



Value Added Intellectual Coefficient and its Elements Influence on the Economic Growth and Development of Iranian Food Industries

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Abstract

This quantitative study seeks to obtain empirical evidence on the relationship between the value added intellectual coefficient and its elements of companies with their economic development. Toward that aim, the data was extracted from a panel consisting of 48 Iranian food industrial companies listed in the Tehran Stock Exchange (during 2010 to 2019). In this article, as independent variables were used value added intellectual coefficient (VAICTM), and its elements effect on the economic development was measured using operating income divided by total sales (OI/S), as an indicator of economic development has been studied. The method of multiple regressions has been used to predict the impact of these variables. The findings show that companies' value added intellectual coefficient and its two of elements include capital employed and human capital efficiency, as a strong factor in their economic performance forecasts, has a direct and significant influence on their economic development. But there is a non-significant relationship between structural capital efficiency as third elements and dependent variable.

Keywords: Intellectual Capital, VAICTM, Capital Employed, Human Capital, Structural Capital, Economic Development.

I. Introduction

Knowledge and information are prime resources in today's "knowledge-economy". The economic enterprises are increasingly knowledge-based and technology driven (Davenport and Prusak, 1998). Intangibles are those most important assets that report in the financial statements. On the basis of international accounting standards these assets are reported by their initial cost at their acquisition time such as goodwill and trademarks. But there are some intangible assets are existence that created by companies themselves, like: knowledge, novelty, name and popularity that create value for companies. These intangible assets we offer "intellectual capital" and in accordance with accounting standards we cannot report them in the financial statements. This issue causes to gap create between companies' book and market values and this problem is increased per year. So, financial information users cannot make a correct financial decision without intellectual capital information and correctly use financial information.

However, the difference between the two values should not be construed as being equal to the value of any intellectual capital, although it does explain the existence and importance of intellectual capital with an organization. It is, therefore, extremely important to identify what creates value, how this value is created and how to make economic forecast this information to capital providers and other users of this information.

Based on the above mentioned and considering the increasing importance of intellectual capital in corporations' strategy, it is necessary to find intellectual capital measurement methods and to study its relation with the economic development of the companies. In the present knowledge based economy, the intellectual capital is the basis for future successes of the companies. Therefore, in order to have sustainable competitive advantage, it is necessary the organizations to coordinate their efforts

and manage their intellectual capital in a well manner. Today there are a lot of large companies in I.R. of Iran, whose shares are actively traded in Tehran stock exchange market. It is worth mentioning, these companies are engaged both in intensive knowledge based /pharmacy, IT, etc. / and intensive labor based industries. Such study is carried out for the first time in food industry of I.R. of Iran, which is based on intensive labor work, and seeks to obtain empirical evidence on the relationship between the intellectual capital of companies active in the said industry and their performance. It is expected that the research results will help the companies involved in food industry, to direct their efforts toward managing their IC and human force potential and provide better performance of the company and stable growth. It must be noted that the number of professional and higher education staff is less compared to the number of labor work employee in food industrial companies. There are many researches that have been done in the level of both national and international around intellectual capital. All of these researchers believe that intellectual capital is knowledge based and they used intensive knowledge based companies or organizations as a statistical society. This research will review their research results in previous studies below that in most of them how IC can impress companies or organizations performance.

Previous Studies

Many conducted studies, often have tried to analyze the problems of intellectual capital. The first studies began with the identification, representation, and classification of IC components (Guthrie et al., 2004). Other studies were interested rather in the practices of IC reporting in companies' annual reports (Kristandl and Bontis, 2007). Some studies also focused on the problem of IC measurement not being recorded in financial statements (Chen et al., 2004). Finally, a number of studies were related to the validation of IC in a decision-making context, notably in terms of its usefulness to investors on a capital market (Lev et al., 2007).

