The Identification of Effective Factors on Intellectual Capital Reporting of the Universities of Iran[#]

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ABSTRACT

The aim of this research is identifying the effective factors on the intellectual capital reporting in the universities of Iran. In this research, first of all by investigating the research literature and the reports of intellectual capital of universities, 258 indicators were identified. Then they were sent to the experts of the government universities of Iran through questionnaires. From these indicators 49 indicators were selected through Fuzzy Delphi method to be suitable for the intellectual capital reporting on the universities of Iran. These identified indicators were both quantitative and qualitative. As there is not any reporting model of intellectual capital for the universities of Iran, the identification of these factors can be very important for the design of the intellectual capital reporting model suitable for the universities of Iran.

Keywords: Intellectual Capital Reporting, University, Fuzzy Delphi Method
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1. INTRODUCTION

Universities, today, face a lot of challenges. In order to solve these challenges, they should be more reflexive, more clear, more competitive and comparable. For this reason, they need to control, develop, and manage the intellectual capital of their universities (Leitner et al., 2014). These challenge can be the allocation of budgets, the number of students, the university ranking, or even changing the university dean. Therefore when evaluating the performance of universities and their managers, especially in the universities which use government budget, what is more important is the accurate, effective management of the intellectual capital in these organs (Taghinattaj and Momenzadeh, 2012). It is considered necessary to have a basis to solve these problems. The intellectual capital reporting can be that basis. The intellectual capital reporting can be a useful basis for the

understanding of organizational performance, clearness, and the responsibility of more responds (Guthrie et al., 2004). The intellectual capital reporting is a valid effort to meet the new demands of the public sectors and is a useful means for the internal and external targets (Sanchez et al., 2009; Leitner and Warden, 2004).

Despite the fulfilled researches which have been done in other countries in the field of intellectual capital reporting of universities, there has been little research in this field in Iran. There has been introduced no special model in this field in Iran. Therefore this research aims to have a step for the intellectual capital reporting of universities. So in the first step, we should identify the effective factors on the intellectual capital reporting.

2. BACKGROUND AND LITERATURE REVIEW

2.1. The Appearance of Intellectual Capital in the Universities of Austria

During the late 1990s, the intellectual capital reporting tool for universities and research organizations was accepted. Austria was the first country which accepted broadly the idea of intellectual capital reporting for universities and research organizations. In 1999, the research centers of Austria were the first European research organizations that published the intellectual capital reporting for those organizations. The first intellectual capital reporting was based on a special intellectual capital model which showed the specifications of a research institution (Leitner, 2002). The aim of the intellectual capital reporting was informational assistance for the management of intangible investment and the disclosure of information for the outside stakeholders. After a short period of time, some other research organizations in Austria and Germany, introduced their intellectual capital reportings in the same way (Leitner and Warden, 2004).

From the point of view of Leitner (2002), the importance of the intellectual capital reporting for universities is because it can be replaced the traditional reporting system, can cause having a relationship between the universities and the ministries, can increase the performance to reach the aims and values, and also can help to make the organizational strategies and goals, and can affect the outputs of the universities. It can also introduce suitable information about the intangibles of universities which will be used for the development of human resources and R&D programs.

2.2. The Importance of Intellectual Capital of Universities in Spain

The subject of intellectual capital reporting for universities has been important not only for Austria, but also for other countries thereafter, especially European countries. Among the European countries, Spain started a vast amount of research in this field, so that the Madrid government considering the national and international activities and according to the agreement between the representatives of the six government universities and the Madrid government, established the intellectual capital reporting of universities which was used during the years of 2006-2010. In this intellectual capital reporting model, about 40 indicators were defined. In this model the general information about the university such as professors or researchers in different majors, the results of PhD theses, and many other things such as the success of the graduates in the working markets were introduced. The aim of this reporting model was the distribution of the current general aspects on the basis of suitable and clear criteria and also considering the qualitative indicators of the university activities and the definition of an information system in the universities for observing the results and auditing the affairs (Sanchez et al., 2009).

2.3. Intellectual Capital Reporting Models for Universities

There have been introduced different classifications about the kinds of intellectual capital reporting and its component elements. Although we have not had a standard classification which can be acceptable by everybody so far, the efforts of the countries, especially European countries, indicate the significance of this issue.

Leitner (2002) introduced an intellectual capital reporting model in which he classified the intellectual capital indicators which were suitable for the universities of Austria in human capital, structural capital, relational capital, research, education, commercialization, transforming the knowledge to all, and services. In the intellectual capital classification of the research centers of Austria (Austrian Research Centers [ARC], 2007), beside the human resources, we can find other things such as structural capital, relational capital, the main processes, and the results.

In the intellectual capital reporting model of Sanchez et al. (2009), the intellectual capital indicators of the universities were classified into three groups: Human capital, organizational capital, and relational capital. The indicators of this model were both financial and non-financial.

