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THE EVALUATION OF INNOVATION CAPITAL IN TSE

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ABSTRACT

In this study, the innovation capital was introduced and the relationship between innovation capital and the expected Return in the companies listed in Tehran Stock Exchange will be assessed. In order to test the proposition, multivariate linear regression model was used. Statistical analysis applied, is a fixed effects panel method. This research studies the companies listed in Tehran stock exchange organization in a period of six years, ending in 2014. Thus the main proposition that there is a significant relationship between the innovation capital and the future expected return on the companies listed in Tehran Stock Exchange is confirmed.

Keywords: *Intellectual Capital, Innovation Capital, Future Expected Return, Tehran Stock Exchange*

INTRODUCTION

Intellectual capital has been considered theoretically as a new topic over last few years worldwide. But since it is seen as a valuable source for countries and organizations, its growing and developing is turning quickly to principle criterion in development of countries. On the other hand, this invisible source has been considered as a valuable resource in companies and a key capital for endeavor growth. Therefore, today necessity of intellectual capital developing and managing has been become to an important requirement in business area, and movement toward knowledge-based economy has resulted in changing over dominant paradigm of industrial economy; Such that it can be seen occurring economy based on knowledge and information which its basis is dependent on intellectual capital. In simple words, it can be possible to consider the intellectual capital as a knowledge package composed of a set of invisible and latent resources, principles, culture, behavior norm, competences, structures, communications, procedures and processes to knowledge. Knowledge is based on intellectual observations.

On the other hand, many current accounting systems and financial reports are unaware of increasing importance and role of intellectual capital, inner possession and knowledge on new age organizations and are unable to measure the real value of intellectual capital as an important asset in financial reports. In other words, financial inventory is consisted of great limitations for explaining real value of companies. In present knowledge-based societies, the efficiency of applied intellectual capital is mattered much greater than applied financial capital. It means that in future, role and importance of financial capitals, compared of intellectual capitals would be decreased significantly for determining constant profit capability. It can be caused to distance between real value of companies and organizations, and what is conducted in traditional accounting calculations (Shams & Khalili, 1390).

However, in addition to introduction and describing concepts, we are to consider proposed models and theories in described intellectual capital, intellectual capital efficiency on companies listed in Tehran stock exchange.

Theoretical Literature

Intellectual capital accounting (invisible asset) is one of the greatest challenges against accounting and accountants. Therefore, it is necessary to establish a systematic framework for reporting invisible asset in order to disclose analog information and increasing confidence capability for interested parties. Today, to succeed at the complex world, with increasing competition, it is necessary to pose knowledge asset (intellectual capital), identify and manage them. For managing the asset, companies should be informed of its present conditions and then they should take necessary action to resolve its deficiencies and shortages. It shall be measured the existing knowledge asset on companies in order to know about it. It helps us evaluate their existing amounts and compare it with desired level and take necessary action in

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order to approach to favorite place. So it is necessary to identify the companies' invisible assets (Zahedi & Lotfizadeh, 1386). Although traditional accounting methods significantly help realize the business importance, in a knowledge-based organization where knowledge is a significant part of a product as well as the wealth of an organization, traditional accounting methods based on sensible assets and information related to previous operation over the organization are not sufficient to evaluate intellectual capital, greatest and most valuable asset to organization (Solivan, 2000). The intellectual capital measure view is focused on how to create new measure mechanisms for reporting non-financial or quality variables of intellectual capital along with traditional, quantity, or financial data (Ghilich, 1984). Intellectual capital measure has been a research area for researchers and practitioners of an organization since mid-1990s. Both have made many efforts to measure and evaluate intellectual capital and as result the efforts have been done for a long time. Models including national intellectual capital index, business IQ, evaluation of intellectual capital potential, intellectual capital gradation, Tobin' s Q (ratio) and so on. In many researches, difference between market values and book values on companies has been addressed by invisible assets which are intellectual capital (You *et al.*, 2014). However, the importance of intellectual capitals over companies arise the question whether intellectual capital are included inside companies' market values or not. In efficient markets, stock costs would be a function of existing intellectual capitals on companies and however all declines in prices would be clear in every terms and it could find no significant association between intellectual capital and future efficiency. To create the intellectual capital significantly requires spend much costs during times, while its advantages are unexpected and unobserved. When companies posed much intellectual capital, it is so important to disclose information, since incorrect information could affect negatively on correct pricing on companies, such that on stock cost measuring, it isn't included existing intellectual capitals (Yu *et al.*, 2014).

Considering to some previous studies as well as existing structures on Tehran stock exchange, it is surveyed two types of the intellectual capital in our study that each one uses two representatives. Human capital (personnel with professional certificate proportional to total personnel) and innovation capital (research expending amount and developing proportion to net sales) (Yu *et al.*, 2014). existing variables are including flow capital ratio, fixed asset ratio, marketing cost ratio, sale growing ratio, company size, firm' s financial lever. Also for dependent variable of study, it is used Ohlson's current remainder interest rate model, say price proportional to natural value.

