

# Assessment of The Linear Relationship Between Intellectual Capital and Indexes Including Profitability, Growth and Revenue of Production Companies Recognized By Tehran Stock Exchange Market

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## Abstract:

*The importance of intellectual capital has increased together with the development of societies from industrial era to information era. However, identification and determination of the value of intangible assets has always been a problem and that is exactly why it is not principally reported by most of the companies. Hence, the current study tries to describe the situation of these key assets in the production companies recognized by Tehran Stock Exchange Market from 2003 to 2009 using a highly-applied and authentic model to assess intellectual capital as presented by Pulic (2000) and subsequently to determine its relationship with the profitability indexes including revenue of assets, changes of profit, proportion of each dividend as well as growth of company's value and the revenue of the*

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shares of the mentioned companies. The research method is of applied type as far as the addressee using it is concerned and is descriptive-correlative as far as its objective is concerned. It is also of quantitative type as far as the method of collecting and analyzing data is concerned. In order to analyze the data and test the hypotheses, combined data regression models and EViews.7 software were used. The findings of the research showed that the investments of production companies in intellectual capital have a direct and positive relationship with the increase of profitability, revenue of assets, profit changes, each dividend and the revenue of the company's shares and it also increases the company's revenues. Also investment in intellectual capital could not have a significant effect on the growth of the company's value. The study could play a role in the decision-makings regarding management of valuable intellectual capitals of the company by informing the production companies under study of the efficiency level of their intellectual capital.

**Keyword:** *Intellectual Capital, Intangible Assets, Profitability, Financial Performance, Tehran Stock Exchange Market.*

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## 1. Introduction

The importance of 'intellectual capital' has increased together with the development of societies from industrial era to information era. This importance could have emanated from factors such as revolution of information technology, increasing importance of knowledge and knowledge-centered economy and the impact of innovation and creativity as the determining factors of competition. During industrial era, the price of properties, machineries, equipment and raw materials were considered as the efficient elements of the commercial unit; however use of intellectual capital determines the success or failure of the commercial unit in the era of information. Despite the importance of tangible assets in production of goods and services, the value of economy and wealth often comes from creating and using intellectual capital and not management of tangible assets by the new economy. Intellectual capitals manage to increase a company's profitability and at the same time to assist the companies to create new goods and services as well as modern commercial processes and organizational shapes. However identification and determination of the value of these assets is a problem that has been going on and that is exactly why it has not been principally reported by most of the companies. This issue has made the recent assets still invisible for the groups outside the economic firm and it has not even been recognizable for the staff working within the organization; whereas the measurement of the intellectual capital is necessary to compare different companies, to determine their actual value and even to improve the controlling methods. Also measurement

of performance enjoying the approach of intellectual capital in the companies result in improvement of the users' decision-making quality, improvement of internal management, improvement of reporting out and improvement of the accounting performance. Hence, the current study tries to use the highly applied and authentic Pulic model, 2000 to measure the intellectual capital. We start with defining the situation of this key capital in the production companies recognized by Tehran Stock Exchange Co. And subsequently determine its relationship with the profitability indexes including revenue of assets, changes of profit, each dividend, the growth of the company's value and the revenue of the shares of the mentioned companies.

## **2. Theoretical framework of the research**

The study reviews the literature of the study and the research background here.

### **2.1. Intellectual capital**

We have to understand the correct meaning of intellectual capital before identifying, managing and measuring it. The meaning of intellectual capital has always been ambiguous and there have been many definitions used to interpret it. Many are inclined to use expressions such as assets, performance sources or stimulus instead of using the word 'capital' and replace the word 'intellectual' by words such as intangible, knowledge based or non-financial. Some professions have presented cost accounting and legal professions as well as completely different definitions such as non-financial fixed assets that have no actual representation and physical existence. According to what was said, some of these definitions will be provided briefly as follows: Intellectual capital consists of all the processes and assets that are not usually and traditionally shown in the balance sheets. It also consists of the group of intangible assets including trade brands, marks and patents taken into account by modern accounting. Intellectual capital is the difference between a company's market value and the cost of substituting its assets.

