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Evaluation and Measurement of Companies' Financial Health Based on the Components of Intellectual Capitals (Case Study: In Iran's Context)

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ABSTRACT

The purpose of the study is to evaluate and measure the companies' financial health based on the components of intellectual capitals. To do this research between the listed companies in Tehran stock exchange, 72 companies were selected based on Cochran formula and were classified into two groups of healthy and distressed according to Taghavi and Pourali's financial health model. The intellectual capitals and its components were collected and calculated for a 8 years period and regarded as the independent variables according to Pulic's model using binary logistic regression test and Pearson correlation test. The results indicated that there is a significant relation between intellectual capitals components and the companies' financial health and increasing in intellectual capital would enhance the companies' financial health.

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INTRODUCTION

Since, avoiding from bankruptcy is a fundamental strategy today which its goal is to guarantee the commercial activities. The prediction of profitability and measurement of the corporate continuing activities have been considered by researches. The financial health which means the power of profitability and continuation of a business unit activities (International Monetary Fund, 2000) have special important for all shareholders and stakeholders and all stakeholders are essentially interested in having suitable means to evaluate and predict the profitability and continuation of these units' activities. Since financial statements is the only common information source available for stakeholders, yet financial health and relative power of the activity continuation are not reflected clearly in these reports (Taghavi & Pourali, 2011). It is clearly that the current age is different from other ages from various dimensions. Cost price of assets, factories, equipments and raw materials were regarded as the success factors in the industry age, but effective use of intellectual capital which usually effective in success or failure of a collection is now the success factor (Rezaei *et al*, 2010). Movement of industrial economy toward knowledge-based economy and blurring physical and material capitals and highlighting non-material capitals such as human, knowledge, intellectual and social capitals are regarded as the essential characteristics of this age. Knowledge-based economy is the one in which production and exploitation from knowledge plays a central role in the value process (Namazi, Ebrahimi, 2009).

In this regard, Setayesh and Kazemnezhad (2009) examined the impact of intellectual capital on firms' performances. The results demonstrate that intellectual capitals have positive and significant influence on ROA and assets turnover ratio, but this influence is not significantly related to P/E. Abbasi and Sedghi (2009) examined the influence of intellectual capitals components on financial performances of the listed companies in Tehran stock exchange (2000-2003) and the results indicated that coefficient of performance of each intellectual capital components has positive and significant impact on shareholders' equity. Also, Pourzamani and jahanshad (2012) studied the relation between intellectual capital and market value and financial performance of the companies. The findings demonstrated that there is no significant relation between coefficient of performance of intellectual capital and market value (P/E). Naidoo (2007) in his thesis "providing a model for predicting financial health in African business companies" selected 42 bankrupt and non-bankrupt companies during 1970 to 1999 and analyzed the financial statements of the companies for determining the profit process which result

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in recognizing their healthy condition. Finally, Taghavi and Pourali (2009) provided the evaluation and measurement of financial healthy model in Iran's context. The model is designed based on Naidoo model (2007) and its result indicates that unlike Naidoo model who classified the African companies into three healthy, central and distressed, the companies were grouped into two groups of healthy and distressed in Iran.

Based on the above literature, since the important part of a company's financial capitals are invested in intellectual capitals (human, structural and communication), the conception is necessary for stakeholders whether investment in intellectual capital has influence on the continuation of a company's activities and their financial health? Or is it possible to regard any relation between the components of intellectual capitals of a company with different levels of the companies' financial health?

2. Research methodology:

2.1. Research hypotheses:

Regarding the four independent variables of value added intellectual coefficient, structural capital efficiency, human capital efficiency, physical capital efficiency and dependent variable of financial health, the four hypotheses is provided:

- Intellectual capital would enhance the financial health of companies.
- Human capital efficiency in intellectual capital of companies would enhance the financial health of companies.
- Structural capital efficiency (organizational) in intellectual capital of companies would enhance the financial health of companies.
- Physical capital efficiency in intellectual capital of companies would enhance the financial health of companies.

2.2. Operational definition of the research variables:

Table 1: Operational definition of the research variables.

