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The Examination of Relationship between Intellectual Capital and Financial Performance According to the Modulating Role of Competitive Advantage

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Abstract

Intellectual capital is a new matter that theoretically is suggested in the few recent years. This unobservable source as one of the companies' increasing sources and a key capital in the development of entrepreneurship has been offered. Today, the necessity of development and management of intellectual capital has been converted into a serious necessity at the macro level and in the business arena. Thus, managers need to measure their efforts of optimum use of intellectual capital on their own organization. Therefore, this research examined the relationship among the variables of intellectual capital and financial performance as well as competitive advantage in the 45 companies listed on Tehran Stock Exchange through 225 answered questionnaires from 300 sent questionnaires by managers. Additionally, data related to the performance was collected from information of companies listed on Tehran Stock Exchange and finally, data analysis and hypotheses testing were done using structural equations and factor analysis was done using LISREL software as well as multiple regressions. The results of the research indicate that there is a positive significant relationship between intellectual capital and competitive advantage, but competitive advantage does not modulate the impact of intellectual capital on the financial performance.

Keywords: Intellectual Capital, Competitive Advantage, Return of Assets, Return of Equity, Profit of Per Share

Introduction

One of the most important problems of traditional accounting system is its inability in measuring companies' intellectual capital. In today's knowledge-oriented societies, the output of the employed intellectual capital in comparison with financial capitals in explaining financial profitability has been gained significant importance. Therefore, tendency to the measurement and consideration of the true value of invisible assets based on the intellectual capital has been significantly increased (Bontis *et al.*, 2000). Thus, all companies are searching for defining intellectual capital and classifying comprehensively this capital that include all the

effective factors. Kendrick one of the American economists states that in 1925 the rate of invisible assets to visible was 30 to 70, but in 1990s it increased 63 to 37 (Seetharaman *et al*, 2002). What that should be taken into account is that the market has identified the worth of knowledge and invisible factors in the process of value-making from a long ago. Recently, the size of the “hidden value” has changed. For example, in 1996 net assets of Merck Company has been only 12/3 of its market value as well as Microsoft has covered 6% of its market value. Intellectual capital is a capital beyond physical and visible assets. Today, the portion of the intellectual capital can play an important role in creating value added and gross domestic product due to producing knowledge and information resulting in producing wealth in the knowledge-economy. For this reason, at the level of enterprises, companies’ financial performance can be affected by the intellectual assets and human capital. Based on this, the present and future success in the inter-organizational competition has been based on the strategic assignment of physical and financial to some extent and it will be based on the strategic knowledge to a large extent. Managers’ challenge is preparing a suitable environment for developing human’s mind in the knowledge-oriented organization (Bontis, 1996). Financial performance both contain applying analysis tools and techniques regarding financial statements and other data related to obtaining useful information that the obtained information are used in evaluating companies’ past performance and present status. Today, intellectual capital is considered the most important asset in an organization and its success depends on its abilities in managing this rare source. It is possible that this important organizational capacity can create competitive advantage in comparison with other organizations. Thus, in the knowledge-oriented world, the organization’s capacities are based on the intellectual knowledge and capital and managers should understand that what capacities are necessary for keeping advantage. Thus, in these conditions the need for more awareness regarding intellectual capital and its control increases and this matter caused that companies identify and manage their invisible assets in order to create value in organizations and improve their general performance as well as achieving competitive advantage. Therefore, the present research is searching for finding the answer that “what is the impact of intellectual capital on the financial performance according to the modulating role of competitive advantage?”

A Review on the Theoretical Principles and Background

Intellectual Capital

With the review of researchers’ theories it will be manifested that a comprehensive definition of intellectual capital is the collective mental ability or key knowledge as a collection. Generally, intellectual capital provides a new data base that through it the organization can compete (Botnis, 1996). Botnis considers intellectual capital as an effort to use efficiently from knowledge (final product) against information (raw material). Brooking (1996) considers intellectual capital as a term for combining invisible market asset, intellectual asset, human asset and infrastructure asset that makes the organization able to do its activities. From Roos and colleagues’ view, intellectual capital includes all processes and assets that usually are not shown in the statement.

Intellectual Capital Elements

Generally, researches and persons working in the field of intellectual capital agree on three elements as human capital, relationship capital and structural capital.

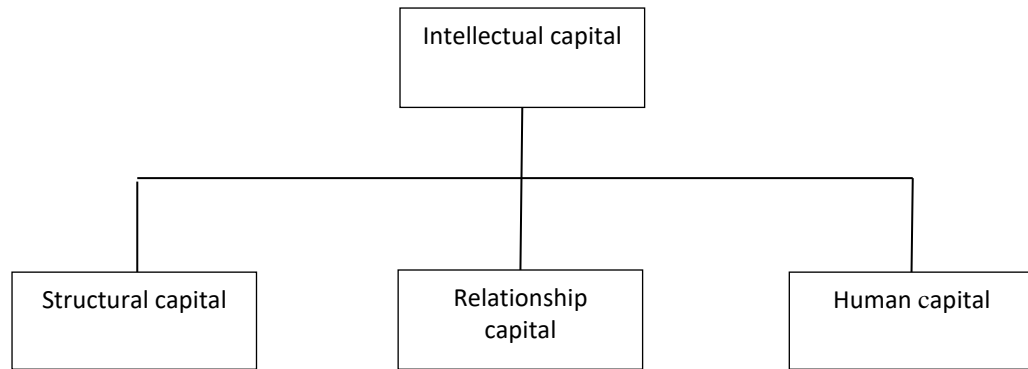


Chart 1. Intellectual capital components

Human Capitals

Human capital shows the knowledge store of an organization (Bontis *et al*, 2000). Roos and colleagues discuss that employees create intellectual capital through competence, attitude and intellectual nimbleness. Moreover, Brooking believe that human asset of an organization include skills, expertise, problem-solving ability and leading styles. Human capital caused that organizations depend on their own employees' knowledge and skills in order to ear income, develop and improve efficiency and productivity (West Phalen, 1999).