Intellectual capital is defined as a set of knowledge assets that are owned by an organization that improve its competitive status by attaching value to the key beneficiaries of the organization. Intellectual capital is a property that measures the ability of an organization to create wealth. This property has no actual or physical representation and is an intangible asset that was earned through using assets involved in human resources, organizational performance and relations outside the organization. The word 'intellectual capital' refers to non-physical resources, added value of the company, human capital, skill, experience, training, customer's communicative

capital, relationship of shareholders, trade marks, agreements and structural capital of organizational culture, work environment, systems and non-materialistic rights.

Generally speaking, the experts of intellectual capital area agree that intellectual capital consists of three elements, i.e., human capital, structural capital and relative capital (figure 1).

#### **2.1.1. Human capital**

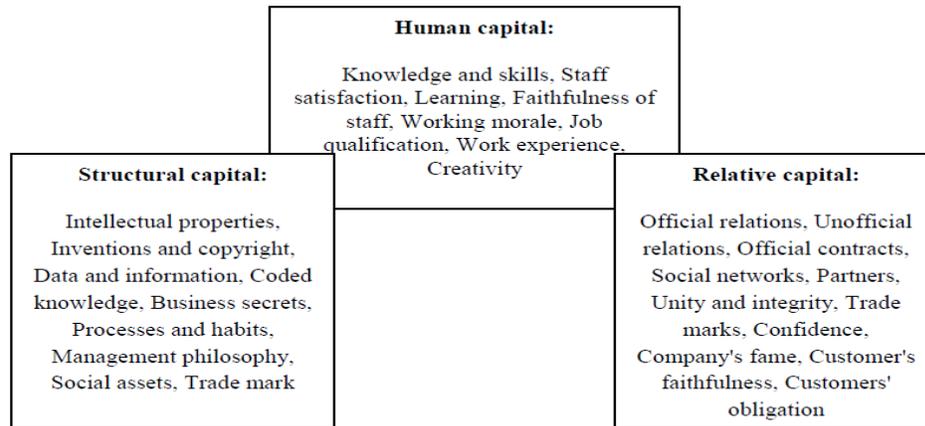
Human capital is the most important type of knowledge or intellectual capitals in an organization. Human capital represents the knowledge reserve of an organization which is manifested by the staff of that organization. It has also been defined as the collective ability of an organization to extract the best solutions out of the individuals' knowledge. The most important elements comprising the human capital of an organization are the set of skills of the work force and the depth and size of their experience. Human workforce could be the spirit of intellectual capital resources. This capital leaves the company at the end of the working day when the staff depart, but the structural and relative capital stay unchanged even when the staff leave the organization.

#### **2.1.2. Relative capital**

Relative or customer-based assets are the set of assets that forms and manages the company's relationship with its environment and consists of the relationship between the company and customers, shareholders, producers, competitors, institutions, government and society. Also relative capital consists of brands and indications of the customers' faithfulness, the company's fame, customer's feedback systems, etc. Relative asset is a bridge to organize the operation of the intellectual assets and is a determining factor to turn intellectual capital to the market value.

#### **2.1.3. Structural capital**

Structural capital consist of the entire inhuman knowledge reserves in an organization which activate the creativity of an organization. The company's mission, perspective, principal values and strategies, working systems and internal processes could be enumerated among these assets. Structural capital should not be mistaken with items such as computer systems and equipment, but they comprise the company's ability to use these tools to achieve profitability.



**Figure 1: Different Intellectual Capitals of the Organization**

## 2.2. Measurement of Intellectual Capital

In this study in order to measure the intellectual capital of the sample companies, the approach based on revenue of assets and added value model of intellectual capital were used. The value added intellectual coefficient was introduced by Anet Pulic as an analytical means to measure the company's performance which is capable to measure and demonstrate the intellectual capital efficiency in a company. One of the other important minor concepts that is derived from value added intellectual coefficient is the intellectual capital efficiency of the organization. In practice the intellectual capital efficiency coefficient shows the degree of value added efficiency out of using all organizational resources of physical and financial assets. The better the existing resources in a company are used, the higher the value added efficiency of a company will be. This method is based on using two utilized capital resources and the intellectual capital. Both recent resources have a very significant role in increasing the value of a company and the spent costs on them are considered as investment. The used capital consists of shareholders' equities, total debts and total modified registrations of profit. On the other hand, intellectual capital in this method consists of two groups of human and structural capital. The above model has five stages as follows:

