

INVESTIGATING THE EFFECT OF INTELLECTUAL CAPITAL ON THE PROFITABILITY OF COMPANIES ACTIVE IN THE STOCK EXCHANGE (The Case Study of Food Industry Firms Listed in Tehran Stock Exchange)

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Abstract: *This paper aims to examine the effect of intellectual capital on the profitability of food and beverage industry firms improved in the Tehran Stock Exchange. The study is applied in terms of its objective and it is descriptive-correlational in terms of its data collection method. After studying the research background and the existing pattern of intellectual capital and organizational performance and development of the theoretical framework, the research variable, conceptual model, and hypotheses were determined. Econometric method was used for data analysis. The relationship between the components of intellectual capital and value-based performance metrics are analyzed through simple and multiple panel regression models. Econometric software of Eviews used to test the hypothesis.*

The result of hypotheses testing with the help of multiple regression modeling showed that there is a significant correlation between components of intellectual capital (human capital, structural capital and capital employed) and profitability of food industry firms listed in Tehran Stock Exchange.

Keywords: *intellectual capital, human capital, structural capital, capital employed and profitability of companies.*

INTRODUCTION AND STATEMENT OF THE PROBLEM

The present era is the age of the knowledge-based economy. Prior to knowledge-based economy, industrial economy was dominated. In the industrial economy, the factors producing economic wealth were physical and tangible assets such as land, labor, money and machinery. In this economy, the use of knowledge as a factor of production had little role, but in the knowledge-based economy, knowledge or intellectual capital as compared to other tangible assets and physical wealth are

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more advantageous. In this economy, intellectual property and human capital in particular, are the most important organizational assets and the potential success of the organization is rooted in its intellectual power rather than its tangible assets (Ahmad poor et al., 2012). For example, intangible assets of successful companies in the world as compared to tangible assets have increased from 38% in 1982 to 85% in 2000 and have had a greater growth in recent years (Ghelich Lee et al., 2009).

The term intellectual capital was first used in 1969 by John Kenneth Galbraith. He believed that intellectual capital is more than just thinking, in the sense of pure thought and involves a degree of intellectual action. In this sense, intellectual capital is not only in itself is a static intangible asset, but also it is an ideological process and is considered as a means to achieve an end (Bontis et al., 1999). The classification proposed by Edvinsson and Malone (1997) is used in most studies in order to classify the intellectual capital. From their perspective, intellectual capital has three basic components of human capital, structural capital and capital employed. Human capital is the basis and foundation of intellectual capital and is the primary component to perform its tasks. Human capital is related to factors such as employees' knowledge, abilities and skills, as well as their behavior in relation to the incentive performances that customers are willing to pay for them and company's profit arises from them (Hemmati and Zamani Amoghini, 2011). Capital structure is comprised of all non-human knowledge deposits in organization, which include databases, organizational charts, processes, strategies, programs implemented and whatever that its value is higher than its material value (Ghelich Lee et al., 2009). Capital employed is defined as all the resources associated with the entity's external relations, including trade relations with customers, suppliers and partners in the research and development projects. This component of intellectual capital is also called relational capital or customer capital (Ghayori Moghaddamet al., 2012).

This classification has led people like Sofian (2008) to state that intellectual capital, which includes knowledge, skills and professional knowledge and technological capabilities, affect the increase of the company's performance. Also people like Rivkin (2002) and Bontis and Stovel (2002) showed that all three dimensions of intellectual capital interact with each other and the way they interact forms the basis of a strong intellectual capital that affects the position value of the company. Edvinsson also stated that when there is a right combination of dimensions of intellectual capital, company's performance will be affected (Kamukama et al., 2010).

Today, contribution of intellectual capital can play an important role in the creation of value added and gross domestic product due to knowledge and

information creation and therefore wealth creation in the knowledge-based economy. That's why the company's financial performance can be affected by the intellectual property and human capital in the level of economic businesses (Abbasi and GoldiSedghi, 2010). Accordingly, in a country like Iran that aims to compete in the economic and trade sphere in its 20-year vision plan, knowledge-based economy should be considered as a strategic tool (Shojae and Baghbanian, 2009).

The purpose of this study is to explain the impact of human capital, structural capital and capital employed on the financial performance of newly listed companies in Tehran Stock Exchange in the food industry for the period of 2002 to 2011. The results can guide investors in the Tehran Stock Exchange and decision-makers of the food industry as well as researchers of the capital market.

