

Research article

The Influence of Intellectual Capital on the Improvement of Companies' Financial Performance

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Abstract

Nowadays, the level of knowledge and intelligence can determine a factory's popularity and also financial and competitive position in a market; therefore, this issue is of great importance among managers. Traditional accounting methods are not able to report this issue thoroughly. Consequently, scholars, who investigate managerial and financial backgrounds, have suggested some models which can be applied to measure intellectual capital of an organization. The present study examines the influence of intellectual capital on the improvement of listed companies' financial performance on Tehran stock exchange. Chosen companies in this article were active in two fields of automotive manufacturing industry and needed instruments, and drug manufacturing industry and needed raw materials in a four-year-period from 2007 to 2010. Two models were utilized for intellectual capital measurement which are VIC model (value of IC) and Pulic model. The current research indicates that there is positive significant association between each component of intellectual capital which is consisting of physical, human and structural capital and various indexes of financial performance. Moreover, there is a positive significant relationship between intellectual capital value and indexes of financial performance in the chosen companies. **Copyright © IJEBF, all rights reserved.**

Keywords: intellectual capital, structural capital, human capital, physical capital, financial performance.

Introduction

The industrial revolution which began in mid18th century in the UK was a transition to new manufacturing processes that caused mass production. Those factories that got access to advanced industrial machinery and adequate asset could be in the vanguard of business and market. But in the 21th century, economic success is dependent upon knowledge, innovation and creativity in making new products. The instruments of innovativeness and creativity are derived from the employees' knowledge and thoughts. The traditional financial report worksheets could not suitably measure its cost efficiency. In fact, financial worksheets measure short-term and tangible assets which are not sufficient to recognize the real value of a company. Therefore, the companies have recently paid more attention to the intellectual capital which refers to the hidden and intangible resources of an organization that cannot fully captured by traditional accounting reports (Young et al., 2006).

Roos et al. (1997) assessed intellectual capital from two perspectives, inside and outside firms. The former aims to the better allocation of given resources, efficiency increase and organization's costs decrease, and the latter purposes to provide needed information about actual or potential investments of the organization to be able to predict the future developments and have a long-term plan. All organizational aspects should be assessed to achieve a comprehensive image of operational performance and organizational values estimation. Common approaches of measurement which are based on accounting cannot be solely capable of obtaining both aforementioned goals.

Considering the mentioned issues, this conclusion can be drawn that appraising intellectual capital and its effects is of considerable importance; therefore, the current study intends to measure intellectual capital and its components

(human capital, structural capital and physical capital) through applying VIC and Pulic models. Furthermore, the influence of these components on the improvement of companies' performance was investigated. So, the following questions can be asked in this research: Does intellectual capital affect the improvement of listed companies' performance on Tehran stock exchange? If this question can be positively answered, the second question is that how it affects. It is hoped that the findings of this research can be helpful to expand researchers' knowledge in the field of investment and capital market.

Theoretical background

Intellectual capital

Economic development and competitive authority are derived from knowledge (Fatres & Beygi, 2009). Accordingly, organizations depend more on knowledge and information. According to Seetharaman et al. (2002) a shift has been occurred from an industrial to a knowledge-based economy. In 1925, tangible assets outnumbered the intangible assets by a proportion of 30 to 70, but in 1990, it was considerably changed to 63 to 37. So, in a knowledge-based economy, the drives of competitive advantage and organization's consistency are knowledge resources such as creation, storage, dissemination, and application of knowledge assets (Seetharaman et al., 2002).

It can be alleged that intellectual capital is a packaged useful knowledge. This package is consisting of different components such as organization's processes, technologies, patents, employees' skills, and information about customers, suppliers, and stakeholders (Stewart, 1997). There are many arguments against defining the term 'intellectual capital' since its interdisciplinary nature involving mostly the disciplines of management, economics, accounting, and law (Marr & Chatzkel, 2004). According to Al-Ali (2003), the term 'intellectual capital' triggers various images of economic value, liquidity, money, money making potential and investment potential.

From a managerial viewpoint, intellectual capital contains human capital and structural capital like knowledge, applied experience, organizational technology, specialized professions and relationships which prove the organization's stability through creating competitive advantage (Edvinsson & Malone, 1997). From an accounting perspective, intellectual capital can be inferred as the difference between book value and market value of firms (Brooking, 1997).