Recent empirical studies have attempted to show that IC significantly contributes to VA created by the company, and therefore is positively associated with its performance. In this context, Nikolaos S. and The others (2021) investigated the influence of intellectual capital environmental and economic performance. To collect all the necessary non-financial information a methodological framework was used which is based on a scoring system and a set of indicators derived from GRI guidelines and the relevant literature, while well-known financial indicators were used to assess firms' economic performance. Javadi S. (2018) has found the significant effects of intellectual capital on economic performance of Steel industry. The results finally the relationship between intellectual capital were confirmed and it has been found that relational and structural capital directly and human capital, indirectly, impress economic performance by structural effects Madition and others (2011) studied the impact of Intellectual capital on the market value and the financial performance of 96 Greek companies on the stock exchange in 4 different economic sectors within 3 years using Pulic's model. The results showed that there was no significant relationship between Intellectual capital and market performance. In this respect, only the relationship between human capital with market performance as a component of value added intellectual coefficient has been approved. However, no significant relationship between the coefficient of value-added intellectual and each of its components with financial performance has been observed. Jafari, E. (2012) has analyzed the IC of 80 Iranian companies listed in the Tehran Stock Exchange in order to examine their impact on the companies' market value and financial performance based on a model offered by Riahi-Belkaoui (2003). He has found that even though the IC has a positive influence on financial performance, but there is a non-significant relationship between IC and market value. On the other hand, in another study, Jafari, E. (2013), has analyzed the IC effects on Firms' market value and Financial Performance based on a random sample of 60 Iranian companies in accordance to the Model developed by Pulic (2000).

The results showed that there is a significant relationship among IC, firms' market value and financial performance. In another study Wei & Lin (2009) studied the financial performance of intellectual capital of 20 financial institutions in Malaysia's stock exchange market by using their Pulic's model. In their study, the population was selected from a single business sector. Results of the study showed that there as a significant relationship between the values added intellectual coefficient and each of its components with financial performance.

Mohd-Saleh (2009) studied the effects of ownership structure of Malaysian companies on the performance of intellectual capital in creating value during 2007-2005 years. The results indicated the negative effect of family ownership on the performance of intellectual capital. Zamani Amoughin (2008) investigated the relationship between intellectual capital and market value added and efficiency of the companies listed in Tehran Stock Exchange. Despite the relevance of these works, still empirical research was needed to test the mutual effect of individual intellectual capital dimensions on food industrial performance in IRAN.

Definition and Measurement of Intellectual Capital

Until now, there has been no generally accepted definition or classification of IC (OECD, 2006). In a recent literature review, Choong (2008) reports on the confusion surrounding the definition of intellectual capital, as well as the numerous denominations associated with it. These definitions are often particular to each discipline or are related to the accounting systems used in each country.

In general intellectual capital is defined as the knowledge, skills, experiences and abilities of the employees; the R&D activities, the organizational routines, procedures, systems, databases and intellectual property rights of the company; and all resources linked to the external relationships of the enterprise, such as with customers, suppliers, R&D partners, etc. (Dí'ez et al. 2010).

An approach which has potential for practical application in the analyses of information from the financial reports of a business is the "Value Added Intellectual Coefficient" developed by Pulic (1998, 2000, 2004). Taking into consideration the increasing importance of the role played by IC in value creation, Pulic (2004) with colleagues at the Austrian "IC Research Centre", developed a new method to measure companies' IC which they called VAICTM. The model relies on the concept of value added as the measure of performance, relative to intellectual capital. This method is very important since it allows measuring the contribution of every resource – human, structural, physical and financial – in the process of creating VA by the company. (Gregory et al. 2010).

II. Research Methodology

The Value Added Intellectual Coefficient (VAICTM) measurement method required financial data on total operating profit, employee costs, depreciation, and amortization. These data included "labor expenses, corporate taxes, dividend, interest expenses, amortization, depreciation, minority shareholders, retained earnings, and total salaries/wages" (Nazari & Herremans, 2007). Economic development (OI/S): Ratio of the operating income divided by total sales, used as a proxy for economic development as reported in the annual reports of industrial firms during the research time periods. It is calculated by using the following formula:

$$OI/S = \text{Operating Income} / \text{sales}$$

Economic development means economic margin arising from the difference between revenues and production costs. It is believed that, as higher investments are made on the intellectual capital by companies, the average cost of production decreases and the product rate increases leading to increase in operating margin or sales as well.

All of these data were obtained from the companies' annual financial reports. The VAICTM methodology developed by Ante Pulic (2000) forms the underlying measurement basis for the independent variable in the present study. Following equation (1) formalizes the VAICTM relationship algebraically as:

$$IC = HCE + SCE \quad (1)$$

$$VAICTM = CEE + IC$$

Where:

IC = intellectual capital

VAICTM = value added intellectual coefficient.