1. RESEARCH METHODOLOGY

1.1. Research method

The present study is applied in terms of its objective and it is also descriptive correlational according to its method.

1.2. Hypotheses

The main hypothesis:

Intellectual capital has a significant positive effect on firms' financial performance.

Sub-hypotheses:

Capital employed has a significant positive effect on firms' financial performance.

Human capital has a significant positive effect on firms' financial performance.

Structural capital has a significant positive effect on firms' financial performance.

1.3. Research Model and Variables

Dependent variable of the study is financial performance of firms. There are different criteria to assess the performance. These criteria can be classified into four general categories of: 1) accounting criteria, 2) accounting and market criteria, 3) financial criteria, and 4) economic criteria (Izadinia and Rasaeyan, 2010). The first group of criteria, i.e. the financial ratios of profitability (PROF), is used in order to measure the performance of food companies in this study. Independent variable is intellectual capital and its component, namely capital employed (CE), human capital (HC) and structural capital (SC). In this study, the cost of advertising (ADV) is used as a control variable.

The following regression model is used to test the hypotheses:

$$PROF = a + b_1HC + b_2SC + b_3CE + b_4ADV + e$$

The acceptance or rejection of research hypotheses is judged based on the results obtained for each of the regression coefficients of β_1 , β_2 , β_3 . According to hypotheses, it is predicted that each of the components of intellectual capital has a positive and significant relationship with the ratio of profitability. Therefore, it is expected that each of the regression coefficients ($\beta_i > 0$) are positive and are statistically significant. Otherwise, there won't be enough evidence to prove the hypothesis.

1.4. Statistical Population and Sample

The target population includes all companies in the food industry in the Tehran Stock Exchange, which consists of 32 companies. From these companies, the companies that had provided the financial information required for the calculation of variables (i.e. 22 companies) were selected. Apart from this constraint, the sample selection of this study had no other criterion. Table 1 shows the companies studied in this research.

Table 1
Sample

<i>Company's name</i>	<i>Company's name</i>
1 Behnoush	12 Shoko Pars
2 Gorji Biscuit	13 Iran Shahd Co.
3 Pars Minoo	14 Behshahr Industrial
4 Isfahan Pegah Diary Co.	15 Minoo Industrial (Khoramdare)
5 AzarbaijanPegah Diary Co.	16 Piazar agribusiness
6 KhorasanPegah Diary Co.	17 Keivan
7 Behshahr Industrial Development Corp.	18 Golokozan
8 Chin Chin	19 Pak Diary
9 Pars Animal Feed	20 Margarin
10 DashteMorghab	21 Mahram
11 Salemin	22 Mazandaran Noosh Co.

1.5. Data analysis

Different econometric methods are used to analyze the data. Eviews software will be used to perform this analysis. In this study, pooled data is used due to panel data. Tests used for data analysis include:

- Stationary tests: are the most important tests for estimating a regression with reliable coefficients and stationary tests are used to avoid the creation of artificial regression. In the pooled data, there are different tests on time series data to investigate whether variables are stationary or not. In this study, the Levin, Lin and Chu tests are used.
- Jark-Bra test: one of the basic conditions in the regression analysis is the normality of the dependent variable. To be more precise, the validity of the results of the regression coefficients using the t-test statistics is subject to the normality of the dependent variable. Jark-Bra test is used for this purpose.
- F-Limer test: The test is used for determining the use of fixed effect model against pooled data. The test is used to determine whether the data are pooled or panel. In this test, if the prob is less than 5%, the data are panel and if it is more than 5%, the data are pooled.
- Hausman test: This test is used for determining the use of fixed effect model against the random effects model. Hausman test is formed based on the presence or absence of a relationship between estimated error of the regression and independent variables. If there is no relationship between them, random effect model will be used.

2. RESEARCH FINDINGS

Descriptive indicators of variables including mean, median and standard deviation are reported in Table 2. According to a survey of 22 companies in the food industry during 10 consecutive years from 2002-2011, the total number of samples studied is 220 years-company. Given that the mean of profitability is much larger than its mode, it can be expected that the distribution of profitability of firms in the sample is skewed to the right. In other words, a few years-companies have greater profitability than other years-companies.