1. First stage: To determine the added value:

$$(1) \quad VA = OP + C + D + A$$

VA: Company's added value

OP: Operational profit  
C: Costs of Staff salary and wages  
D: Amortization  
A: Amortization of intangible assets

2. Second stage: To determine the efficiency of the used capital

In this model in order to present the full image of efficiency of the resources creating value, it is necessary to take efficiency of the physical assets as well as financial assets into consideration. This efficiency comes from the following relation:

$$(2) \quad CEE = VA/CE$$

CEE: Capital Employed Efficiency

CE: Capital Employed which is equal to total book value of company's assets less its intangible assets.

3. Third stage: To determine the efficiency of human capital

$$(3) \quad HCE = VA/HC$$

HCE: Human Capital Efficiency

HC: Human capital which is equal to company's total salary and wages costs

4. Fourth stage: To determine the efficiency of structural capital

$$(4) \quad SC = VA - HC$$

SC: Structural Capital

$$(5) \quad SCE = SC/VA$$

SCE: Structural Capital Efficiency

The intellectual capital efficiency could now be calculated according to the following formula:

$$(6) \quad ICE = HCE + SCE$$

ICE: Intellectual Capital Efficiency

5. Fifth stage: To determine value added intellectual coefficient

The last stage is to calculate the value added intellectual coefficient which is as follows:

$$(7) \quad VAIC = ICE + CEE = HCE + SCE + CEE$$

VAIC: Value Added Intellectual Coefficient shows the efficiency to create the company's intellectual value or ability. The more this coefficient is, the better the management has used the potential ability of the company.

### **2.3. Productivity and financial performance coefficients**

There are several criteria to assess the productivity and performance of the company. The two traditional and modern groups could be named in a classification. Traditional criteria consist of net profit or revenue of properties and shareholder's equities before applying interests or taxes to them. Among modern criteria, economic added value and Tubins Q could be named. In this section some of the assessment criteria of financial performance and profitability as dependent variables in the study are defined.

#### **2.3.1. Equity Profit Share (EPS)**

Ordinary shares are a type of financial capital that shows the company's ownership. In fact one who purchases the ordinary shares of a company, gains ownership right in that company and shares the incomes and profits of that company and if there is any loss, the holder of the ordinary shares will lose. Companies often use ordinary shares at international level for financing purposes. Most of the transactions are performed on the financial capital in Iran's stock exchange market which is considered a major source to finance under the current circumstances. Each dividend is the result of dividing net profit owned by the ordinary shareholders by the number of ordinary shares.

#### **2.3.2. Revenue of Assets (ROA)**

Revenue of assets is one of the different financial formulas which are usually used by the financial analysts and or other users of them in order to analyze the companies' financial situation and profitability of the commercial firms. This index is the result of net profit over total earned assets and shows the percentage out of the total assets that the company has managed to create revenues.

#### **2.3.3. Changes of Net Profit ( $\Delta NI$ )**

Changes of net profit are equal to net profit at the end of the cycle minus net profit in the beginning of the cycle over net profit in the beginning of the cycle. It goes without saying that the more this ratio, the more the company's profitability in that year will be.

#### **2.3.4. Growth of the Company's Value (TQ)**

The ratio of TQ is one of the most famous performance assessment criteria which is the result of dividing the value of the company's market by the book value of the company's capitals. If the TUBINS Q index calculated for the company in the market is larger than one, there is more tendency to invest. In other words, a high TUBINS Q ratio is usually a valuable sign of

opportunities for the company's growth. If this ratio is smaller than one, investment will stop. If the Company uses all the investment opportunities, the final TUBINS Q value will move toward one.

### **2.3.5. Real Revenue of the Shares (RR)**

The real revenue of the shares is an old concept. When maintaining shares for one year, the interests consist of cash dividends that were paid during the year plus any changes to the market and or investment interests at the end of the year. To calculate it, historical data were used and we are sure about it to have been realized, while locating the anticipated revenue is a difficult task because we deal with the future and the future is uncertain.