Structural capital

Structural capital include all the non-human sources of knowledge in the organization that includes data bases, organizational charts, administrative instructions, processes, strategies, practical programs and generally everything that its value is higher than its material value (Roos & Roos, 1997).

Relationship capitals

Stewart (1997) suggests that customers' main matter is the knowledge in marketing channels and relationship with customers. Customer's capital indicates potential ability of an organization due to its external invisible factors that have developed new definitions of the new concept of customer's capital to relationship capital that include knowledge in all the relationships that the organization makes with customers, rivals, providers, commercial association or the government (Botnis, 1999).

Definition and Meaning of Competitive Advantage

J.Kigan considers competitive advantage as the increasing amount of the company's suggestions in comparison with competitors' view. Haolma defines competitive advantage in difference of characteristics or dimensions of a company that enables better services than competitors for customers. From Porter's view (1985) competitive advantage is presentable values for customers in a way that these values are higher than customers' costs.

Above definitions and the other offered definitions regarding competitive advantage indicate that direct contact determines customers' values, company's presented values, and competitors' presented values as well as the necessities and dimensions of competitive advantage. Therefore, management should do a complete evaluation from internal and external environment I order to define competitive advantage of an economic unit. When a manager can find a strength point in his/her economic enterprise has found a competitive

advantage. Companies in the technology area, management and marketing can have competitive advantage in relation to their competitors.

Financial Performance

The development of economics, the increase of shares companies, and the separation of management from ownership have made representative matters as one of the most important investors' challenges. Representative matters springs from the fact that investors usually have not the necessary desire or ability for managing company's affairs. Thus, this responsibility is assigned to the managers. If managers and investors want to increase their personal interests and if supervision over representative's performance requires costs, this matter implicitly states that the representative may not seek the owner's interests and increasing his/her wealth. Therefore, choosing a suitable criterion in order to have confidence in achieving company's final objective that is increasing owners' wealth is one of the most important solutions to progress shareholders for evaluating company's performance and making appropriate decisions.

Background

Firer and Williams in their research title "the examination of intellectual capital and criteria of business companies' performance" with the aim of determining the relationship between intellectual capital and performance and its sample size of 75 business companies using Palik model found that there a strong relationship among three components of value added (human capital, structural, physical) and criteria of traditional performance (Firer & Williams, 2003). In examining the relationship among intellectual capital and stock value as well as financial performance with the aim of determining the relationship between intellectual capital and market value, Chenetal and colleagues (2005) stated that the higher model of value added of capital and intellectual capital of companies improves financial performance and increase companies' stock value. Bollen and colleagues in the examination of intellectual capital structure and intellectual properties with the company performance with the aim of empirical making of intellectual capital value and intellectual properties with companies' performance used survey data of managers in German pharmacy industry for conducting the analysis of regression focused on the correlation among human capital, relationship capital, intellectual properties and company performance. The results indicated that including intellectual properties in the connecting intellectual capital to company performance models, the statistical validity of such models and their relatedness increases it for managers and intellectual capital is an important resource of economy and wealth of an organization (Bollen *et al.*, 2005).

Hang and colleagues (2007) also in their examination of relationship between intellectual relationship and companies performance showed that there is a relative correlation between intellectual capital and companies output. They also obtained the positive relationship between increasing of intellectual capital and future output of companies. The results of Juei's research regarding intellectual capital and market value of a company in the U.S. electronic industry showed that there is a positive relationship between intellectual capital and market value of a company (Juei, 2008). Chen in a research titled "intellectual capital performance in Pakistani companies' parts" for measuring intellectual capital; value added of capital coefficient was used. The findings showed that chemical, oil, gas and cement had high intellectual capital performance and bank had middle intellectual capital performance and public sector's companies had low intellectual capital performance

(Chen, 2009). The results of Kiong tin and colleagues (2009) in the examination of intellectual capital performance and its relationship with the financial performance of financial institutes in Malaysia showed that there is positive significant relationship between intellectual capital and profitability of company. Additionally, this study showed that human capital efficiency and efficiency of used capital have positive significant impact on the profitability, while the efficiency of structural capital has a negative impact.