By and large, intellectual capital refers to the sum of structural and organizational capital. Human capital is consisting of applied experiences, organizational technology, relations with customers and professional which stabilize an organization through making competitive advantage in the market (Edvinsson & Malone, 1997).

a) Human capital

The essence of human capital is the sheer intelligence of the organizational members (Bontis, 1998). According to Chen et al. (2004) human capital is an organization's combined human capacity which can find the best solutions for business problems from the knowledge of its individuals. It refers to such factors as employees' knowledge, skill,

capacity, and attitudes in relation to fostering performances which customers are willing to pay for and the company's profit comes from. Brooking (1997) states that an organization's human asset contains skills, expertises, problem-solving abilities and leading strategies. High staff turnover can be an indication of losing human capital in an organization. Human capital can make organizations be highly dependent upon employees' knowledge and expertise to have more income, development, efficiency and profitability (Westphalen, 1999).

Employees can get human capital through their competence, attitude and intellectual agility (Roos et al., 1997). Black and Lynch (1996) found that 10% increase in the level of staffs' education can enhance efficiency about 9% in productive firms, and 13% in non-productive firms. Moreover, improving the level of employees' knowledge can increase their creativity, efficiency, and the customers' profitability, satisfactory and loyalty (Bontis, 2001). The staffs who apply their knowledge in the firm can provide competitive edge, and as a result, the organizations promote their salary. Teamwork can develop organizational performance through enhancing their innovativeness and creativity to present applicable ideas and learning capacity at work. For instance, teamwork is one of the important mechanisms for collective learning and knowledge exchange among team members (Seleim et al., 2004).

b) Structural capital

Structural capital refers to the non-human storehouses of knowledge such as databases, data resources, organizational routines, institutions and methods, instructions and rules, form and content of the processes, organizational strategies, and operational programs (Roos et al., 1997). Structural capital is consisting of the existing knowledge in information technology, patents, plans and trademarks (Stewart, 1997).

Chen et al. (2004) believe that structural capital deals with the system and structure of an enterprise. It is a business routine. An enterprise with strong structural capital will create favourable conditions to utilize human capital and allow human capital to realize its fullest potential. Structural capital can be owned by an organization and it even exists when the employees go home (Bartsh & ..., 2005). An appropriate structural capital is able to provide a suitable environment to share knowledge, improve collectively, decrease the time of expecting, and increase staffs' efficiency (Edvinsson & Malone, 1997).

c) Relational capital (customer)

Knowledge of marketing channels and customer relationships is the main theme of customer (relational) capital (Bontis, 1998). Relational capital reflects the ability of the firm to interact positively with business community members in order to stimulate potential for wealth creation. It includes all knowledge assets accumulated by the firm from its relationships with customers (Bontis et al., 2004). Although originally conceptualized by Hubert Saint-Onge, more recent definitions have broadened the category to include relational capital which in effect encompasses the knowledge embedded in all the relationships an organization develops whether it be from customers, competitors, suppliers, trade associations or government (Bontis, 1998). Relational capital is mainly concerned with an organization's potential ability due to external intangible factors (Stewart, 1997). According to Chen et al. (2004)

it can be classified into basic marketing capacity, market intensity and customer's loyalty. Customer capital acts as a bridge and a catalyst on the operations of intellectual capital. It is the main requirement and determinant in converting intellectual capital into market value and thereupon organization business performance.

Financial performance

Financial performance is a criterion which can determine how a firm uses different components of intellectual capital and earns money. It can be considered as an index for firm's health in a specific period of time; it can be also utilized to evaluate the firm in an industry or compare it with other industries and economic sections (Marian, 2011). Many researches have been conducted to achieve an appropriate criterion to assess firms and managers' performances in order to be confident that the firms and actual investors' benefits are in the same direction. This criterion can be also helpful to obtain a basis for making economic decisions by potential investors and creditors. Based on these researches, four perspectives were suggested which can be named as follows: accounting, economic, combined, and finance management perspectives (Azarbaijani, 2011). But, one of the shortages of traditional measurement systems is their disability to measure and evaluate firms' intellectual capital, especially in knowledge-based companies (Anderson, 2004). In knowledge-based economies, which have emerged recently, the index of intellectual capital is more dominant than financial capital to determine the capability of profitability and financial return; therefore, assessing and considering the real value of intangible assets based on intellectual capital is of great importance (Bontis et al., 2000).