In fact, main challenge of our study is to assess the market expects from companies' rating according to identified intellectual capitals over financial reports. In fact, result of the study shows that how much the expected return attributed to companies are affected by identified capital on companies.

Considering to issues mentioned above, the main question of our study is addressed as followed: Is there any significant relationship between existing innovation capital and expected return?

Research Backgrounds

Yu *et al.*, (2014) have investigated stock market rating in relation to intellectual capital over IT companies at a study in which was considered IT companies at Taiwan. Their study was focused on whether enjoying higher intellectual capital is resulted to lower rating for companies or not. In this study, it is highlighted on four types of intellectual capital: human capital, innovation capital (representing research and develop level), existing capital and also proportional capitals (like proportion of marketing cost and sale growing ratio). The research results showed that lower rating issue, in fact for human capital is more prominent than of each three variables. Also, another result of research is that it is more affected by interior investors than exterior ones.

Dimitrios and Georgios (2011) had conducted a study as titled "the effect of intellectual capital on company's market value and financial function". They tested a sample of 96 firms during 2006-2008 and considered value ratio of stock holders' wages, value of assets and income growth as an index for financial function, common stock market ratio to book value of stock holder's wages as a market value index, and three components of PALIK's intellectual additive value as an index for intellectual capital. Nevertheless the intellectual capital is recognized as an important asset for companies' competition advantage, the results of the study didn't verify such claim and it is confirmed only an association among

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a component. The results of intellectual capital or human capital and financial function index of stock holders' wages value present that in the case of Greek businesses, human resources developing is the most important factor that should be taken more attention.

In order to provide measure framework of invisible assets in high education and research institutes on Italia, Giustina *et al.*, (2010) considering to existing theories and empirical experiences, fundamental concept model by composing measured indices of compiled capital, had found that creating invisible assets is based on mission of educational and research organizations. Therefore, identifying and measuring of intellectual capital are an operational preference to evaluate convergence between strategic tendency and operation inside of organizations, and a set of taken comprehensive indices can provide an appropriate context to process them and communicate between strategic indices and topics and management.

Hong Yu *et al.*, (2005) at their study considered to evaluate innovation capital on Taiwan universities. In this study by using methods of fuzzy analytical hierarchy process (AHP) and LIKOR, it has been determined the innovation capital and graded different kinds of universities and three groups of 52 specialists (research-centered universities, instruction-centered and professional universities) have been asked. According to theoretical principles proposed in the study, universities are focused on innovation to attain a higher intellectual capital which is considered as the main factor of intellectual capital in affecting on quality and instruction and research over the university. Ton *et al.*, (2007) have investigated association of intellectual capital and financial function over 150 ones of stock exchange companies during 1992 to 2002 in Singapore. The results of study were considerable in different areas. Such that the intellectual capital and financial function of these companies significantly have a positive correlation. Also, the intellectual capital and financial function on companies as well as the intellectual capital growing have a direct association with financial function. On the other hand, the intellectual capital contribution in companies' function was different from industry.

Chen *et al.*, (2005) have investigated the association between intellectual capital, market value and financial function of stock exchange companies during 1992-2002. They have used a great sample of Taiwan registered companies and utilized PALIK's model for it. Their study represents that the importance intellectual capital is due to increase profitability and grow revenue. The results of the study confirmed that the investors are evaluating the company value by higher efficiency of intellectual capital, and the companies with higher intellectual capital have a higher level of profitability and revenue growing over current, present and next year. They considering to positive association of intellectual capital (IC) to market value and company's financial function concluded that the intellectual capital is an important guidance asset for company. Chung (2004) conducted a study on association between intellectual capital and business function and the importance of business on Taiwan biotechnology. The study also considered whether human capital affect on association between innovation and organizational function. Findings of this study show that components of intellectual capital affect on companies' function. Edvinsson and Mallon (1997) defined the difference between market value and book value as the intellectual capital. In Bontis's point of view, the intellectual capital of company in a more extensive meaning contains of intellectual capital and structure capital. He stated in another essay that intellectual capital is composed of a set of personnel's characteristics such as competence, commitment, motivation and loyalty. Though the intellectual capital is accounted as essence of intellectual capital, its feature is losing by personnel's exit. Bontis (1996) in his study investigated three components of intellectual capital including customer capital, structure capital and human capital in service and non-service sector on Malaysia. This study shows that the structure capital have a greater effect on function of two sectors. Although it was important the effect of human capital, the effect is more on servicing company than non-service ones. Donaldson and Preston (1995) in their study investigated structure capital. The structure capital is belonged to whole company and contained innovation capital, association capital, organizational skeleton and etc. Measuring of intellectual capital value was conformed to stockholders' view theory believed the association of interested parties including all forms of company's association to stockholders, employees, consumers, suppliers and union representatives.