CEE = capital employed efficiency.

HCE = human capital efficiency.

SCE = structural capital efficiency.

To calculate VAIC, one should determine the company's ability in creating value added which is achieved from the difference of output and input. Outputs include all the revenues from the

sale of goods and services and inputs include all costs excluding personnel costs which were spent on creating these revenues in company.

Pulic (2000) states that higher the VAIC coefficient, the better will be the efficiency of VA by a firm's total resources. The first step in calculating CEE, HCE and SCE is to determine a firm's total VA. This may be done with the help of computation by the following algebraic equation:

$$VA = I + DP + D + T + M + R + WS = OP + EC + DP + A \quad (2)$$

Where:

VA is computed as the sum of interest expenses (I); depreciation expenses (DP); dividends (D); corporate taxes (T); equity of minority shareholders in net income of subsidiaries (M); profits retained (R); wages and salaries (WS); it may also be calculated as the sum of operating profit (OP); employee costs for the year (EC), Depreciation (DP) and Amortization (A).

Pulic, in assessing the relationship between value added and physical capital employed believes that intellectual capital cannot create value on its own and without physical capital. So considering the capital employed in the creation of intellectual capital in a company, seems necessary. Therefore, to determine the efficiency of capital employed we can conclude that any invested currency in physical and financial assets has led to what extent of value added. In other words, this relation shows the ability of employed capital in creating value in a company. Alternatively VA can be calculated by deducting operating expenses (materials, maintenance and other external costs) from operating revenues (Pulic, 2000).

According to Pulic (2000), CEE is the ratio of total VA divided by the total amount of capital employed (CE), where capital employed is defined as the book value of a firm's net assets. Equation (3) presents the CEE relationship algebraically:

$$CEE = VA / CE \quad (3)$$

Where:

CE = book value of the net assets

Since in measuring the intellectual capital of a company, it is believed that staff costs should not be treated as current expenses and should be considered a capital expenditure or should be considered as part of the intellectual capital, Coefficient of value added efficiency of human capital shows that how much value added was created in company per each unit of money spent on manpower. Thus the relationship between human capital and value added is in the ability of human capital in creating value in that company.

Pulic (2000) present authors propose to use "total salary and wage costs" as the indicator of a firm's human capital (HC). HCE, therefore, is calculated as the ratio of total VA divided by the total salary and wages spent by the firm on its employees. Equation (4) shows this relationship algebraically:

$$HCE = VA / HC \quad (4)$$

Where:

HC = total salary and wage costs

Coefficient of value added efficiency of structural capital shows the share of structural capital in creating value added.

In order to calculate SCE, it is first necessary to determine the value of a firm's structural capital (SC). Pulic (2000) proposes that a firm's "total VA less its human capital" is an appropriate proxy of a firm's SC. That is:

$$SC = VA - HC \quad (5)$$

Where:

SC = Structural capital

HC = total salary and wages.

Based on prior empirical research findings, Pulic (2000) argues that there is a proportionate inverse relationship between HC and SC in the value creation process. According to him, the less HCl participates in value creation, the more SC is involved. Consequently, Pulic (2000) suggests the following formula for calculating SCE which is the ratio of a firm's SC divided by the total VA:

$$SCE = SC / VA \quad (6)$$

Where:

SCE_{it} = structural capital efficiency

For the purpose of the empirical analysis, this study uses correlation and multiple regressions as the underlying statistical tests. In conducting the liner multiple regression analysis following control variables have been included:

Financial leverage (DEBT): Financial leverage as measured by total debt divided by book value of total assets is used to control for the impact of debt servicing on corporate performance and wealth creation (Riahi-Belkaoui, 2003).

Size of the firm (SIZE): Size of the firm as measured by the natural log of total market capitalization (Firer and Stainbank, 2003) is used here to control for the impact of size on wealth creation through economies of scale, monopoly and bargaining power (Riahi-Belkaoui, 2003).