Comparing the mean of capital components indicates that capital employed in the companies is greater than other two components of intellectual capital, i.e. human capital and structural capital. Structural capital after that and human capital is in the last place. This result is slightly different based on the median, i.e.

there is no significant difference between human capital and structural capital and the capital employed in in the first place here. Investigation of the coefficient of determination of the components of intellectual capital reveals that food companies studied are more scattered in the context of structural capital than the other two dimensions of intellectual capital.

Table 2
Descriptive indices of research variables

<i>Variable</i>	<i>No. of observations</i>	<i>Mean</i>	<i>Mode</i>	<i>SD</i>	<i>Coefficient of variation</i>
Profitability	220	2.28	6.79	11.18	1.35
Structural capital	220	102515.8	34153.50	182825.8	1.78
human capital	220	95075.47	32804.50	162503.4	1.71
capital employed	220	660895.6	263979.0	1018539.0	1.54
Advertisement cost	220	4940.11	530.00	27767.60	5.62

Levin, Lin and Chu (LLC) test is used to investigate this issue. The null hypothesis in each test is the presence of unit root (non-stationary) for the desired variable. LLC test results for each of the variables have been reported in Table 3. According to the results, the assumption of unit root is rejected for all variables in 0.05 error level (Sig. <0.05). So it can be assumed that the variables are stationary.

Table 3
The results of stationary test

<i>Variable</i>	<i>LLC statistics</i>	<i>Sig. level</i>
Profitability	-16.81	0.000
Structural capital	-6.37	0.000
Human capital	-11.53	0.000
Capital employed	-3.19	0.000
Advertisement cost	-31.53	0.000

F-Limer and Hausman test results to determine the appropriate method for estimating the model Based on the results of the F-Limer test, of the two models of equal effects and fixed effects, the second model is chosen (F = 6.86, Sig. <0.05). Secondly, according to Hausman test, of the two models with fixed effects and random, the first model is superior (X2 = 12.53, Sig. <0.05). In order to estimate the simultaneous effect of the components of intellectual capital on the profitability, the fixed effects model is used.

Table 4
Limer and Hausman test results to determine the appropriate method of estimating the model of the impact of all the components of intellectual capital on the profitability

<i>Test</i>	<i>Statistics</i>	<i>Sig. level</i>	<i>Result</i>
F-Limer	6.86	0.000	fixed effect
Hausman	12.53	0.014	Fixed effect

The results of the estimate of the relationship between intellectual capital components and profitability are shown in table 5 using fixed effects method. According to the results of this table, two components of human capital and capital employed, in accordance with predictions made, don't have a positive impact on the profitability of the sample companies. But the impact of capital structure on profitability of food companies has been as expected. Given the significance level, the effect is statistically significant (t = 5.831, Sig. <0.05). The effect of the variable of the cost of advertising does not have a significant effect on the profitability of companies (Sig.> 0.05).

F-test statistic indicates that the estimated model is statistically significant so that more than 50% of the total variance of profitability is explained by the explanatory variables of the model (R2 = 53.7%). According to Durbin-Watson test statistics, there is a serial correlation between the residuals of the estimated model (DW = 1.268). This may undermine the credibility of the results. To further investigate and fix the autocorrelation, the term AR (1) is added to the model. The results are shown in Table 6. As can be seen, after solving the autocorrelation of the residuals of model, of the components of intellectual capital, the structural capital has a positive and significant impact on the profitability of companies. Durbin-Watson statistics show that after the addition of the AR (1) to the model, serial autocorrelation between residuals has been fixed (1.5 <DW <2.5).

Table 5
Results of simultaneous effect of intellectual capital components on profitability

<i>Variable</i>	<i>Coefficient regression</i>	<i>T-statistics</i>	<i>Sig. level</i>	<i>Predicted sign</i>	<i>Results</i>
Constant coefficient	10.490	11.913	0.000		
Human capital	-0.000	-1.852	0.066	+	Rejected
Structural capital	0.000	5.831	0.000	+	Accepted
Capital employed	-0.000	-4.263	0.000	+	Rejected
Advertisement cost	0.000	0.232	0.816		
F-statistics				8.533	
Sig. level of F				0.000	
Coefficient of determination (R^2)				0.537	
Adjusted Coefficient of determination (R^2_{adj})				0.474	
Durbin-Watson statistics (DW)				1.268	

Table 6
Results of simultaneous effect of intellectual capital components on profitability after solving autocorrelation