Review of literature

The first empirical study related to intellectual capital measurement was conducted in the middle of 1980s by a Swedish association. From then on, lots of studies were done intra-countries (Olson, 2001; Brenan, 2001; Abeysekera & James, 2005; Garcia & Martinez, 2007; Marian, 2011) or inter-countries (Subbarao & Zeghal, 1997).

Baum and Silverman (2004) examined whether venture capital firms' (VCs) emphasizing picking winners or building them by comparing the effects of start-ups' alliance, intellectual and human capital characteristics on VCs decisions to finance them with the effects of the same characteristics on future startup performance. They found a significant relationship between intellectual capital components and venture financing and performance of biotechnology start-ups in Finland.

Garcia and Martinez (2007) attempted an empirical research in which they assessed the use of intellectual capital information in investment decisions in Spanish firms.

Cabrita and Bontis (2008) appraised the intellectual capital and business performance in the Portuguese banking industry and found that human capital is directly effective in other components of intellectual capital, but indirectly effective in business performance. Human capital influences relational capital not only directly but also indirectly through the structural capital.

Marian (2011) studied the influence of intellectual capital on Romanian companies' financial performance. Marian's research proved that intellectual capital and companies' financial performance are positively related.

Salman et al. (2012) investigated the impact of intellectual capital on return on assets in Nigerian manufacturing companies. Their results show that a relationship exists between intellectual capital components efficiencies and company performance. Furthermore, human capital influences productivity performance of the sample companies more than structural and physical capital.

Anvari Rostami (2003) did a research and evaluated different methods and models of measuring intellectual capital. Findings of another research by Anvari Rostami et al. (2005) indicate that intellectual capital is highly correlated with stock market values.

Ghalichli et al. (2008) conducted a research and found that human and structural capitals improve competitive advantage in two automotive firms of Iranian market, but such an effect was not proved about relational capital. Findings of this study demonstrate that intellectual capital components of these two firms can be prioritized as follows: human capital, structural capital and relational capital.

Madhoushi and Asgharzadeh Amiri's (2009) study showed that in Tehran stock exchange, there is positive significant association between intellectual capital and return on investments; intellectual capital and future return on investment; growth rate of intellectual capital and growth rate of future return on investment.

Research methodology

The present study is an applied, quasi-experimental, and ex-post facto research. In an ex-post facto research, authors do not have direct control of independent variables since they have already occurred (Namazi, 2000).

Theoretical background of the research was obtained through valid English or Persian magazines and books. Quantitative data was also collected by referring to the financial statements of listed companies on Tehran stock exchange, Tadbirpardaz software program, and other databases related to Tehran stock exchange.

Research hypotheses

Considering the research review of literature and aims, the following hypotheses are suggested:

1. There is a relationship between physical capital efficiency and indexes of financial performance.
2. There is a relationship between human capital efficiency and indexes of financial performance.
3. There is a relationship between structural capital efficiency and indexes of financial performance.
4. There is a relationship between intellectual capital value and indexes of financial performance.

Target population

This article aims to investigate the industries in which knowledge and technology are of considerable importance. So, Chosen companies in this study were active in two fields of automotive manufacturing industry and needed instruments, and drug manufacturing industry and needed raw materials in a four-year-period. The companies which are in concordance with the following issues were regarded as target population:

- the company was listed in Tehran stock exchange before 2007 and continued its activity until the end of 2010.
- the company had earnings after tax during the 4-year-period of 2007-2010.
- the company's financial year should finish at the end of March each year.

Active companies in automotive and drug manufacturing fields were about 59, but considering the aforementioned conditions, just 41 companies were accepted as target population of the research.

Research variables

Independent variables

Two models of VIC and Pulic were applied in this research which are explained below. Due to the fact that needed data was assembled through financial statements and other accessible resources, these models were chosen.