### **2.3.6. Abnormal Revenue of the Shares (AR)**

Abnormal revenue is the additional revenue over anticipated revenue by the investors in comparison with the actually materialized revenue during a certain period of time.

## **2.4. Research Background**

Research started regarding the general aspects of the intellectual capital in 1990s. It was mainly about the growing awareness of the scientists and users of the existence and value of intangible assets in organizations as well as development of models to classify intellectual capital. But today, despite the development of this concept, several qualitative and quantitative studies were conducted and some of the conducted studies before and after the current study are referred to as follows:

**Table 1: Research background**

Researcher/s	Year	Results
Chin Chen et al	2005	Higher intellectual capital (on the basis of Pulic's Measurement Model) of the companies results in improvement of financial performance and increase of value of the shares market of Taiwan Stock Exchange Companies.
Bannany	2006	Investment in IT systems in banks has significant and negative relationship with the performance of intellectual capital. On the other hand, risk, effectiveness and personnel costs show a positive and significant relationship with it.
Yalama	2007	Value Added Intellectual Coefficient over profitability of banking institutions has 61.3% average effect on Turkey's Istanbul stock exchange market.
Appuhami	2007	There is a significant relationship between companies' intellectual capital and increase of their shares price in Thailand stock exchange market.
Pew Tan et a	2007	There is a positive relationship between intellectual capital and financial performance indexes (each dividend, revenue rate of stockholders' equities and annual revenue rate) in Singapore stock exchange market. There is also a significant difference between intellectual capital coefficients in different industries.
Kamath	2008	Human capital had a major effect on profitability, productivity and value of pharmaceutical companies in India among elements of intellectual capital.
Fernandez	2002	The amount of intellectual capitals has direct relationship with productivity.
Mousavi et al	2012	There is only a significant relationship between human capital efficiency and rate of capital return (ROE) among indexes of financial performance of the sample companies in Tehran stock exchange market.
Namazi and Ebrahimi	2009	There is a positive and significant relationship between intellectual capital and current financial performance and future of the recognized companies by Tehran stock exchange market regardless of the company's size, the debt structure and financial performance of the past both at the level of all companies and at the level of industries.
Madhooshi, Asgharnejad Amiri	2009	There is a positive and significant relationship between intellectual capital and financial revenue, intellectual capital and future financial revenue, rate of growth of intellectual capital and rate of growth of future financial revenue of the investment companies in Tehran stock exchange market.
Hemmati, Moeineddin and Mozafari	2010	There is a significant relationship between intellectual capitals and value of market and financial performance of non-financial companies.

### 3. Research Hypotheses

H1: There is a significant relationship between intellectual capital and revenue of assets.

H2: There is a significant relationship between intellectual capital and changes of net profit.

H3: There is a significant relationship between intellectual capital and each dividend.

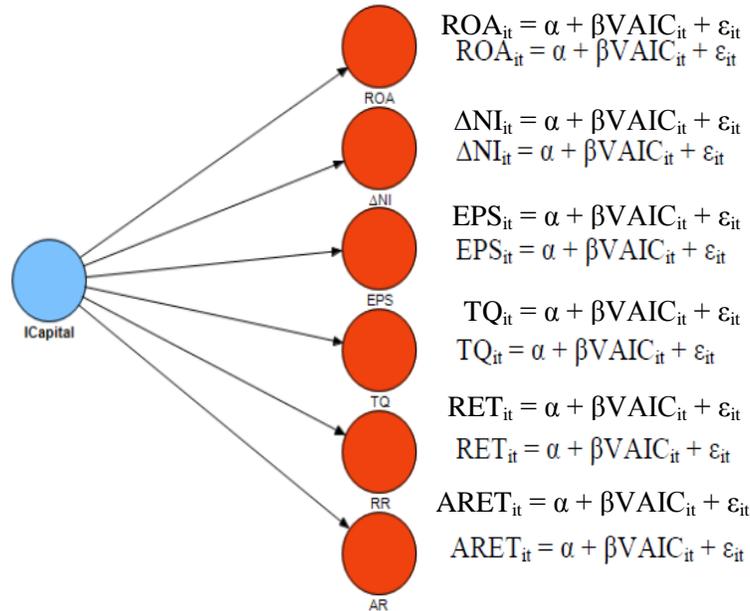
H4: There is a significant relationship between intellectual capital and growth of the company's value.