Dependent variable	
Variable name	Way of measuring
Financial health	$P(Z) = \frac{e^{-Z}}{1 + e^{-Z}}$ Healthy firms: $Z = -14/408 + 3/62 \text{ (EVA)} - 0/977 \text{ (MVA)} + 0/097 \text{ (debt ratio)} + 5/761 \text{ (acid ratio)} - 0/11 \text{ (net working capital to total assets)} + 0/805 \text{ (current ratio)}$
	$P(Z) = \frac{1}{1 + e^{-Z}}$ Distressed firms: $Z = 461/003 - 143/095 \text{ (EVA)} - 0/536 \text{ (debt ratio)} + 52/141 \text{ (acid ratio)} - 3/635 \text{ (net working capital to total assets)} - 30/417 \text{ (current ratio)}$
Independent variables	
value added intellectual coefficient	VAIC= HCE+SCE+CEE
Human capital efficiency	HCE=VA/HC
Structural capital efficiency	SCE= SC/VA
Physical capital efficiency	CEE= VA/CE
Control variables	
Firm size	Natural logarithm of total assets
Leverage ratio	Total debts to total assets ratio
M/B ratio	Market value to book value per share ratio

2.3. Research population and its statistical sample:

To do the research, the statistical samples of the listed companies in Tehran stock exchange were gathered which have the following conditions:

- 1- The companies should be listed in Tehran stock exchange before 2005.
- 2- Their activities should not be halted during 2005 to 2012 and their stocks should be active during that period.
- 3- The companies should not be a part of investment companies.
- 4- Their financial statements and explanatory notes should be completely available.
- 5- Their financial year ends in 18/03/ each year.
- 6- They should not change their financial year during the studied periods.
- 7- They should not be a part of an insurance and construction company.
- 8- The studied companies should not suffer bankruptcy during the 8 years period.

According to the above conditions, the statistical population of 331 active companies listed in Tehran stock exchange has been collected which 72 companies were randomly selected based on Cochran formula.

$$n = \frac{(331)(1.96)^2 \times (0.5)(0.5)}{(331)(0.1)^2 + (1.96)^2(0.5)(0.5)} \sim 72.3 = 72$$

Where, (d) is the maximum permissible error (0/1), confidence coefficient is 0/95, t= 1/96, p and q values are both 0/5 and N is population volume. P is regarded 0/5 due to if p=0/5, n would find its maximum amount and I t is lead to the sample to be big enough.

2.4. Research model:

The regression model is related to the research hypotheses tests:

$$Y = \alpha_0 + \alpha_1 HCE + \alpha_2 SCE + \alpha_3 CEE + \alpha_4 SIZE + \alpha_5 M/B + \alpha_6 LEV + \text{Year effects} + \text{Industry Effects} + \varepsilon_{it}$$

Y: financial health

HCE: human capital efficiency

SCE: structural human efficiency

CEE: physical capital efficiency

SIZE: firms size

M/B: M/B ratio

LEV: Leverage ratio

2.5. Data analyzing method:

In the first chapter, we will deal with descriptive statistics in the form of minimum statistics, maximum statistics, amplitude, and center-based statistics including average, mean, flow and standard deviation. In the second chapter, we will firstly do Pearson correlation test between the research's independent variables and then examine the existence of colinearity between independent variables. On the other side, the dependent variable should be quantitative and be included in relative/distance measurement level to conduct the linear regression analysis. However, our dependent variable is not included in relative/distance index and its index is based on nominal two-sided. To do so, two-sided logistic regression method is used. To test the fitting of the model and significance of each variable in the model, Chi square statistics (X^2) and Wald is used.

3. Research's results:

3.1. Descriptive statistics:

Table 2: Descriptive statistics of the sample firms.

Variable name	Min.	Max.	Average	Standard deviation
value added intellectual coefficient	-3/23	38/45	4/2975	3/7057
Structural capital efficiency	-3/47	37/1	0/9024	3/37
Human capital efficiency	0/22	12/74	3/0912	1/7023
Physical capital efficiency	0/01	2/32	0/3078	0/1807
Firm size	3/56	33/43	27/36	2/0942
Financial leverage	0/04	1/68	0/6206	0/1854
Market value to book value	-1/14	8/97	1/7603	1/1527

According to the table 2, most sampled companies have high distribution in value added intellectual coefficient and structural capital efficiency; hence there are high difference between the coefficients of sampled companies. Human capital efficiency, firm size, market value and book value per share have partly high distribution.