1. VIC model (value of IC)

This model is based on the hypothesis that the firm's surplus profit, which shows that a firm's profit is more than other firms' profits in an industry, is derived from human capital. Needed data in this model was extracted from financial statements, except data related to the proportion of average rate of profit to tangible assets. This model is consisting of six phases which can be explained in the following manner (Stewart, 1997):

1. evaluating the firms' average rate of profit before tax for four previous years
2. evaluating the firms' average rate of tangible assets for four previous years
3. dividing the average rate of profit by the average rate of tangible assets to find the proportion of return on tangible assets
4. calculating the average rate of tangible assets (like number 1) for four previous years. We continue the calculation just if the proportion of return on tangible assets is more.
5. evaluating return on surplus through dividing the proportion of return on tangible assets by the average rate of tangible assets. Now, we should subtract the result from the earnings before tax and then, we should multiply the result by a negative average rate of tax for four previous years.
6. Finally, earnings after tax should be divided by an appropriate percentage which is the rate of capital charges.

The achieved finding of these six stages is VIC. This model demonstrates the firm's ability in the usage of intellectual capital to be successful more than other existing firms in the industry.

2. Public model

1. first stage: determining the added value

$$VA = OUT - IN$$

VA: the firm's added value

OUT: total income of selling products and services

IN: total cost of bought materials, parts and services

In this model, the amount of salary is not included due to the active role of human resources in the process of value making. So, the costs which are related to staffs are not considered as costs but as investments. Value added can be calculated based on the given data in annual reports and statements:

$$VA = OP + EC + D + A$$

OP: operational profit

EC: employees' costs

D: depreciation

A: expiration (depreciation of intangible assets)

2. second stage: determining the efficiency of applied capital

In this model, the efficiency of physical and financial capitals should be also considered to find the efficiency of resources which make value. This efficiency can be calculated through the following equation:

$$CEE = VA/CE$$

CEE: the efficiency of applied capital

CE: applied capital which equals with total book value of firm's assets that is subtracted from its intangible assets.

3. third stage: calculating the efficiency of human capital

Based on this model, all costs which are related to the employees are considered as investments, so the following equation is suggested:

$$HCE = VA/HC$$

HCE: human capital efficiency

HC: human capital which equals with total costs of salaries

4. fourth stage: determining the efficiency of structural capital

The efficiency of structural capital can be calculated through the following equation:

$$SC = VA - HC$$

SC: the firm's structural capital

$$SCE = SC/VA$$

SCE: the efficiency of structural capital

Now, intellectual capital can be calculated on the basis of the following equation (Pulic, 2004):

$$ICE = HCE + SCE$$

ICE: the efficiency of intellectual capital

5. fifth stage: determining the value added coefficient of intellectual capital

In the last stage, the value added coefficient of intellectual capital is calculated through the following equation (Pulic, 2000):

$$VAIC = ICE + CEE = HCE + SCE + CEE$$

VAIC: it shows the efficiency of making value or intellectual ability for the firm. The more this coefficient is, the more managers are able to use the potential ability of the firm.

It should be noticed that Pulic model considers both human and structural capitals, but it does not formally pay much attention to customer capital.

Dependent variable

Financial performance is the dependent variable of this study. The rate of return on stockholders' equity, the rate of return on assets, and earnings on each share are all used to calculate the dependent variable of financial performance. These criteria were derived from Azabajani's research, 2011).

The rate of return on stockholders' equity:

The rate of return on stockholders' equity is the most supported among other criteria of financial performance. Return on stockholders' equity indicates the amount of return by investors which were gotten through their investments. The following equation shows this rate:

$$\text{ROE} = \text{NI} / \text{Equity}$$

ROE: the rate of return on stockholders' equity

NI: net profit

Equity: book value of stockholders' equity

The proportion of return on assets:

The proportion of return on assets is another financial criterion which indicates the amount of management efficiency in applying the existing resources in order to increase the profitability. It is also beneficial in analyzing the profitable resources; it should be mentioned that it is not absolute, but it is in relation to its derived resource (Ramezani, 2008).