In a research titled “the examination of relationship between intellectual capital and performance of financial companies in 15 Malaysian stock companies with the regression pattern, Neak Mohammad (2009) found that intellectual capital has the highest impact on the bank institutes than insurance and credit institutes in the performance of that institute. Meditunes and colleagues conducted the test of impact of intellectual capital on the market value and finally financial performance in 96 companies listed in Athens Stock Exchange that included 4 different parts of industries during three years from 2006 to 2008. Generally, the results showed that Greece market respects more physical assets than intellectual capital thus, the relationship of human capital efficiency was also confirmed (Madininos *et al.*, 2011). Cheng and colleagues examined the impacts of intellectual capital, human capital, customer, innovation and the process of corporate performance in 56 from 224 companies in health care industry in a four-year period. In this research, structural equations method was used to analyze the data. Empirical findings showed that there was an important relationship between intellectual capital and corporate performance and results also showed that companies can increase their own corporate performance by value added of human capital (Cheng *et al.*, 2011).

Variables and Models

In this research the extraction of variables was based on the creating previous researches’ problems and on the hypotheses. Based on this, the study variables in the research are as follows:

- Intellectual capital;
- Competitive advantage;
- Financial performance.

Therefore, in the first hypothesis intellectual capital is independent variable, competitive advantage as dependent variable and in the second hypothesis the impact of intellectual capital as independent variable and financial performance as the dependent variable and competitive advantage has the mediator role. The variable of intellectual capital was evaluated through questionnaire in three dimensions of humanistic, structural and relationship and competitive advantage also in four dimensions of quality, flexibility, time and cost. Based on the theoretical studies, this research is designed based on Botonis and Mintezberg’s theories and based on this, questions and hypotheses are designed in order to examine the relationship among intellectual capital and financial performance as well as the modulating role of competitive advantage.

Methodology

The methodology of the present research is applied in objective because its results can be practically applied. From the viewpoint of data nature, the present research is an Ex post facto one because historical data of companies are used to test hypotheses. Moreover, from the viewpoint of relationship of variables the present research is correlative because regression and correlation are used to analyze hypotheses. Since that the research describes the situation it is considered a descriptive research. The period of time of the research is between 2012 and 2013. The statistical population, according to its nature was the companies listed on Tehran Stock Exchange. In order to determine samples, random sampling method was used using the following formula:

$$n = \frac{NZ^2\delta^2}{\varepsilon^2(N-1) + Z^2\delta^2} \quad (1)$$

$$Z = 1/96$$

$$\delta^2 = \frac{r}{6} = \frac{5-1}{6} = .667 \quad (2)$$

In order to collect related data to intellectual capital and competitive advantage, questionnaire and in order to collect data related to financial performance, information sources in the companies listed on Tehran Stock Exchange were used. At last, 300 questionnaires were distributed and 225 questionnaires were answered which were used to analyze the final analysis. The adjusted questionnaire had 71 questions that 4 questions were related to the specifications of respondents, 50 questions were used to measure the variable of intellectual capital and 17 questions were used to measure the variables of competitive advantage. The measurement scale of questions related to the variables included five ranges as completely disagree, disagree, no idea, agree and completely agree and each scale was scored between 1 to 5. In order to compile the questionnaire of intellectual capital, Bontis (1998) and Lip and Logeri's criteria (2004) and in order to compile the questionnaire of competitive advantage, Lee and Zhao's criteria were used. The contents of the questionnaires were confirmed by academic and organizational elite. Based on this, the questionnaire has a suitable validity. Cronbach's alpha was used to calculate its reliability and its values were 0.96 and 0.92 for the intellectual capital and competitive advantage respectively.

In order to achieve to the objectives of the research, the following hypotheses were used:

Hypothesis 1: There is a significant relationship between intellectual capital and competitive advantage.

Hypothesis 2: There is a significant relationship between intellectual capital and financial performance according to the modulating role of competitive advantage.

Sub-hypothesis 2-1: There is a significant relationship between intellectual capital and EPS according to the modulating role of competitive advantage.

Sub-hypothesis 2-2: There is a significant relationship between intellectual capital and ROA according to the modulating role of competitive advantage.

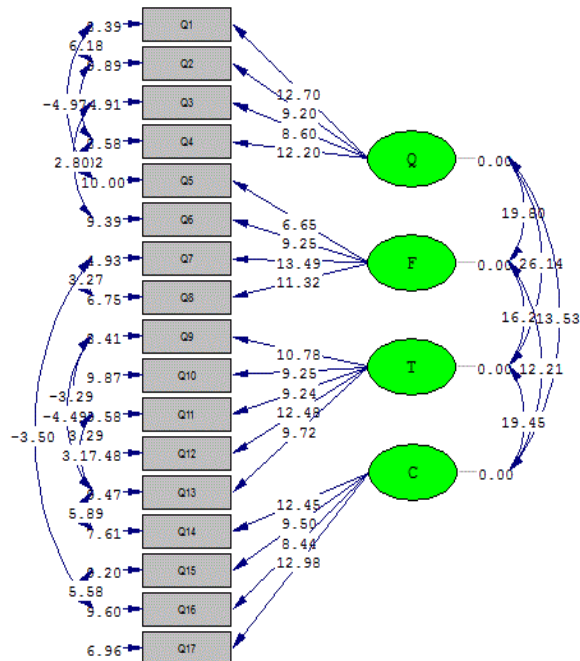
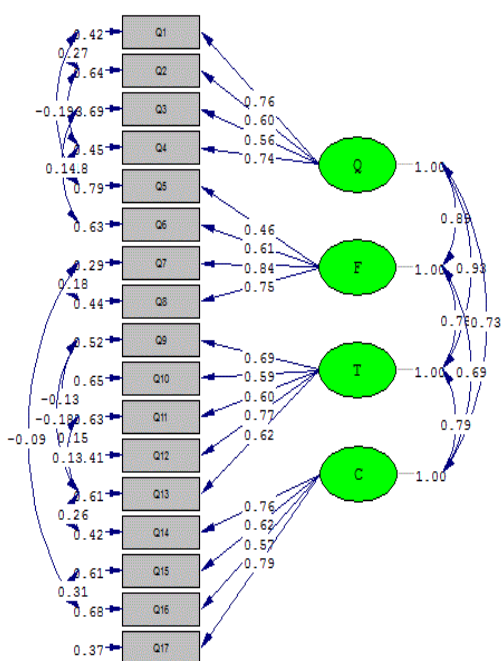
Sub-hypothesis 2-3: There is a significant relationship between intellectual capital and ROE according to the modulating role of competitive advantage.

