standard deviation in the first, second and third steps are in order 1.2, 1.09, 0.94.

Fifth Step: Bringing out Final Measurement Model of Intellectual Capital at Payame Nour University: After performing three steps of Delphi, the participators emphasize on increasing the agreement between members, decreasing standard deviation and variance, increasing attitude statistics toward the center of variants, time limit and finally they emphasize on the finality of their ideas in the third step. A decision has been made to stop the steps of Delphi performance. As the achieved coefficient concordance is highly reliable, in this step a final measurement model for intellectual capital at Payame Nour University has been brought out.

CONCLUSION

The results of the project show that intellectual capital of Payame Nour University includes four major parts like human capital, communicational capital, infrastructural capital and intellectual property.

In evaluating intellectual model of Payame Nour University, each variant is divided into subsidiary components which are summarized in twelve variants like:

- Units and branches
- Institute's fame
- Attitudes
- Entrepreneur and creativity
- Knowledge, skilled and deserving
- Loyal Consumers
- Agreements and Contracts
- Philosophy, management process and organizational culture
- Information system and communicational nets
- Financial relations
- Spiritual possession rights
- The rights of signs and plans

Among these components y11 (spiritual possession rights) with λ= 0.89 is more that the others and y10 (Financial relations) with λ= 0.55 is the lowest one.

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