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Burney (1991) believes that since the intellectual capital naturally has been identified as an invisible concept, gradually has been considered as a guidance asset provided fixed competing advantages and optimal financial function by dominant firms.

Proposition of Research

Scientific study always starts with a kind of question and its purpose is to find the answers to questions by using scientific methods. The most difficult step for the study process is to recognize taken problem. The basic question for the study is as followed:

1) What is the innovation capital? Is there any significant relationship between innovation capital and future expected returns?

Research Statistical Community

The under-studied community for this survey is composed of all companies listed in Tehran stock exchange for 2008 to 2014 that have all followed conditions:

- 1) The company shall be listed in Tehran stock exchange before 2008
- 2) Fiscal year shall be ended at March 20.
- 3) Shall not be in investment and financial companies.
- 4) Financial information of companies shall be in access.

The statistical community of present study is composed of all companies listed in Tehran stock exchange that until end of 2014 based Rahavarde Novin software in stock exchange has been equal 437 companies. The sample volume considering to screening method and after eliminating negligible cases has been equaled 65 companies.

MATERIALS AND METHODS

Methodology and Conceptual Model

Present research is induction-analog and ex post facto (using past information) and its statistical method is correlation namely determining association between variables by multivariate regression.

Basic model of study for answer to research proposition is developed as followed (Yu et al., 2014):

$$R = a_0 + a_1 * EDU + a_2 * RD + a_3 * Royalty + a_4 * D/M + a_5 * B/P + a_6 * Labor + a_7 * Ln(ME) + a_8 * Working + a_9 * Fixed + \varepsilon$$

Where:

Dependent Variable

RET is considered as the real rate of stock return on the end of year t over year t-1.

$$RET = \frac{(1-a)P_{it} - a(1000) + (1+a)D_{it}}{P_{it-1} + a(1000)}$$

That

P_{it} is stock price in end of year t.

P_{it-1} is stock price in end of year t-1.

D_{it} is dividend per share.

a is percent of bonus share (Face value per share is 1,000 Rials in Iran).

Independent Variables

RD is considered as the independent variable that represents the ratio of research and development to net sales at end of the year t.

Royalty as an independent variable presents the ratio of paying for royalty to net sale at end of the year t. It should be said the two variables RD and Royalty jointly are taken consideration to assess research hypothesis.

Control Variables

EDU is considered as the control variable represent personnel number percentage of high educational certification to total personnel. D/M as a research control variable represents the book value of long-term debts over the year t to market value of stockholder's labors on the end of the year t+1

Ln(ME) as a research control variable represents natural logarithm of market value of stockholders' labor on the end of month July, year t+1

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B/P as a research control variable represents book value on year t to market value of stockholders' wages on the end of year t+1.

Labor as a research control variable represents the ratio of wage cost to net sale on year t.

Working as a research control variable represents the ratio of company's flow capital on the end of year t.

"Fixed" as a research control variable represents the ratio of company's fixed asset on the end of year t.

Model Estimation and Analysis

Descriptive Statistics

Descriptive statistics of dependent and independent variables by using the data of 65 companies over test term (2008-14) is measured includes of average, mean, standard deviation, minimum, maximum which are presented on table 1.

Table 1: Descriptive statistics of research variables

	Variable description	Average	Mean	standard deviation	Minimum	Maximum
RET	Real rate of stock return	0.1434	0.1465	0.0562	0.0448	0.0448
EDU	Personnel number of high educational certificate	0.2470	0.2307	0.1079	0.0507	0.0507
RD	research & development	0.1535	0.1453	0.0769	0.0249	0.0249
Royalty	Ratio of paying for royalty to net sale	0.5039	0.5029	0.1712	0.2009	0.2009
D/M	Book value of long-term debts divided to market value of stockholders' equity	0.3064	0.3071	0.1408	0.0657	0.0657
B/P	Book value divided to market value of stockholder	0.4924	0.4927	0.1931	0.1461	0.1461
Labor	Labor cost ratio to net sale	0.5039	0.5110	0.0968	0.3343	0.3343
Working	Working capital ratio	0.4992	0.5006	0.0977	0.3344	0.3344
Ln (Me)	Logarithm of market value of stockholders' equity	22.992	23.181	1.226	12.854	12.854
Fixed	Flow ratio of fixed asset	0.4558	0.4565	0.0512	0.3679	0.3679

Testing of Research Hypothesis

Before considering regression models, first it is necessary to test linear regression hypothesis. Results of Kolmogorov Smirnov are denoted the normality of dependent variable distribution, Durbin Watson's test denotes independence of errors and test VIF is denoted non-exist convergence between independent variables.