In the intellectual capital reporting model of Ramirez and Gordillo (2014), the intellectual capital reporting of the universities of Spain was classified into three groups: Human capital, structural capital, and relational capital. According to their definition, human capital means the abilities and skills of the individuals of the institutions, the structural capital means how the institution has been structured and how it works, and the relational capital means the relations of the institutions with the students and the outside world.

The intellectual capital reporting model of Lietner et al. (2014) for the universities of Europe was classified as: Human capital, structural capital, relational capital, process capital (education), process capital (research), process capital (3rd mission), results and effects (education), results and effects (research), results and effects (3rd mission). In this intellectual capital reporting, the human capital includes the inputs, processes, and outputs. In fact, in this model, in addition to education and research which are two important outputs of universities, other outputs such as commercialization of the researches have been considered important. This model is in the shape of a process which indicates how the universities use the intellectual capital and what its effects on the outputs of the universities are.

3. RESEARCH METHOD

3.1. Research Question

The aim of this research is to identify the effective factors on intellectual capital reporting of the universities of Iran. In order to reach this aim, the research question is raised as the following:
- What are the effective factors on the intellectual capital reporting on the universities of Iran?

3.2. Community Expertise

The community expertise of this research are the faculty members of selected government universities of Iran who are dependent to the ministry of science, research and technology. The research expertise sample includes 16 persons of the university experts of the ministry of science, research and technology who have answered

the questionnaire distributed to them and have been asked to write their opinions. The experts were the faculty members in accounting and management who were completely familiar with the subject of the research and had written some articles about the intellectual capital. These experts, besides being the faculty members, had some executive activities such as being university dean, financial assistant, financial manager, and group manager.

3.3. The Means of Collecting Data
In order to prepare the questionnaire, the available research were done about the subject of this research was investigated. Then after identifying the exact indicators, the questions were prepared. The thesis supervisor and thesis advisors exactly investigated these questions and then the questionnaire was prepared. This questionnaire was then was sent to the experts to have their comments about the specified indicators, based on the Likert scale from 1 to 10, i.e., 1 for the lowest importance and 10 for the highest importance, to give each indicator suitable number. They were also asked to introduce any other indicator related to the aim of this research if necessary. After employing Fuzzy Delphi method, these indicators were selected as the final ones.

3.4. Validity
In fact, the Validity of the questionnaire shows that how much the questions and the variables are investigated and how much the content area of the variables and the subject is covered. So, in this research the method of validity and concentration on the subject literature and also using the experts' points of view were used for the evaluation of the questionnaires. Therefore, we can be sure about the validity of the questionnaire.

3.5. Analysis Method
In order to specify the intellectual capital indicators of universities, in this research, the valid magazines, articles and sites were used. About 330 intellectual capital indicators for universities were identified. These indicators were taken from the reports and articles which were published between 2002 and 2015. They were about the indicators of intellectual capital reports of the universities and research centers of Austria, Spain, Britain, Italy, Germany, Canada, Poland, Colombia, Taiwan, and Jordan. Then some of these indicators were omitted. 258 sub-indicators were identified to be suitable for the universities of Iran. Then a questionnaire was sent to the experts to identify which of these 258 indicators were suitable for the intellectual capital reporting model of the universities of Iran.

3.6. Fuzzy Delphi Method
The Fuzzy Delphi method was introduced by Ishikawa et al; Hsu et al., 2010). in 1993. This method is a combination of the traditional Delphi and Fuzzy set theory. Using Delphi Fuzzy Method can increase the productivity and quality of the questionnaire. The analyses will also be more objective (Hsu et al., 2010). This method includes four steps. First the experts' opinions are collected, then the triangular Fuzzy numbers from the point of view of the experts are prepared. In this research the geometric mean model (Klir and Yuan, 1995; Hsu et al., 2010) was used to find the common understanding of the decisions and opinions of the experts about each indicator. It is assumed that the evaluation value of No. j element given by No. i expert of n experts is,

$$\widetilde{W_{ij}} = (a_{ij}, b_{ij}, cij), i = 1, 2, \ldots, n, j = 1, 2, \ldots, m$$

Then the fuzzy weighting $\widetilde{W_{ij}}$ of No. j element is $\widetilde{W_j} = (a_j, b_j, c_j)$ (Hsu et al., 2010).

$$a_j = \min\{a_{ij}\}, \ldots b_j = \frac{1}{n}\sum_{i=1}^{n} b_{ij} \ldots, \ldots c_j = \max\{c_{ij}\}$$

Then from the defuzzification method, the Fuzzy weight of each replaced element is specified by the following formula:

$$S_j = \frac{a_j + 4b_j + c_j}{6} \quad , \quad j = 1, 2, \ldots, m$$

In the final step, in order to identify the suitable factors from the point of view of the experts, we choose a domain to accept or reject that indicator so that if $Sj \geq a$, that factor is suitable and if $Sj < a$, that factor will not be suitable and is omitted.