H5: There is a significant relationship between intellectual capital and actual revenue of the shares.

H6: There is a significant relationship between intellectual capital and abnormal revenue of the shares.

#### 4. Conceptual and Operational Models of Research

In this study, the following model was accepted and assessed in order to test the relationship between intellectual capital and indexes of profitability, growth, revenues of the recognized production companies by Tehran Stock Exchange Market (Figure 2).



**Figure 2: Conceptual and Operational Models of Research**

#### 5. Research Methodology

The current study is of applied type as far as the addressees are concerned and is of descriptive-correlative type as far as the objective is concerned. Also it is of quantitative type as far as the method of data collection and analysis is concerned. It is longitudinal from timing aspects and was conducted using the former statistics. The statistical group of this research is the companies recognized by Tehran Stock Exchange Market that were active members of the market between 2003 and 2009. There were 457 companies and 2334 year/companies. In order to determine the final statistical sample, the systematic elimination method was used and the following conditions were implemented. 1. The companies whose end of fiscal year was not 19 or 20 March were deleted. There were 103 companies and 388 year/companies. 2. Banks, financial institutions and financial investment companies were set aside due to their different

nature of activity from other commercial firms. There were 13 companies and 64 year/companies. 3. At the end of Perth's observations, the first 100 and the 99<sup>th</sup> hundred of the entire observations were deleted. There was 38 year-companies. 4. Implementing the above conditions, 341 production companies equal to 1844 year/companies were selected to estimate the models and test the research hypotheses. The required data and information by the research were collected using the website of Stock Exchange Market as well as Tadbir Pardaz software directly from Tehran Stock Exchange Market and the financial statements of the mentioned companies were collected. Data analysis was conducted according to economic measurement of the combined data using EViews.7 software.

## 6. Research Finding

Further understanding of the research variables, average, criteria deviation and correlation coefficients among hidden structure of intellectual capital and profitability and financial performance indexes were studied in this part of the paper. According to the given results in table 2, the added value of intellectual capital and the variables of revenue of properties (16/0) correspond with the dividend (15/0) at 1% level and the revenue of shares variable (08/0) at 5% level.

**Table 2: Pearson's average, deviation of criteria and correlation coefficients among research variables**

Variable	Mean	S.D.	1	2	3	4	5	6	7
1 Added value of intellectual capital	0.05	0.13	1						
2 Revenue of Assets	0.13	0.10	0.16 <sup>***</sup>	1					
3 Percentage of changes of net profit	0.28	1.55	-0.01	0.11 <sup>***</sup>	1				
4 Dividend of each share	899.44	866.43	0.15 <sup>***</sup>	0.69 <sup>***</sup>	0.12 <sup>***</sup>	1			
5 TUBINS Q performance criteria	1.53	0.90	0.03	0.57 <sup>***</sup>	0.06 <sup>*</sup>	0.42 <sup>***</sup>	1		
6 Revenue of Company's Shares	0.27	0.66	0.08 <sup>**</sup>	0.18 <sup>***</sup>	0.17 <sup>***</sup>	0.18 <sup>***</sup>	0.21 <sup>***</sup>	1	
7 Unusual Revenue of shares	0.18	0.28	0.02	0.02	0.09 <sup>**</sup>	0.02	0.14 <sup>***</sup>	0.38 <sup>***</sup>	1

<sup>\*</sup> Correlation is significant at 0.01 level.

<sup>\*\*</sup> Correlation is significant at 0.05 level.

<sup>\*\*\*</sup> Correlation is significant at 0.1 level.

Subsequently the research hypotheses were studied according to the approach of the combined data and using EViews.7 software. The estimated results of each model have been presented as follows. Table 3 containing the results of data analysis shows that the investment of the production companies under study on intellectual capital has direct and positive relationship with the increased revenue of assets, changes of profit, each dividend, and actual and unusual revenue of the shares and it increases the company's revenues. Also investment in intellectual capital can not put a significant effect on the growth of the company's value.