After testing the regression hypothesis and make sure to support them, the results from regression equation for first and second hypothesis are presented on table (2). The value of statistic F in the model is denoted on signification of total regression model.

As it is seen on below of table (2), determination coefficient and adjusted determination coefficient of above model are 49.1% and 44.7% respectively.

So, it could be concluded that in regression equation, only about 44.7% of expected returns on under-measured companies is provided by independent and control variables. On these tables, positive (negative) numbers in coefficient value presents direct (reverse) effect of every variable on companies' share price.

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Table 2: Results of regression equation model

Variable name	Variable coefficient	Coefficient value	Statistic t	Significance level	
Fixed number	α_0	-0.651	-0.223	0.823	
EDU	Personnel number of high educational certificate	α_1	0.409	2.451	0.044
RD	research & development	α_2	0.922	3.711	0.001
Royalty	Ratio of paying for royalty to net sale	α_3	0.334	3.073	0.013
D/M	Book value of long-term debts divided to market value of stockholders' equity	α_4	0.381	3.838	0.0017
B/P	Book value divided to market value of stockholder	α_5	-0.539	-2.388	0.041
Labor	Labor cost ratio to net sale	α_6	0.753	2.141	0.048
Working	Working capital ratio	α_7	0.894	2.601	0.031
Ln (ME)	Logarithm of market value of stockholders' equity	α_8	-0.280	-0.230	0.021
Fixed	Flow ratio of fixed asset	α_9	0.711	-0.671	0.036
Determination coefficient	0.491	Statistic F	Statistic F	11.643	
Adjusted determination coefficient	0.447	Significance (p-value)	Significance (p-value)	0.006	
		Durbin Watson's statistic	Durbin Watson's statistic	2.018	

Test: according to table (2), significance level (sig) of all variables is considered lower than significance level on present study (5%). Also, numerical value of statistic t respective to these variables is greater than statistic t from table by same degree of freedom. Therefore, on certain level 95%, coefficient obtained for above variable on regression model is significant.

Empirical Results

“There is a significant association between innovation capital and expected return on the companies listed in Tehran stock exchange.”

According to table (2) significance level (sig) of variables RD (research & development) and Royalty (the ratio of paying for royalty to net sale) is considered lower than significance level on present study (5%). Also, the numerical value of statistic t respective to these variables is greater than the statistic obtained from table with the same degree of freedom. However, hypothesis H_0 is rejected at the certain level 95% and hypothesis H_1 is based on there is a significant association between innovation capital and expected return on Tehran stock exchange listed companies, is verified.

Conclusion

The purpose of present study is the relationship between innovation capital and the expected Return on the companies listed in Tehran stock exchange. It has been conducted for the period is six years that

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associated by 390 observation-company. The obtained results from testing the hypothesis are denoted that the innovation capital have a feature “value association” with expected return on the companies listed in Tehran stock exchange.

The results from some other previous researches also state the strong association between innovation capital and expected return. However, the results of present study are along with the results from Yu *et al.*, (2014), Lee *et al.*, (2014), Costlow and Vitenberg (2011), Gesh and Moon (2010), Rezaei (1389) and Ghalibaf and Izadi (1388). According to the findings of the study, it is suggested to practitioners of capital market, deciders, financial analyzers and potential investors on Tehran stock exchange to take special consideration to analyze investment plans on financial asset and human capital and innovation mentioned here, since considering the factors tends to select investment package with maximum and minimum risk and maximum efficiency. In addition, it can make dual the clearness of decision context.

Research Limitations

There are some limitations for researcher during process that this study doesn't exclude it. Main limitations for present study should be considered in interpreting and generating research findings, are as followed:

- 1) In this study, we faced to some limitations in relation to sample selecting including not changing fiscal year, availability of needed information for variables and etc. Surely, using more courses and participations would be helpful for research validity and fluency.
- 2) One of the study limitations is not-using regressions on company level (time regression) due to shortness of time serial on every company. Therefore, it is recommended to conduct the study by using time serial regression on every company level by accessing to necessary information for conducting similar study.
- 3) Considering time area, present study (2008-14) by addition that the sample companies necessarily aren't representative all active business units in country by size, organizational structure, kind of products and kind of industry, however generating must be associated by caution.
- 4) The Tehran stock exchange firm is a small example of Iranian firms. However it is not possible to generate above study to all Iranian firms.
- 5) The study data is extracted from Tehran stock exchange that inefficiency of it makes encounter the research results to limitation (Saeedi *et al.*, 2014).

Future Study Recommendation

It is recommended subjects for future study as followed:

- 1) Studying the effect of possession on companies' expected return.
- 2) Studying the effect of control and manage of interest on companies' expected return
- 3) Studying the effect of factors such as industry type and economy circumstances on companies' expected return.
- 4) Studying the effect of financial report quality on companies' expected return.

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