The proportion of return on assets can be accounted according to this equation:

$$\text{ROE} = \text{NI} / \text{Asset}$$

ROE: return on assets

Asset: book value of assets

Earnings per share (earnings on each share):

'Earnings per share' is the criterion of each firm's performance during a specific period of time. Equation of calculating earnings per share is as follows:

$$\text{EPS} = \text{NI} / \text{S}$$

EPS: earnings per share

S: the number of current stock

Controlled variable

'Financial leverage' (the proportion of all liabilities to all assets) and 'firm size' (logarithm of the assets) were considered as controlled variables to administer other probable variable which are effective in the firms' financial performances. These variables were investigated in the study which was conducted by Latif et al. (2012).

Data analysis and hypotheses test

In the present study, regarding the type of the achieved data and utilized methods of analysing, a regression model with common least squares method was applied to investigate intellectual capital and dependent variable of financial performance:

$$(ROA, EPS, ROES) = \alpha + \beta_1 VACA + \beta_2 VAHU + \beta_3 STVA + \beta_4 Lev + \beta_5 APD + \beta_6 Assets Log + \beta_7 EPS + \beta_8 ROA + \beta_9 ROSE + \varepsilon$$

Table 1: research variables

Variable	Variable definition
VACA	Coefficient of physical capital efficiency
VAHU	Coefficient of human capital efficiency
STVA	Coefficient of structural capital efficiency
Lev	Financial leverage
Assets Log	Logarithm of assets
EPS	Earnings per share
ROA	Rate of return on assets
ROSE	Rate of return on stockholders' equity
CIV	Value of intellectual capital

Research findings

Descriptive statistics:

Different indexes such as mean, median and standard deviation were used for data analysis of descriptive statistics. Table 2 demonstrates the amount of these indexes.

Table 2: descriptive statistics of research variables

Variable	Mean	Median	Minimum	Maximum	Standard deviation
Coefficient of physical capital efficiency	2.192	1.84	0.202	11.21	1.77
Coefficient of human capital	3.67	3.12	1.12	17.3	2.56

efficiency					
Coefficient of structural capital efficiency	0.65	0.68	0.06	1	0.18
Value of intellectual capital (million)	1046730	228600	5954	13721300	2767100
Financial leverage	0.62	0.65	0.103	0.97	0.15
Logarithm of assets	11.9	11.8	10.84	13.96	0.615
Earnings per share	1021	734.5	35	3737	831
Rate of return on assets	13.72	12.19	0.18	45.39	8.41
Rate of return on stockholders' equity	35	34	0.64	71.60	15.92

The amounts of physical capital efficiency's mean and median are respectively 2.192 and 1.84 which prove the fact that physical capital efficiency is less than the average level in most firms. The amount of standard deviation indicates that variation of physical capital efficiency is high among the firms. Human capital efficiency's mean and median are respectively 3.67 and 3.12 which show that human capital efficiency is less than the average level in most firms. Mean and median in structural capital efficiency are 0.65 and 0.68 and demonstrate that structural capital efficiency is higher than the average level in most firms.

Testing the first main hypothesis

H₀: There is no significant relationship between physical capital efficiency and firms' financial performance.

H₁: There is a significant relationship between physical capital efficiency and firms' financial performance.

Table 3: results of regression model between physical capital and financial performance

Dependent variable	F	Significance of F	R square	Adjusted R square	Coefficient of significance	Coefficient of D. W
Rate of return	26.483	-	0.719	0.692	0.407	1.708

on assets						
Earnings per share	4.626	0.004	0.084	0.066	0.007	1.909
Rate of return on stockholders' equity	4.41	0.005	0.083	0.064	0.001	1.634

In this hypothesis, the relationship between physical capital efficiency and indexes of financial performance was investigated and a regression equation was suggested which is as follows:

$$(ROA, EPS, ROES) = \alpha + \beta_1 VACA + \beta_2 Lev + \beta_3 Assets Log$$

At first, the general significance of regression models should be tested through the statistic F. Considering the significance levels of this test, it can be noticed that regression is generally significant. In other words, at least one of the coefficients' partial regressions of independent variable or controlled variable is not zero. Table of partial regression coefficients should be assessed to determine the amount of each variable's coefficient and its significance levels.