3.2. The research's hypotheses test:

3.2.1. First hypothesis:

Table 3: Condition of the research hypothesis in the model.

Variable	B	S.E	Wald	Df	Sig.	Exp (B)
Fixed coefficient	0/199	0/245	2/012	1	0/004*	2/036
value added intellectual coefficient	0/302	0/114	1/796	1	0/036*	1/444
Firm size	0/099	0/296	0/966	1	0/221	1/596
Financial leverage	0/172	0/374	1/745	1	0/034*	1/622
Market value to book value	0/126	0/105	1/265	1	0/074	1/278

* 5% error level

According to the table 3, odds ratio is 1/444 for value added intellectual coefficient of companies and it indicates that the influence of value added intellectual coefficient has positively influence on enhancing financial health of companies, as the higher value added intellectual coefficient, the financial health tends to be

more, i.e. healthy firms have higher value added intellectual coefficient than distressed companies. Wald's significance level (0/036) demonstrating that this variable is significant in 5% error level and H_0 can be rejected with 95% confidence level. Therefore, it can be concluded that there is a significant relation between value added intellectual coefficient and financial health of the companies. The regression model can be offered here:

$$Y = 0.199 + 0.302 \text{ VAIC} + 0.099 \text{ SIZE} + 0.126 \text{ M/B} + 0.172 \text{ LEV} + 11.254 + 56.365 + \varepsilon_{it}$$

Year effects and industry effects are equaled with 11/254 and 56/365, respectively.

3.2.2. Second hypothesis:

Table 4: Condition of the research hypothesis in the model.

Variable	B	S.E	Wald	Df	Sig.	Exp (B)
Fixed coefficient	0/102	0/521	1/965	1	0/014*	1/245
value added intellectual coefficient	0/369	0/114	2/251	1	0/000*	1/659
Firm size	0/142	0/354	1/362	1	0/077	1/116
Financial leverage	0/095	0/625	0/996	1	0/243	1/748
Market value to book value	0/205	0/441	1/475	1	0/102	1/569

* 5% error level

According to the table 4, odds ratio is 1/659 for human capital efficiency and it indicates that the influence of human capital efficiency has positively influence on enhancing financial health of companies, as the higher human capital efficiency, the financial health tends to be more, i.e. healthy firms have human capital efficiency than distressed companies. Wald's significance level (0/000) demonstrating that this variable is significant in 5% error level and H_0 can be rejected with 95% confidence level. Therefore, it can be concluded that there is a significant relation between human capital efficiency and financial health of the companies. The regression model can be offered here:

$$Y = 0.102 + 0.369 \text{ HCE} + 0.142 \text{ SIZE} + 0.205 \text{ M/B} + 0.095 \text{ LEV} + 15.625 + 43.278 + \varepsilon_{it}$$

Year effects and industry effects are equaled with 15/625 and 43/278, respectively.

3.2.3. Third hypothesis:

Table 5: Condition of the research hypothesis in the model.

Variable	B	S.E	Wald	Df	Sig.	Exp (B)
Fixed coefficient	0/255	0/514	1/952	1	0/014*	1/521
value added intellectual coefficient	0/458	0/301	2/265	1	0/001*	1/774
Firm size	0/157	0/202	2/174	1	0/003*	2/163
Financial leverage	0/065	0/326	1/265	1	0/085	1/521
Market value to book value	0/196	0/625	1/521	1	0/052	2/362

* 5% error level

According to the table 5, odds ratio is 1/774 for structural capital efficiency (organizational) and it indicates that the influence of structural capital efficiency has positively influence on enhancing financial health of companies, as the higher structural capital efficiency, the financial health tends to be more, i.e. healthy firms have structural capital efficiency than distressed companies. Wald's significance level (0/001) demonstrating that this variable is significant in 5% error level and H_0 can be rejected with 95% confidence level. Therefore, it can be concluded that there is a significant relation between structural capital efficiency and financial health of the companies. The regression model can be offered here:

$$Y = 0.255 + 0.458 \text{ SCE} + 0.157 \text{ SIZE} + 0.196 \text{ M/B} + 0.065 \text{ LEV} + 4.662 + 3.744 + \varepsilon_{it}$$

Year effects and industry effects are equaled with 4/662 and 3/744, respectively.