<i>Variable</i>	<i>Coefficient regression</i>	<i>T-statistics</i>	<i>Sig. level</i>	<i>Predicted sign</i>	<i>Results</i>
Constant coefficient	9.171	6.301	0.000		
Human capital	-0.000	-1.713	0.000	+	Rejected
Structural capital	0.000	5.299	0.000	+	Accepted
Capital employed	-0.000	-2.482	0.014	+	Rejected
Advertisement cost	0.000	0.994	0.322		
AR (1)	0.312	4.482	0.000		
F-statistics				11.293	
Sig. level of F				0.000	
Coefficient of determination (R^2)				0.650	
Adjusted Coefficient of determination (R^2_{adj})				0.593	
Durbin-Watson statistics (DW)				2.038	

According to the arguments made above, just the second sub-hypothesis that human capital has a significant positive impact on financial performance is accepted, but no sufficient evidence was found to prove the other two hypotheses. Table 7 shows specific impact of each company on the profitability (estimation of fixed effects).

Table 7
Estimation of fixed effects of sample companies

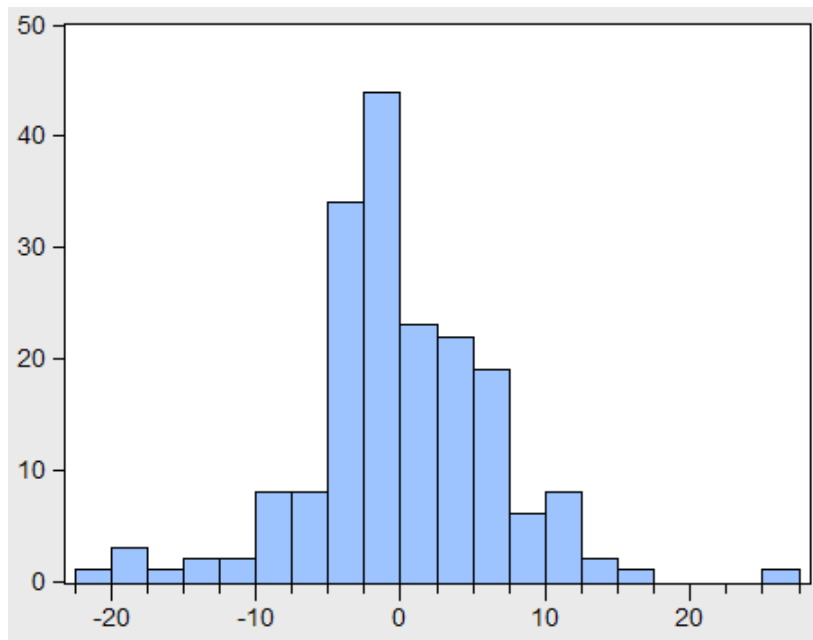
	<i>Company</i>	<i>Estimation of effect</i>
1	Behnoush	4.35
2	Gorji Biscuit	-4.72
3	Pars Minoo	1.21
4	Isfahan Pegah Diary Co.	-1.19
5	Azarbaijan Pegah Diary Co.	-8.04
6	Khorasan Pegah Diary Co.	2.45
7	Behshahr Industrial Development Corp.	16.47
8	Chin Chin	-15.27
9	Pars Animal Feed	4.98
10	Dashte Morghab	-2.49
11	Salemin	7.05
12	Shoko Pars	-10.91
13	Iran Shahd Co.	-6.54
14	Behshahr Industrial	4.89
15	Minoo Industrial (Khoramdare)	1.46
16	Piazar agribusiness	-2.21
17	Keivan	-7.03
18	Golokozan	10.18
19	Pak Diary	1.69
20	Margarin	-0.35
21	Mahram	-3.32
22	Mazandaran Noosh Co.	-4.08

One of the basic assumptions in the regression model is the normality of residuals. Here, this assumption will be discussed. Jark-Bra test is used for this purpose. The test results are shown in Table 8. However, according to Jark-Bra test results, the normality of residuals is not accepted (JB = 27.17, Sig. <0.05); but the results of the rectangular graph of residuals show that their statistical distribution is largely similar to the normal distribution (Figure 1).