Regarding the tables of partial regression coefficients and significance levels of the variable 'intellectual capital' and investigating the relationship between earnings per share and rate of return on stockholders' equity, it can be concluded that the significance level of intellectual capital is less than 0.05; therefore, the first hypothesis, which is based on a significant relationship between physical capital and two variables of financial performance, is confirmed. But the significance level in assessing the relationship between physical capital and rate of return on assets is more than 0.05 which rejects the hypothesis which is in regard with the existing significant relationship between these two variables. It should be pointed out that the coefficient of determining regression models for the regression model of rate of return on assets is 0.719, earnings per share is 0.084, and rate of return on stockholders' equity is 0.083 which prove that about 72%, 8% and 8% of dependent variable's changes were occurred by independent and controlled variables. Furthermore, the coefficient of Durbin-Watson test indicates that there is no autocorrelation between independent variables. This coefficient can be appropriate when it is among 1.5 and 2.5 and the nearer it is to 2, the less the autocorrelation exists among variables. In this hypothesis, the coefficient of Durbin-Watson test is among 1.5 and 2.5 which shows there is no autocorrelation between independent variables. As it has been mentioned, physical capital efficiency has the highest association with the rate of return on assets which is about 72%. This variable does not have a significant relationship with two other indexes of performance, since they are less than 8.5%.

Testing the second main hypothesis

H₀: There is no significant relationship between human capital efficiency and firms' financial performance.

H₁: There is a significant relationship between human capital efficiency and firms' financial performance.

Table 4: results of regression model between human capital and financial performance

Dependent variable	F	Significance of F	R square	Adjusted R square	Coefficient of significance	Coefficient of D. W
Rate of return on assets	30.636	0.000	0.748	0.723	0.047	1.865
Earnings per share	4.897	0.003	0.088	0.07	0.005	1.884
Rate of return on stockholders' equity	8.088	0.000	0.143	0.125	0.000	1.61

In this hypothesis, the relationship between human capital efficiency and financial performance was investigated and a regression equation was designed as follows:

$$(ROA, EPS, ROES) = \alpha + \beta_1 VAHU + \beta_2 Lev + \beta_3 Assets Log$$

Considering the significance levels of this test, it can be noticed that regression is generally significant. In other words, at least one of the coefficients' partial regressions of independent variable or controlled variable is not zero. Table of partial regression coefficients should be assessed to determine the amount of each variable's coefficient and its significance levels.

Regarding the tables of partial regression coefficients and significance levels of the variable 'intellectual capital', it can be seen that the significance level of intellectual capital is less than 0.05; therefore, this hypothesis, which is based on a significant relationship between human capital and financial performance, is confirmed. It should be mentioned that the coefficient of determining regression models for the regression model of rate of return on assets is 0.748, earnings per share is 0.088, and rate of return on stockholders' equity is 0.143 which prove that about 75%, 9% and 14% of dependent variable's changes were occurred by independent and controlled variables. Moreover, the coefficient of Durbin-Watson test indicates that there is no autocorrelation between independent variables. As it can be noticed, human capital efficiency has the highest association with the rate of return on assets which is about 75%.

Its second highest association is with the rate of return on stockholders' equity which is 14%. The existing relationship between this variable and the variable 'earnings per share' is about 9%.

Testing the third main hypothesis

H₀: There is no significant relationship between structural capital efficiency and firms' financial performance.

H₁: There is a significant relationship between structural capital efficiency and firms' financial performance.

Table 5: results of regression model between structural capital and financial performance

Dependent variable	F	Significance of F	R square	Adjusted R square	Coefficient of significance	Coefficient of D. W
Rate of return on assets	35.066	0.000	0.772	0.75	0.008	1.895
Earnings per share	22.243	0.000	0.305	0.291	0.000	1.991
Rate of return on stockholders' equity	32.597	0.000	0.401	0.398	0.000	1.692

In this hypothesis, the relationship between structural capital efficiency and financial performance was investigated and a regression equation was suggested as follows:

$$(ROA, EPS, ROES) = \alpha + \beta_1 STVA + \beta_2 Lev + \beta_3 Assets Log$$

Considering the significance levels of this test, it can be noticed that regression is generally significant. In other words, at least one of the coefficients' partial regressions of independent variable or controlled variable is not zero. Table of partial regression coefficients should be assessed to determine the amount of each variable's coefficient and its significance levels.