**Table 3: Results of testing the research hypotheses**

Hypothesis	Variable	Coefficient	T-student stat.	Significance
H <sub>1</sub> : Accepted	Width from origin	0.07 <sup>***</sup>	53.01	0.00
	VAIC	0.16 <sup>***</sup>	8.44	0.00
	Fisher stat. (significance):	Adjusted determination coefficient: 4.06%	F-Limier Stat. (significance): 0.79 (0.58)	Husman stat. (significance): --
	58.32 <sup>***</sup> (00/0)			
H <sub>2</sub> : Accepted	Width from origin	0.11 <sup>***</sup>	9.94	0.00
	VAIC	0.37 <sup>***</sup>	3.65	0.00
	Fisher stat. (significance):	Adjusted determination coefficient: 0.88%	F-Limier Stat. (significance): 0.59 (0.74)	Husman stat. (significance): --
	12.21 <sup>***</sup> (00/0)			
H <sub>3</sub> : Accepted	Width from origin	728.59 <sup>***</sup>	55.49	0.00
	VAIC	910.46 <sup>***</sup>	6.57	0.00
	Fisher stat. (significance):	Adjusted determination coefficient: 4.50%	F-Limier Stat. (significance): 1.31 (0.25)	Husman stat. (significance): --
	53.27 <sup>***</sup> (00/0)			
H <sub>4</sub> : Rejected	Width from origin	1.59 <sup>***</sup>	75.15	0.00
	VAIC	0.18	1.09	0.27
	Fisher stat. (significance):	Adjusted determination coefficient: 7.89%	F-Limier Stat. (significance): 16.92 (0.00)	Husman stat. (significance): 18.12 <sup>***</sup> (0.00)
	17.56 <sup>***</sup> (00/0)			
H <sub>5</sub> : Accepted	Width from origin	0.23 <sup>**</sup>	2.56	0.00
	VAIC	0.58 <sup>***</sup>	3.76	0.00
	Fisher stat. (significance):	Adjusted determination coefficient: 1.17%	F-Limier Stat. (significance): 17.15 (0.00)	Husman stat. (significance): 0.00 (0.96)
	14.75 <sup>***</sup> (00/0)			
H <sub>6</sub> : Accepted	Width from origin	0.18 <sup>***</sup>	3.58	0.00
	VAIC	0.16 <sup>**</sup>	2.53	0.01
	Fisher stat. (significance):	Adjusted determination coefficient: 0.54%	F-Limier Stat. (significance): 37.60 <sup>***</sup> (00/0)	Husman stat. (significance): 0.00 (0.99)
	8.02 <sup>***</sup> (00/0)			

## 7. Discussion and Conclusion

Promotion of Economy in today's world mainly emanates from information and knowledge whose result is increased interests of intellectual capital. One of the interests of intellectual capital for researchers and users is its application as a tool to determine the value of the commercial unit. Some authors believe that since the current reporting and management systems do not have the ability to make the required information for the management of processes operational on the basis of knowledge and intangible resources, the information is increasingly losing the relevance, while the role and importance of financial investments to determine the abilities of sustainable profitability have shown remarkable reduction in comparison with intellectual capital in the current knowledge-centered societies. That is why the current study necessitates presentation of a solution to assess intellectual capital and to define its role in profitability and financial performance of the companies, particularly the production companies recognized by Stock Exchange Market as the main pole of industrial sector in Iran. Although assessment of the intellectual capital is undoubtedly accompanied by risks, failing to assess it will have a higher risk if it leads to massive loss of the relevance of Accounting. Nevertheless the following results coming from another long-term survey of observations that intellectual capital as a resource that cannot be copied and is scarce and strategic in production companies under study could have a significant effect on expansion of indexes of profitability, revenue of shares, except growth of the companies' value. The findings of the former studies also confirmed this consequence similarly according to table 1. Hence it is recommended that the officials of the governmental and private organizations adopt the measurement of this separate capital on their agenda in order to understand, reinforce, disclose and manage it. Disclosure of intellectual capital means to create an image of the company's attempts in line with progress, development, reinforcement of resources and qualifications relevant to the staff, customers, technology and processes, and since organizational qualifications are achieved on the basis of intellectual capitals, any improvement in these qualifications depend on effective management of the intellectual capital and or knowledge management whose result will be improving transaction performance and creating values.

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