Results

In order to analyze the existence of one-variable relationship, SPSS 18 and in order to confirm the relationship among variables and factors, Confirmatory Factor analysis and structural equations technique using LISREL 8.72 which is one of the most famous software for applying such models, were used. In order to test the hypotheses, the measurement of synchronal relationships, direct or indirect among variables was used. Additionally, multivariable regression analyzed the hypothesis of modulating role of competitive advantage.

The Analysis of Confirmatory Factor of the Variable of Competitive Advantage (CA)

In this section, the confirmatory analysis of variable of competitive and determination of models' goodness of fit are done. First, the model is drawn in nonstandard estimation state. Since the possibility of comparison among observed explaining latent variable is existed only in the standard estimation and model in standard form shows that to what extent the related variance to the latent variable is explained by the observed variable, after that the model is drawn in standard coefficient state. LISREL software for every fee parameter, (estimated) in model 1 calculates one value of t. This test shows that which parameter can be eliminated from the model without X² will be increased. The ideal is the value will be smaller than 2 instead of considered insignificant. Thus, with drawing of the model in significant number state (t-value) goodness of fit will be achieved if all indices are significant or not in this case, the model will be corrected and after replications of stages, the goodness of fit of the model will be achieved. The multiple variables correlation square (R²) is the introducer of the relation of explained variance by the latent variable (the test for exactness of a indicator) and should (to the possible extent) will be close to 1. The charts of 2 and 3 indicate the model in the standard estimation state and significant numbers of t-value.



Chi-Square=252.94, df=100, P-value=0.00000, RMSEA=0.063 Chi-Square=252.94, df=100, P-value=0.00000, RMSEA=0.063

Chart 2. The model in the standard coefficient state

Chart 3. The model in significant numbers state (t-value)

The numbers on the paths show the value indicator t-value for each path. If this value is not significant, that will be red colored in the output of the software. In analysis of the value of t-statistic, it has been for all questions of higher than 1.96 and as a result, they have been significant. The result of confirmatory analysis of competitive advantage after determining the model's goodness of fit, it is presented in Table 1. The values of t-statistic for each question is higher than 1.96 and the determination coefficient value of it is also suitable and acceptable. Thus, models have acceptable goodness of fit and none of questions are eliminated.

Table 1

Determination coefficients and statistic value of t-test in the measurement model of the variable of competitive advantage

Casual relation	Determination Coefficient (R ²)	t-value	Casual relation	Determination Coefficient (R ²)	t-value
Q-Q1	0.58	12.70	T-Q10	0.35	9.25
Q-Q2	0.36	9.20	T-Q11	0.37	9.24
Q-Q3	0.31	8.60	T-Q12	0.59	12.48
Q-Q4	0.55	12.20	T-Q13	0.39	9.72
F-Q5	0.21	6.65	C-Q14	0.58	12.45
F-Q6	0.37	9.25	C-Q15	0.39	9.50
F-Q7	0.71	13.49	C-Q16	0.32	8.44
F-Q8	0.56	11.32	C-Q17	0.63	12.98
T-Q9	0.48	10.78			

The Analysis of Confirmatory Factor of the Variable of Intellectual Capital (IC)

Charts 4 and 5 show the model in standard estimation state and significant numbers t-value are for the variable of intellectual capital.