To analyze the respective relationships defined in prior sections linear multiple regressions analysis is performed based on the following general models:

H1: $OI/S_{it} = a + \beta_1 (VAICTM_{it}) + \beta_2 (SIZE_{it}) + \beta_3 (DEBT_{it}) + \epsilon_{it}$

H1a,b,c: $OI/S_{it} = a + \beta_1 (CEE_{it}) + \beta_2 (HCE_{it}) + \beta_3 (SCE_{it}) + \beta_4 (SIZE_{it}) + \beta_5 (DEBT_{it}) + \epsilon_{it}$

In addition to the previous, while a and ϵ represent respectively the intercept and the error terms, $\beta_1 - \beta_5$ are the slope coefficients representing the influence of the associated independent variables over the dependent one, i and t represent kind of company and annual time.

Testing Hypotheses

The following main and subsidiary hypotheses were used in this research:

H. There is a positive association between “Value Added Intellectual coefficient (VAICTM)” and economic development.

Ha. There is a positive association between “Capital Employed efficiency (CEE)” and economic development.

Hb. There is a positive association between “Human Capital Efficiency (HCE)” and economic development.

Hc. There is a positive association between “Structural Capital efficiency (SCE)” and economic development.

Descriptive Statistics

Table (1) shows the mean and the standard deviation of dependent variables and variables of the study separately. High standard deviation indicates the high volatility of variables. A factor has been used to measure the economic development of companies is OI/S, however, its standard deviations was different from the other indexes. The standard deviation of the independent variables, VAICTM and their components, had the lowest volatility indicating the homogeneity among the companies during the investigation.

On the other hand, the average efficiency of intellectual capital components shows HCE accounted for the largest share of intellectual capital production appearing more efficiency than the other components. The highest standard deviation is related to OI/S indicating the sever volatility in the economic development of firms during the research period.

Table 1: Descriptive statistics

Variable	N	Mean	Maximum	Minimum	Std. Deviation
OI/S	48	11.53	43.6	-56.8	9.7
VAIC	48	3.07	23.81	-1.74	1.7
CEE	48	0.31	0.80	-0.001	0.14
HCE	48	2.24	6.75	-0.04	1.09
SCE	48	0.52	23.8	-2.21	1.29

Reference: Research calculate

The Results Derived From Model Estimation and Interpretation

Table (2) shows the results derived from testing main hypothesis (H1) or estimating main equation dealing with the relationship between value added intellectual coefficient (VAICTM) and economic development. Toward that end, the effect of value added intellectual coefficient (VAICTM) on economic development was studied by using the ratio of operating income to sales. The results show that there is a positive and significant relationship between the value-added intellectual coefficient and economic development variables. The probability of this relationship is equal to 99% as well. The coefficient of determination (R^2) is also equal to 90% having the highest coefficient of determination compared to those estimation models derived from main hypotheses. Control variables such as the financial leverage (debt) and firm size (size) have a positive but not significant influence on the economic development.

According to the results derived from this table, it can be seen that the value added intellectual coefficient (VAICTM) has a positive and significant effect on the economic development. The values coefficient of VAICTM and t-statistics are equal to 0.002 and 6.77 respectively. Hence, the main research hypothesis that the more the value added intellectual coefficient, the better the economic performance will be for enterprises is proved in this way.

Table (3) shows the results derived from estimating the three sub-hypotheses or secondary equation. The purpose is to examine the relationship between the values added intellectual coefficient elements and economic development.

Table 2: The results derived from testing main hypothesis – Fixed effects

Dependent variable - (OI/S) Method: Pooled EGLS (Period SUR) Sample (adjusted): 2002 2011			
Variable	Coefficient	t-Statistic	Prob.
Fixed	8.16	0.5	0.5
(VAIC TM)	0.002	*6.77	0.0
DEBT	0.01	0.74	0.4
SIZE	0.07	0.06	0.9
Weighted Statistics			
R ² 0.90		D-W 2.04	
Unweighted Statistics			
R ² 0.38		D-W 1.11	

*- It implies significant at 99% confidence level.