3.2.4. Fourth hypothesis

Table 6: Condition of the research hypothesis in the model.

Variable	B	S.E	Wald	Df	Sig.	Exp (B)
Fixed coefficient	0/415	0/336	2/115	1	0/003*	1/996
value added intellectual coefficient	0/115	0/295	1/996	1	0/011*	1/745
Firm size	0/374	0/196	1/021	1	0/096	1/026
Financial leverage	0/096	0/522	1/255	1	0/074	1/556
Market value to book value	0/114	0/487	1/657	1	0/046*	1/602

* 5% error level

According to the table 6, odds ratio is 1/745 for physical capital efficiency and it indicates that the influence of physical capital efficiency has positively influence on enhancing financial health of companies, as the higher physical capital efficiency, the financial health tends to be more, i.e. healthy firms have physical capital efficiency than distressed companies. Wald's significance level (0/011) demonstrating that this variable is significant in 5% error level and H_0 can be rejected with 95% confidence level. Therefore, it can be concluded that there is a significant relation between physical capital efficiency and financial health of the companies. The regression model can be offered here:

$$Y = 0.415 + 0.115 CEE + 0.374 SIZE + 0.114 M/B + 0.096 LEV + 2.623 + 7.552 + \varepsilon_{it}$$

Year effects and industry effects are equaled with 2/623 and 7/552, respectively.

4. Conclusion and recommendations:

According to the first hypothesis, intellectual capitals in companies increase the financial health of them. This is a positive relation, namely higher the investment in intellectual capitals, the more financial health would be. The results of this test are similar to the researches of Setayesh & Kazemnezhad (2009), Abbasi & Sedghi (2010), Jigal & Malol (2010) and inconsistent with Maditinos *et al.*, (2011) in Greece.

According to the second hypothesis, human capitals efficiency in companies increases the financial health of them. This is a positive and significant relation, namely higher the investment in human capitals, the more financial health would be and indicating that there is some other factors which is not regarded in this research, but influencing on financial health enhancement. The results of this test are similar to the researches of Setayesh & Kazemnezhad (2009), Abbasi & Sedghi (2010), Pourzamani & Jahanshad (2011) and Maditinos *et al.*, (2011).

Third hypothesis test indicated that the structural capitals (organizational) would increase the intellectual capitals of the companies, namely higher the efficiency of in structural capitals, the more financial health and continuation of the companies' activities would be. The results of this test are similar to the researches of Setayesh Abbasi & Sedghi (2010), Sinaei & Hajipour (2012), Jigal & Malol (2010) and inconsistent with Maditinos *et al.*, (2011). It is clearly that paying attention to and investing in structural capitals of an organization may improve the financial health in Iran.

According to the fourth hypothesis, physical capitals efficiency in companies increases the financial health of them. It means that higher the efficiency of physical capitals efficiency, the more financial health and continuation of the companies' activities would be. The results of this test are similar to the researches of Setayesh & Kazemnezhad (2009), Abbasi & Sedghi (2010), Jigal & Malol (2010) and inconsistent with Maditinos *et al.*, (2011) in Greece. Regarding the results of the research, the following recommendations are provided:

- 1- Since bankrupted companies have not continuing operations, the intellectual capital components can be examined and modeled in relation with the years before bankruptcy and based on arrangements.
- 2- Regarding to value creation of intellectual capital components, the impacts of the components can be examined on companies' financial ratios and their relation with different financial health level.
- 3- According to Pulic's model ignores the customer's capital, the customer's capital can be collected in another research through a questionnaire and tested with financial health of companies.
- 4- According to the financial health assessment based on the provided models, the managers, analysts, and other users of financial and non-financial information can examine the arrangements of the other influencing factors in order to provide the related supplementary information. These variables can even be included in cultural, ethical and political variables of the companies' surroundings.
- 5- Regarding to the influencing of intellectual capital components on the companies' financial health, it is recommended that intellectual capital components be calculated based on Pulic's model and provided as supplementary information for decision-making in financial statements of the companies in order to evaluating the continuation of activities and profitability.

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