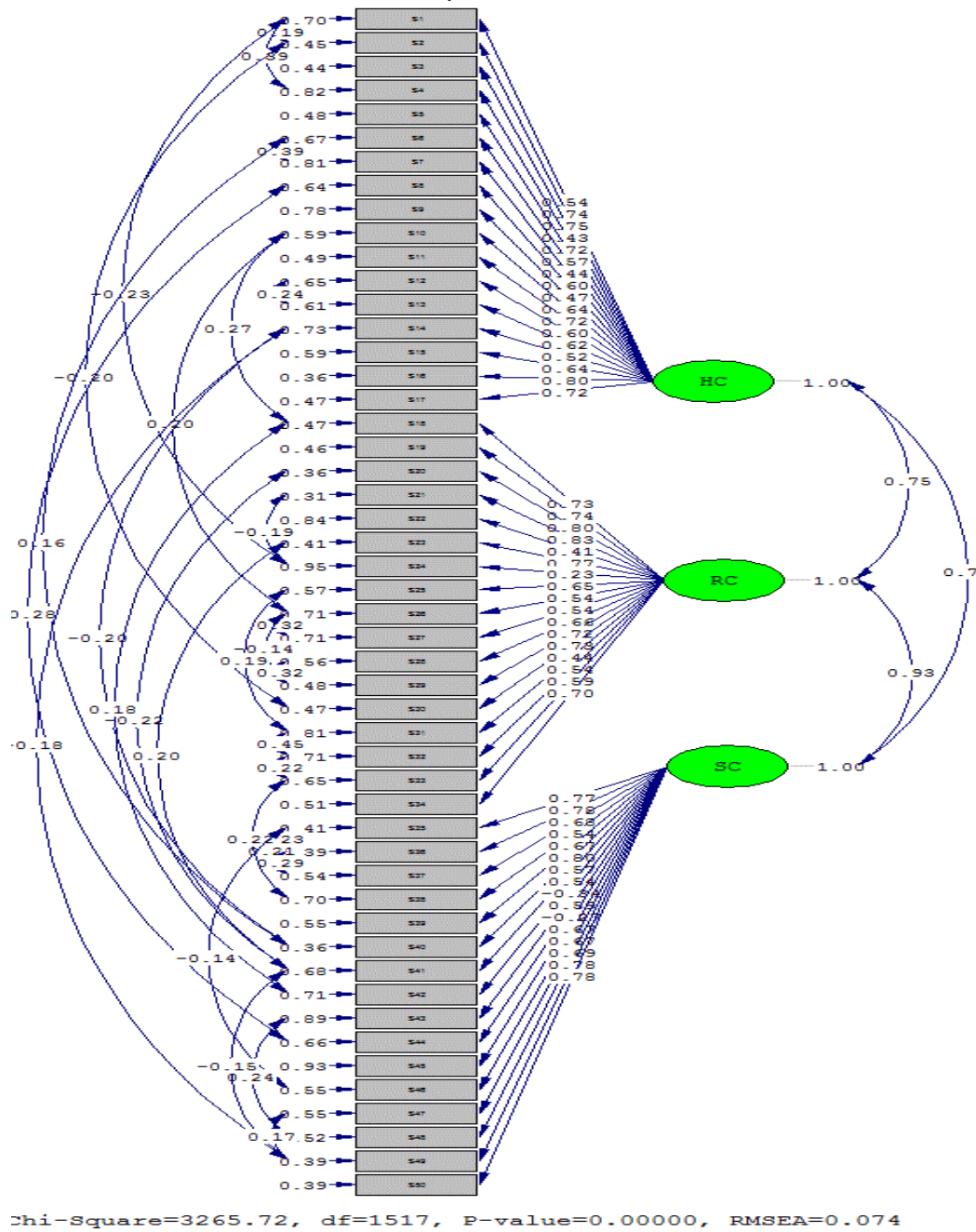


Chart 4. The model in standard coefficients state

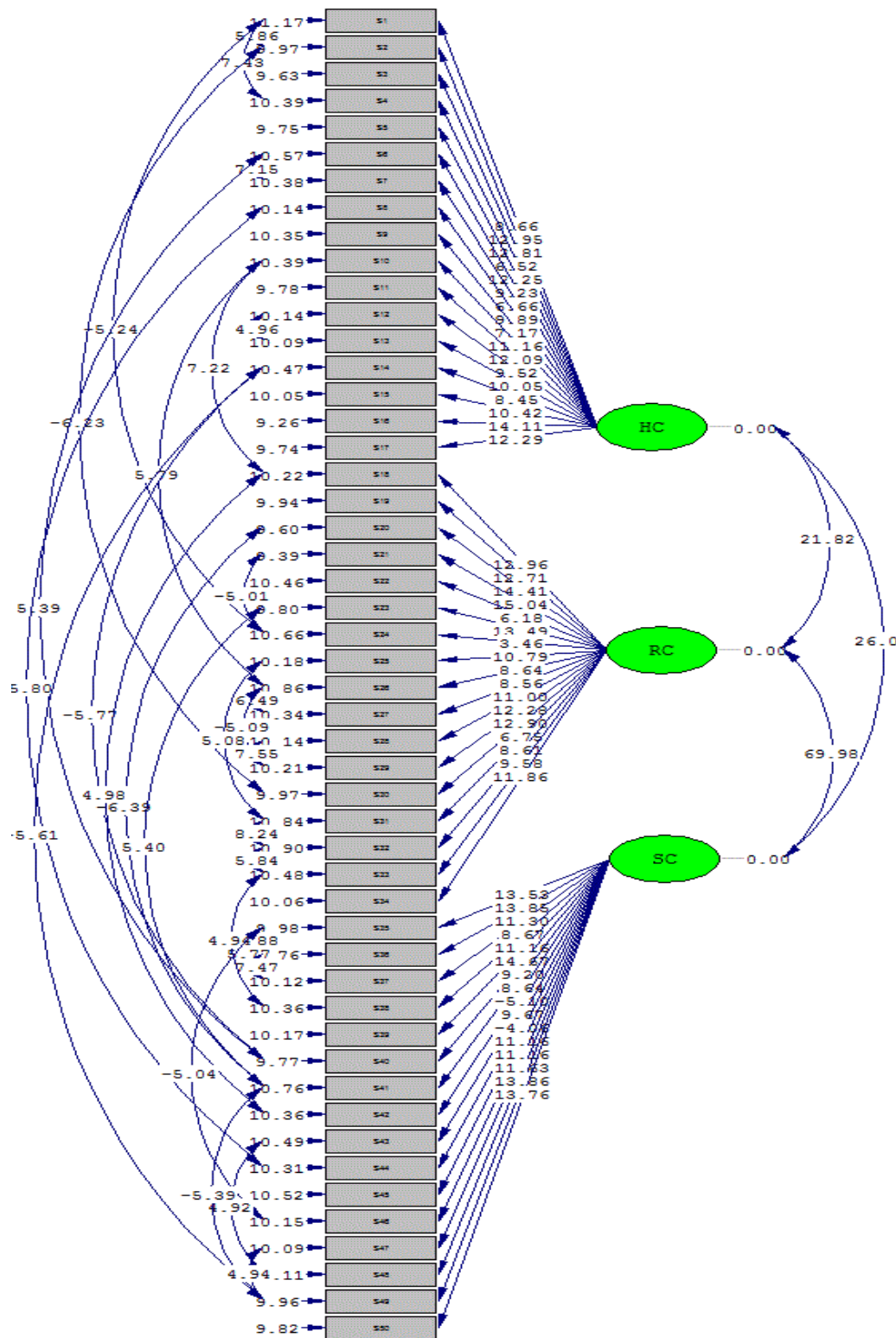


Chart 5. The model in significant numbers (t-value)

The results of the confirmatory analysis of intellectual capital are presented after the determination of model's goodness of fit in Table 2. The values of t-statistic for questions are higher than 1.96 and the value of their determination coefficient are suitable and acceptable. Thus, models have acceptable goodness of fit and none of questions are eliminated.

Table 2

Determination coefficients and statistic value of t-test in the measurement model of the variable of intellectual capital

Causal relation	Determination Coefficient (R ²)	t-value	Causal relation	Determination Coefficient (R ²)	t-value
HC-S1	0.30	8.66	RC-S26	0.29	8.64
HC-S2	0.55	12.95	RC-S27	0.29	8.56
HC-S3	0.56	12.81	RC-S28	0.44	11.00
HC-S4	0.18	6.52	RC-S29	0.52	12.28
HC-S5	0.52	12.25	RC-S30	0.53	12.90
HC-S6	0.33	9.23	RC-S31	0.19	6.75
HC-S7	0.19	6.66	RC-S32	0.29	8.61
HC-S8	0.36	9.89	RC-S33	0.35	9.58
HC-S9	0.22	7.17	RC-S34	0.49	11.86
HC-S10	0.41	11.16	SC-S35	0.59	13.53
HC-S11	0.51	12.09	SC-S36	0.61	13.85
HC-S12	0.35	9.52	SC-S37	0.46	11.30
HC-S13	0.39	10.05	SC-S38	0.30	8.67
HC-S14	0.27	8.45	SC-S39	0.45	11.16
HC-S15	0.41	10.42	SC-S40	0.64	14.67
HC-S16	0.64	14.11	SC-S41	0.32	9.20
HC-S17	0.53	12.29	SC-S42	0.29	8.64
RC-S18	0.53	12.96	SC-S43	0.11	-5.10
RC-S19	0.54	12.71	SC-S44	0.34	9.67
RC-S20	0.64	14.41	SC-S45	0.07	-4.06
RC-S21	0.69	15.04	SC-S46	0.45	11.16
RC-S22	0.16	6.18	SC-S47	0.45	11.16
RC-S23	0.59	13.49	SC-S48	0.48	11.63
RC-S24	0.05	3.46	SC-S49	0.61	13.86
RC-S25	0.43	10.79	SC-S50	0.61	13.76

The Main Model