In this research the margin of the acceptance of the indicator is 7.5. If the defuzzified number of the Fuzzy number from the point of view of the experts is close to 7.5 or more, it is accepted as a suitable indicator and otherwise it is rejected.

4. RESULTS

4.1 Descriptive Data
The descriptive data of the experts in this research are: 94% of the experts, the faculty members of the government universities of Iran, were male and 6% were female. 69% had PhD in accounting, 25% had PhD in management, and 6% had PhD in educational planning. The academic ranks of the research experts were: 25% full professors, 19% associate professors, and 56% assistant professors. The experts' years of work experiences were: 6% more than 30 years, 31% 25-30 years, 19% 20 to 25 years, 6% 15-20 years, 13% 10-15 years, and 25% 5-10 years. The experts' ages were 13% more than 60, 25% between 50 and 60, 37% between 40 and 50, and 25% between 30 and 40.

4.2. Results of Research Question
The following table indicates the answers to the question of the research: What are the effective factors on the intellectual capital reporting on the universities of Iran?

The columns of this Table 1 explains: a_j for the minimum scale of the experts' opinions, b_j for their average scale, c_j for their high scale, and for the final defuzzified number which is taken by Delphi Fuzzy formula. As the acceptance scale is 7.5 and more, therefore the scales 7.5 and more were chosen as the ones suitable for the final indicators of intellectual capital reporting. So, from the 258 indicators sent to the experts, 49 indicators were chosen as suitable for the intellectual capital reporting of the universities of Iran.

From these 49 chosen indicators, the highest scores were for the number of faculty members, the number of universities Patents granted, and the percentage of the faculty members with PhD degrees; and the lowest scores of these chosen indicators were: The percentage of the inter-disciplinary independent research

Table 1: Effective factors on the intellectual capital reporting on the universities of Iran

Indicator	a_j	b_j	c_j	S_j	Result
Number of researchers	4	8.505	10	8.003	Accepted
Number of faculty members	5	8.75	10	8.33	Accepted
% of faculty members to the sum of students	3	8.39	10	7.76	Accepted
Number of PhD students	4	8.66	10	8.109	Accepted
% of students applying for more advanced programs	4	7.83	10	7.55	Accepted
The successful amount of research programs	4	8.208	10	7.805	Accepted
Facilities and material resources supporting pedagogical qualification and innovation	4	8.41	10	7.94	Accepted
Facilities and material resources supporting research and development	3	8.12	10	7.58	Accepted
The institution's assessment and qualification processes	4	8.009	10	7.67	Accepted
Research management and organization	3	8.11	10	7.57	Accepted
Effort in innovation and improvement	3	8.509	10	7.83	Accepted
Management quality	4	8.32	10	7.88	Accepted
Hardware and databases	4	7.91	10	7.606	Accepted
Transformational leadership	4	7.81	10	7.54	Accepted
Value of research contracts (% of contracts with new clients; % of contracts with clients from abroad; % of contracts with business enterprise clients)	4	8.16	10	7.77	Accepted
Number of inter-disciplinary independent research projects	4	7.78	10	7.52	Accepted
Research activities abroad	4	8.28	10	7.85	Accepted
Number of international researchers	4	8.61	10	8.079	Accepted
Number of international researchers on freelance contracts	4	8.11	10	7.74	Accepted
Students satisfied with contacts with teachers/ professors (%)	5	7.802	10	7.701	Accepted
Students satisfied with classrooms, laboratories and libraries (%)	4	7.95	10	7.63	Accepted
Students satisfied the course structure (%)	4	7.88	10	7.59	Accepted
Number of ongoing evaluated research and development projects, and projects for developing and promoting the arts internally funded by the university	5	7.92	10	7.78	Accepted
Number of researchers and artists funded by research and development projects, and projects for developing and promoting the arts supported by third-party funds	5	7.92	10	7.78	Accepted
University – business collaborative research projects	3	8.32	10	7.71	Accepted
Scientific publications among the top 10% most cited worldwide publications (%)	4	7.92	10	7.61	Accepted
International scientific co-publications per researcher	3	8.25	10	7.67	Accepted
Number and value of nationally funded research projects	4	8.46	10	7.97	Accepted
Number and value of internationally funded research projects	4	8.33	10	7.88	Accepted
University Patents granted	5	8.71	10	8.31	Accepted
Number of public-private co-publications	4	7.82	10	7.55	Accepted
Society opinion about university	4	7.89	10	7.59	Accepted
Total funds for research and development (R&D)/number of researchers	3	8.21	10	7.64	Accepted
Amount of resources devoted to R&D/total budget	3	8.047	10	7.53	Accepted
Existence of a strategic plan for research	3	8.24	10	7.66	Accepted
National patents	4	7.79	10	7.52	Accepted
International patents	5	8.32	10	8.048	Accepted
Number of international received awards	4	8.404	10	7.93	Accepted
Number of publications in international journals and books	3	8.302	10	7.701	Accepted
Theses completed	4	8.039	10	7.69	Accepted
Number of independent research projects	3	8.013	10	7.508	Accepted
Number of awarded doctoral degrees	4	7.83	10	7.55	Accepted
Industry–University Interaction	4	8.54	10	8.03	Accepted
Relations with society in general	5	8.33	10	8.05	Accepted
Number of patents of each faculty member	4	8.29	10	7.86	Accepted
Full time faculty members with PhDs (%)	5	8.604	10	8.23	Accepted
Number of full professor	4	8.19	10	7.79	Accepted
Professional innovation	3	8.14	10	7.59	Accepted
Number of R&D projects which are developing	4	7.84	10	7.56	Accepted