Table 8
Jark-Bra test results to investigate the normality of residuals

<i>Jark-Bra statistics (JB)</i>	<i>Significance level (Sig.)</i>
27.170	0.000

Figure 1: Rectangular graph of residuals



3. DISCUSSION AND CONCLUSION

In the industrial economy, the production factors of economic wealth are physical and tangible assets such as land. But in the knowledge-based economy, intellectual knowledge or capital as compared to other tangible assets and physical wealth are more advantages. In addition, shareholders are so interested in the performance of

company they invest. Because based on agency theory, corporate executives may make decisions that are not consistent with the investment objectives. Accordingly, contracts between owners and managers are of paramount importance and investors are always looking for ways to align these interests. Thus, improvement of the performance of the business unit increases the company's value and thus the interests of owners and managers will be simultaneously maximized. Considering the importance of this issue, this study examines the relationship between intellectual capital components and performance (profitability) of food companies listed in the Tehran Stock Exchange.

Descriptive findings showed that the company's profitability is in the very low level of 8%. In other words, food firms listed in the Tehran Stock Exchange have weak profitability for their shareholders. The results show that the two components of intellectual capital, i.e. the human capital and capital employed, have a negative impact on the profitability of food companies. Among these, the impact of human capital was non-significant. Thus, it can be concluded that food companies listed in Tehran stock exchange have not properly used the two components of intellectual capital to create profits. The negative impact of human capital on the performance of listed companies was formerly reported by Ghayori-Moghadam et al (2012) in the three industries of Pharmaceutical products, chemical product and automobile parts and by Darabi et al (1392) in the pharmaceutical industry. In contrast, structural capital has a positive and significant impact on the profitability of food companies. In other words, this component of intellectual capital is considered as a source of profit creation in food companies. This finding is consistent with results of Ghayori-Moghaddam (2012) and Darabi et al (2013).

For further research in the future, the following suggestions are offered:

1. Since there are other indices than ROA for the assessment of corporate profitability, it is suggested to investigate the relationship between intellectual capital components and the profitability of food companies listed in Tehran Stock Exchange based on indicators such as efficiency of equity, return on investment and compare the results with the findings of this research.
2. It is suggested to investigate the relationship between intellectual capital components with other functional aspects of food firms listed in the Tehran Stock Exchange using financial ratios of other groups.
3. It is recommended to investigate the subject of this research (intellectual capital and performance related to food companies) in other industries (such as pharmaceuticals, chemicals, machinery and equipment, etc.).

References

1. Ahmad Poor, A., Malekyan, E., Zare Bahman Miri, M.J., and Nadi, Z. (2012). The Role of the structure of Board in intellectual capital of companies with a fuzzy approach, case study of pharmaceutical companies in Tehran Stock Exchange. *Accounting knowledge*, (8), 73-93.
2. Izadinia, N. and Rasaiian, A. (2010). The relationship between some of the criteria related to corporate governance and the economic and financial criteria of evaluation of the performance. *Knowledge of accounting*, 1, 53-72.
3. Darabi, R., Kamran Rad, S. and Seyed Jarahi, H. (2013). The impact of intellectual capital on Tobin's Q ratio (Q) of pharmaceutical companies. *Research on financial accounting and auditing*, 18, 175-195.
4. Abbasi, E. and Goldie Sedghi, A. (2010). Investigating the effect of the efficiency of intellectual capital on the financial performance of companies in the Tehran stock exchange. *Review of accounting and auditing*, 60, 4-57.
5. Ghayori-Moghaddam, A., Mohammadi Zanjiirani, D. and Nematollahi, Z. (2012). The effect of intellectual capital on efficiency as a measure of business performance. *Financial accounting research*, 13, 87-104.
6. Ghelich Lee, B., Hejari, Z., Rahmanpour, L., Habibpour, A. and Yazdani, S. (2009). Design of measuring and reporting model of intellectual capital (Case Study: Workers Welfare Bank). *Management perspective*, 32, 131-150.
7. Hemmati, H. and Zamani Amoghini, R. (2011). The relationship between intellectual capital and value-added and cumulative abnormal returns. *Journal of Management*, 24, 44-58.
8. Bontis, N., Dargonetti, N.C., Jacobsen, K. and Roos, G. (1999), "The knowledge toolbox: A review of the tools available to measure and manage intangible resource", *European Management Journal*, 17, 391-402.
9. Edvinsson, L. and Malone, M.S. (1997). "Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower", *Harper Business*, New York, NY.
10. Kamukama, N., Ahiauzu-Augustine, M. Ntayi, J. (2010). Intellectual capital and performance: testing interaction effects, *Journal of Intellectual Capital*, 11, 554-574.