It is necessary that before entering into the stage of testing hypotheses to be assured from the correctness of measurement model. In the research, Confirmatory factor analysis is done using path analysis for testing the significance about factors. In analysis of each of models, before the confirmation of structural relations, the model's goodness of fit should be assured in a way that X^2 statistic and other criteria for the suitability of the model's goodness of fit should be examined in a way that a model is suitable that has following optimum states. The value of X^2 to the freedom degree should be smaller than 3 and as it is smaller, it is better, because this test shows the difference between the data and the model. As the index of RMSEA is closer to the absolute value of 0.50 and smaller than 0.08 (closer to zero) shows the higher model's goodness of fit and if it show not a suitable goodness of fit, model should be corrected by the output related to the model's correctness and then using the corrected

model, questions and hypotheses should be examined. Tables 3 and 4 show t-statistic, standard coefficient and error value for the variables of intellectual capital and competitive advantage.

Table 3

The examination of coefficients and t-value for the index of intellectual capital

Items	Standard coefficient	t-statistic	Determination coefficient	Error
HC	0.94	16.19	0.88	0.038
RC	0.82	13.45	0.67	0.043
SC	0.83	13.77	0.69	0.039

Table 4

The examination of coefficients and t-value for the index of competitive advantage

Items	Standard coefficient	t-statistic	Determination coefficient	Error
Quality	0.90	-	0.81	-
Flexibility	0.74	12.42	0.54	0.044
Time	0.81	14.14	0.66	0.042
Cost	0.77	11.67	0.60	0.048

All the variables have t-statistic of higher than 1.96 as well as their determination coefficient is suitable. Thus, none of them is eliminated and we will continue our work with all the items (variables) and examine the model. The main model is presented in the standard coefficients state and significant number of t-value in charts 6 and 7.