Source: (Leitner et al., 2014; Ramirez and Gordillo, 2014; Secundo et al., 2010; Veltri et al., 2014; Wu et al., 2012; Sanchez et al., 2009; Wilkinson et al., 2009; ARC, 2007)

projects, and the national patents. In fact, this research shows the importance of human capital factor in the intellectual capital reporting of the universities of Iran.

5. CONCLUSION

As it is clear from the Table 1, from the point of view of the university experts, 49 indicators were distinguished to be suitable for the intellectual capital reporting of the universities of Iran. The most important factor effecting on the intellectual capital reporting of the universities of Iran is related to the number of faculty staff. In fact, the results of this research shows that from the intellectual capital factors that are effective on the intellectual capital reporting of the universities, the human capital is the most important and most effective factor. And that is the number of faculty members of the universities. The faculty members of the universities are

considered as the most important capital of the universities. Their different scientific and behavioral aspects have a very significant role in attracting students and the relations with other universities. Look at a university as the factory which produces science, we will find out that the main factor of the production of this factory, in other words university, is the faculty members who produce their products such as science, publications, and patents. The students who use the university products, want more satisfaction from the university.

The main challenge for the universities in the 21st century is how to change the value from human capital to structural and relational capital. For example, it is not sufficient to gather the most famous professors to provide a university with global rank. The knowledge of each individual who deals with knowledge should be transferred to the structure of a high education institution. The intellectual capital reporting is the means of reaching this goal (Leitner et al., 2014).

In this research, the effective factors of intellectual capital reporting of the universities of Iran were recognized. As there is not any intellectual capital reporting model for the universities of Iran, this research may be an important step to reach this significant goal of the universities. In order to have an intellectual capital reporting for the universities of Iran, one can use the selected indicators of this research and can easily compare the government universities of Iran with each other, and in this way the suitable budget allocation to the universities will be done. The ministry of science, research and technology of Iran can use these indicators to rank the universities and allocate the suitable budget to the universities. It can also use some of these indicators to promote the professors, because human capital has a very important role in universities.

The next step after preparing an intellectual capital reporting for the universities of Iran, can be comparing the universities of Iran with the other universities in the world. Therefore the identified factors in this research can be a suitable means for the ranking of universities. The universities' mangers can also use these factors and indicators to respond about their actions, the university stakeholders, i.e. professors, staff, students, people, government, and society.

The powerful point of this research is that in order to identify the effective factors on the intellectual capital reporting of the universities, a lot of articles and reports about the intellectual capital during the years 2002 to 2015 were surveyed and analyzed contently, and this research was not done only on the basis of a model, but the quantitative and qualitative indicators both were considered.

By comparing the other researches, it was specified that the faculty member indicator of the intellectual capital reporting of universities was also considered important in the researches of Leitner et al. (2014) and Altenburger and Schaffhauser-Linzatti (2015) and Ramirez and Gordillo (2014). The satisfaction percentage indicator of the students was another important factor which was considered significant in Leitner et al. (2014). In fact this qualitative factor is an important factor in achieving the goals of the universities

which were considered important in this research.

5.1. Limits and Future Research

Because of the limitation of time, the domain of this research was the government universities of Iran which are related to the ministry of science, research and technology of Iran, not all of the universities of Iran. The experts' samples of the research were the faculty members who had executive university roles. If the opinions of other stakeholders were considered, we could perhaps have better results.

It is proposed for the future researches to have this activity in all of the universities of Iran in order to have better results. Another subject which can be proposed for the future research is identifying the effective factors on the intellectual capital reporting of the medical universities of Iran. Another research for future can be finding the relationships between the intellectual capital indicators of this research.

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