Regarding the tables of partial regression coefficients and significance levels of the variable 'intellectual capital', it can be seen that the significance level of intellectual capital is less than 0.05; therefore, this hypothesis, which is based on a significant relationship between human capital and financial performance, is confirmed. It should be pointed out that the coefficient of determining regression models for the regression model of rate of return on assets is 0.772, earnings per share is 0.305, and rate of return on stockholders' equity is 0.401 which prove that about 77%, 30% and 40% of dependent variable's changes were occurred by independent and controlled variables. Moreover, the coefficient of Durbin-Watson test indicates that there is no autocorrelation between independent variables.

Considering the aforementioned coefficients, structural capital efficiency has the highest association with the rate of return on assets which is about 77%. Its second highest association is with the rate of return on stockholders' equity which is 40%. Its relationship between the variable 'earnings per share' is about 31%.

Among the components of intellectual capital, structural capital has the most significant relationship with the indexes of financial performance. In addition, the rate of return on assets is in relation to 'intellectual capital efficiency' more than other indexes of financial performance.

Testing the fourth main hypothesis

H₀: There is no significant relationship between the value of intellectual capital and firms' financial performance.

H₁: There is a significant relationship between the value of intellectual capital and firms' financial performance.

Table 6: results of regression model between the value of intellectual capital and financial performance

Dependent variable	F	Significance of F	R square	Adjusted R square	Coefficient of significance	Coefficient of D. W
Rate of return on assets	12.078	0.000	0.495	0.454	0.003	1.717
Earnings per share	7.475	0.001	0.385	0.332	0.000	1.633
Rate of return on stockholders' equity	2.094	0.048	0.195	0.128	0.011	1.689

In this hypothesis, the relationship between the value of intellectual capital and financial performance was investigated and a regression equation was suggested which is as follows:

$$(ROA, EPS, ROES) = \alpha + \beta_1 CIV + \beta_2 Lev + \beta_3 Assets Log$$

Considering the significance levels of this test, it can be noticed that regression is generally significant. In other words, at least one of the coefficients' partial regressions of independent variable or controlled variable is not zero. Table of partial regression coefficients should be assessed to determine the amount of each variable's coefficient and its significance levels.

Regarding the tables of partial regression coefficients and significance levels of the variable 'intellectual capital', it can be seen that the significance level of intellectual capital is less than 0.05; therefore, this hypothesis, which is

based on a significant relationship between human capital and financial performance, is confirmed. It should be pointed out that the coefficient of determining regression models for the regression model of rate of return on assets is 0.495, earnings per share is 0.385, and rate of return on stockholders' equity is 0.195 which prove that about 50%, 39% and 20% of dependent variable's changes were occurred by independent and controlled variables. Moreover, the coefficient of Durbin-Watson test indicates that there is no autocorrelation between independent variables. Testing this hypothesis is similar to the previous observations in the Pulic model in which the highest association is with the rate of return on assets that is about 50%.

Conclusion

The current study aimed to assess the influence of intellectual capital on the improvement of companies' financial performance in two fields of automotive manufacturing industry and needed instruments, and drug manufacturing industry and needed raw materials in a four-year-period from 2007 to 2010. Target population of the research was consisting of 41 companies. Intellectual capital was appraised based on two models of CIV and Pulic. The components of intellectual capital in Pulic model were structural capital, human capital and physical capital. The effects of each component on firms' performance were separately assessed. In the next step, the relationship between human capital and indexes of financial performance was evaluated in CIV model. According to Pulic model, three components of intellectual capital were in a significant relationship with financial performance which are in agreement with the results of Marian, Cohen and Rehman's researches; and structural capital was in highest correlation with financial performance. This high correlation can be the result of broad activities of two fields of automotive and drug manufacturing. After structural capital, human capital has the second high association with financial performance. Regarding the aforementioned findings, it is alleged that the most important elements to increase financial performance in knowledge-based industries such as automotive and drug manufacturing are investing in the sections of structural capital and human capital. Moreover, there was a significant relationship between intellectual capital and efficiency based on CIV model, which is in concordance with the results of Lonqvist's research. Comparing two models can clarify this fact that both of them can produce the same results, and using different methods does not make different results in assessing financial performance.

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