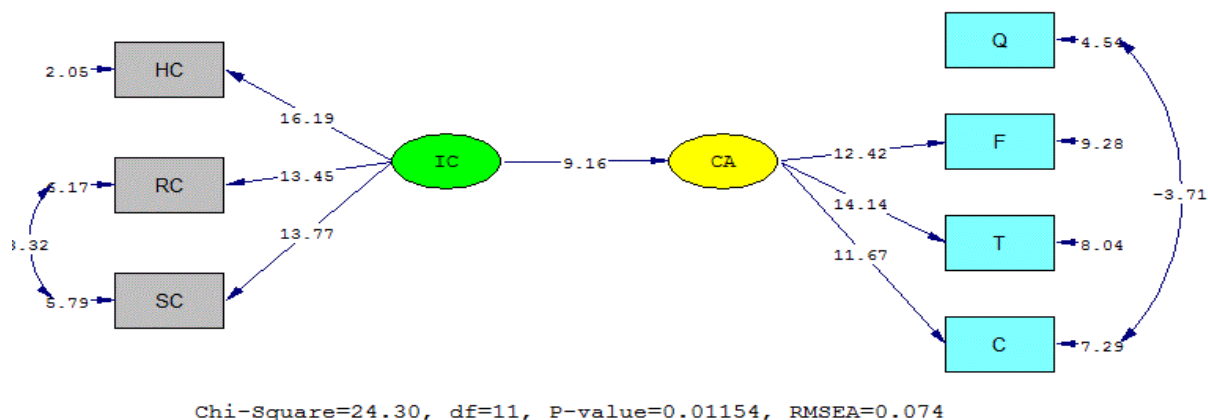


Chart 6. The model in significant numbers state (t-value)

The numbers on the paths show t-value for each path. If the value is not significant, that is shown red in the output of the software. In this analysis t-statistic value is higher than 1.96 for all paths and thus they are significant.

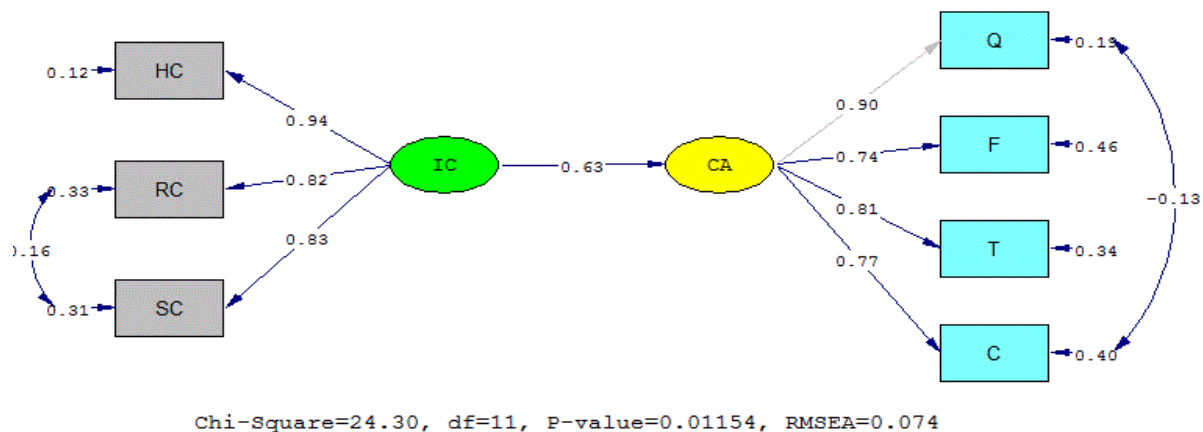


Chart 7. The model in standard coefficient state

The above chart shows the general model in standard coefficient state. The estimation results (the following of the chart) indicates model’s goodness of fit. According to the output of the LISREL the value of χ^2 to the freedom degree is equal to 2.21 and smaller than 3 that is a suitable value. The lowness of the index shows the little difference between the conceptual model and observed data. Additionally, the output shows RMSEA 1 and observed data. Additionally, the output shows RMSEA =0.074 for the model that is smaller than 0.08. In addition to χ^2 as the index RMSEA is smaller, the model has more suitable goodness of fit. Table 5 shows the values for each of goodness of fit indices.

Table 5
The indices of goodness of fit examination

Indices	χ^2	df	χ^2 /df	RMSEA	GFI	AGFI	NFI	NNFI	IFI	CFI
Reported value	24.30	11	2.21	0.074	0.97	0.92	0.98	0.98	0.99	0.99

As it is shown, based on the above, based on the above criteria, the model has an optimum goodness of fit. As it is shown chi-square value to the freedom degree is smaller than 3. Additionally, the value of RMSEA is equal to 0.074 and smaller than 0.08 and indices CFI-IFI-NNFI-NFI-AGFI-GFI are higher than 0.90. Therefore, the model has showed a good goodness of fit and is confirmed. Now, using the value of t-statistic and standard coefficient, we will examine the impact of each independent variable on the dependent variable according to the model.

Testing Hypotheses

After the examination and confirmation of the main mode, the hypotheses of the research model are evaluated and in this section hypotheses related to each question are tested.