Reference: Eviews software calculations

Table 3: The results derived from testing three sub-hypotheses – Fixed effect

Dependent Variable: OI/S? Method: Pooled EGLS (Period SUR) Sample (adjusted): 2002 2011			
Variable	Coefficient	t-Statistic	Prob.
Fixed	-60.06	*-4.92	0.0
CEE	44.9	*10.18	0.0
HCE	4.79	*8.41	0.0
SCE	-0.001	-0.86	0.38
DEBT	-0.006	-0.51	0.60
SIZE	3.79	*3.95	0.0001
Weighted Statistics			
R-squared 0.94		D-W 2.02	
Unweighted Statistics			
R-squared 0.64		D-W 1.22	

*- It implies significant at 99% confidence level.

Reference: Eviews software calculations

It can be seen from the results that all auxiliary independent variables except one i.e. Structural capital efficiency, have a positive and significant effect on the economic development as well. Coefficient and probability values for Capital Employed Efficiency (CEE) and Human Capital Efficiency (HCE) are equal to 44.9, p-value =99%, 4.79 and p-value= 99% respectively.

Accordingly, it shows that these variables have a positive and significant effect on the economic development. The Structural capital efficiency, on the other hand, has negative coefficient as well as the low significant degree. When corporate development is measured by OI/S, it cannot be said that the results derived from the empirical findings enables a valid proof to be made about the hypothesis that there is a significant relationship between the Structural capital efficiency and the corporate development. Unlike the firm size, the financial leverage (debt) as a control variable has a negative and non-significant effect on the economic development. i.e. the coefficient, t-statistics and probability values for the firm size as a control variable respectively are 3.79,t=3.95 and 99%. It shows that this variable has a positive and significant effect on the economic development. The coefficient of determination (R^2) is also equal to 94% indicating that this model has the highest coefficient of determination compared to those related to the auxiliary hypotheses.

III. Discussion and Conclusion

The preparation of financial statements aimed at providing comprehensive and reliable information that will assist the users of financial statements in decision making. Thus, omitting or ignoring the information regarding “intellectual capital” asset will prevent the process of improving organizations performance. Besides, it will negatively affect the qualitative aspect of financial statements, as well as on the decisions made by the users of such information.

The effect of value added intellectual coefficient (VAICTM) on (OI/S) as an indicator of economic development has been studied in this section. The findings show that companies’ value added intellectual coefficient, as a strong factor in their economic development forecasts, has a direct and significant influence on their performance especially on (OI/S).

Moreover, the more the value added intellectual coefficient, the better will be the economic development of the organization. But when the (VAICTM) is divided into three components and used in regression equation to predict companies’ economic development, only two elements i.e. CEE and HCE seem to have a positive and significant effect on the economic development. The results derived from testing the third factor i.e. SCE, on the contrary, show that there is no significant relationship between economic performance and this variable in this regard. According to the objectives of this study, comparison of the results of this study with other studies is analyzed. The results of the

statistical analysis will be discussed and compared with some research carried out in intellectual capital below:

While compared Madition and others research with the present study should be noted that in both studies, Pulic's model has been used as an indicator of measuring Intellectual capital. However, the results of two studies, except for a minor case, were different and this difference as resulted from two things. First, in the study of Madition and other the data related to 4 different industries were combined that undesirable results in an industry may lead to thwarting the desired results of another industry. Secondly, it can be concluded that local factors can also lead to different results in the investigations of Intellectual capital. In other words, the impact of Intellectual capital on firm performance not only in different industries but also in other places or countries may not have the same results. If one wants to further explain the impact of industry and place, it is advisable to review the results of research conducted at one place or one country. For example, in a study conducted by Jafari about the effect of intellectual capital on the market value and the financial performance of 80 companies from all industries listed in Tehran stock, in comparison with the present study, as it can be seen, when a study is carried out in one place or in other words in the stock exchange market of Iran by a joint research and researcher so that once a combination of different industries as selected as the population and again the population is only one industry, so the results will be different in some ways. These factors suggest that the impact of intellectual capital on the performance of different industries have different results, and the results won't be the same. Wei & Lin research, similar to the present study, the population was selected from a single business sector. Results of the study showed that there as a significant relationship between the values added intellectual coefficient and each of its components. Since In this study, only economic performance is considered as an indicator of performance evaluation, its results in terms of the impact of the intellectual value added and each of its components is quite similar with the results of the present study. Thus it can be concluded that selection of a business or industry from among different industries in two different places may also have similar results in some respects. But on the one hand in this study, other performance indicators have not been used in order to make a comprehensive comparison with the present study.

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