Hypothesis 1: Intellectual capital has an impact on the competitive advantage.

If the absolute value of t-statistic is smaller than the value of the table 1.96, the null hypothesis is confirmed and If the absolute value of t-statistic is higher than the value of the table 1.96, the null hypothesis is rejected.

Table 6
t-statistic for the first hypothesis

t-statistic	Table value	Conclusion	Impact value
9.16	1.96	No impact	0.63

Because the absolute value of t-statistic is 9.16 and higher than the value of the table 1.96, thus, null hypothesis is rejected, in other words, intellectual capital has a significant impact on the competitive advantage and the impact value is equal to 0.63 positive (direct). It means that with the increase of intellectual capital, competitive advantage can be improved.

Hypothesis (1-2): Competitive advantage modulates the impact of intellectual capital on EPS.

In order to analyze the modulating role of competitive advantage in the relationship between intellectual capital and EPS, multivariable regression is used. Table 7 shows the results of regression analysis.

Table 7
The results of regression analysis and the summary of the model

Model components	VIF	Tolerance	Sig	t-statistic	Beta	Standard error
Fixed			0.00	4.544		106.391
Intellectual capital	3.474	0.288	0.131	1.540	0.391	304.029
Competitive advantage	4.202	0.238	0.992	-0.010	-0.003	266.708
Competitive advantage × Intellectual capital	3.003	0.333	0.542	-0.615	-0.145	207.368
F-statistic				4.617		
Significance of F-statistic				0.007		
Determination coefficient				0.257		
Durbin-Watson statistic				1.448		

According to the significance level of the interaction between the variable of intellectual capital and competitive advantage (0.542) and the value of t-statistic (-0.615) because the value of t-statistic is smaller than the table value 1.96 and significance level is higher than 0.05. Therefore, the null hypothesis is confirmed, in other words, competitive advantage does not modulate the impact of intellectual capital on EPS.

Hypothesis 2-2: Competitive advantage modulates the impact of intellectual capital on ROA.

In order to analyze the modulating role of competitive advantage in the relationship of intellectual capital and ROA, multivariable regression is used and its results are observed in Table 8.

Table 8

The results of regression analysis and the summary of the model

Model components	VIF	Tolerance	Sig	t-statistic	Beta	Standard error
Fixed	-	-	.000	4.754	-	1.471
Intellectual capital	3.474	.288	.974	-.033	-.008	4.213
Competitive advantage	4.202	.238	.082	1.785	.479	3.689
Competitive advantage × Intellectual capital	3.003	.333	.642	-.469	-.106	2.868
F-statistic				6.124		
Significance of F-statistic				0.002		
Determination coefficient				0.315		
Durbin-Watson statistic				1.511		

According to the significance level of the interaction between the variable of intellectual capital and competitive advantage (0.642) and the value of t-statistic (0.469) because the value of t-statistic is smaller than the table value 1.96 and significance level is higher than 0.05. Therefore, the null hypothesis is confirmed, in other words, competitive advantage does not modulate the impact of intellectual capital on ROA.

Hypothesis (2-3): Competitive advantage modulates the impact of intellectual capital on the ROE.

The results of regression analysis for the modulating role of competitive advantage in the relationship between intellectual capital and ROE are presented in the following table.

Table 9

The results of regression analysis and the summary of the model

Model components	VIF	Tolerance	Sig	t-statistic	Beta	Standard error
Fixed	-	-	.056	1.969	-	7.322
Intellectual capital	3.474	.288	.144	1.491	.368	20.963
Competitive advantage	4.202	.238	.179	1.369	.371	18.356
Competitive advantage × Intellectual capital	3.003	.333	.359	.928	.213	14.272
F-statistic				5.729		
Significance of F-statistic				0.002		
Determination coefficient				0.301		
Durbin-Watson statistic				2.097		

According to the significance level of the interaction between the variable of intellectual capital and competitive advantage (0.359) and the value of t-statistic (0.928) because the value of t-statistic is smaller than the table value 1.96 and significance level is higher than 0.05. Therefore, the null hypothesis is confirmed, in other words, competitive advantage does not modulate the impact of intellectual capital on ROA.

Conclusions

The first hypothesis is the examination of positive significant between the variables of intellectual capital and competitive advantage that this hypothesis was examined and because the absolute value of t-statistic was equal to 9.16 and higher than the value of .96, the null hypothesis is rejected, in other words, intellectual capital has a significant impact on the competitive advantage and the value of this impact was 0.63 positive that its results are presented in Table 6. In the first, second and third sub-hypotheses of the second main hypothesis, for examining the modulating role of competitive advantage in the relationship between intellectual capital and performance indices, multivariable regression analysis was used. Because the determination coefficient was higher than (0.005) and the value of t-statistic was negative and smaller than 1.96 in measuring intellectual capital with three indices of performance, it can be concluded that competitive advantage does not modulate the impact of intellectual capital on the financial performance. Based on the above results, designating supporting and encouraging system for employees' superior ideas in order to improve intellectual capital in the organization and therefore, improving the organization's performance as well as the organization's attempt for creating a supporting culture through designating encouraging systems for reinforcing creativity and innovation in the direction of improving companies' performance are suggested. Moreover, compiling intellectual capital indices at national and organizational levels can be useful for developing intellectual capital in organizations.

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