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The relationship Between Intellectual and IT Based Structural Capital with Financial Performance (A Case Study)

Reza Pirayesh *[1], Sahar Zhaleh Khojasteh[2], Vahideh Alipoor[3]

Assistant Professor of Management and Accounting Department, university of Zanjan, Iran[1]
Master of Business Management, university of Zanjan, Iran [2]
Assistant Professor of Management and Accounting department, university of Zanjan, Iran[3]
r_pirayesh@znu.ac.ir1, s.khojasteh@znu.ac.ir[2], vahidehalpoor@znu.ac.ir[3]

Abstract : The emergence of high technology, information, and innovation based environment in the world today has greatly altered the way and manner businesses are done globally. In the competitive and constantly changing business world, intellectual capital has a special position in directing business and determining the level of organizational performance as an intangible asset. The study investigates the relationship between intellectual capital and the performance of the banks listed in Tehran Stock Exchange in terms of financial and marketing performance using Pulic's Value Added Intellectual Coefficient (VAIC) model. This is an applied research In terms of purpose and in terms methodology is a solidarity research. The statistical population includes the banks listed in the stock exchange during the years 1388-1393. We used ROE and ROA variables, the capital adequacy ratio and earnings per share using financial reports and "Rah-Avard Novin" financial software to evaluate financial performance. For analyzing any existing relationship between variables, GLS and OLS regressions are used in this study with Eviews. It

Keywords: Intellectual Capital, Structural Capital, Physical Capital, Human Capital, Financial Performance

1. Introduction

Intellectual capital promotes as a key factor for the survival of the organization and maintaining competitiveness [1].Organizations need a good capacity to maintain, develop, organize and use the capabilities of their employees to stay at the front of competition. It seems that intellectual capital is increasingly considered as one of the major features for the survival of the organization [2].

Currently, knowledge and information are regarded as keys to economic prosperity. Knowledge-based economy through research, technology and thinking causes products with added value. Intellectual capital can be defined as knowledge-based capital of the organization that has attracted much attention in the last two decades [3]. Nowadays, many companies invest in cases like employee training, research and development, customer relations, computer and office systems that these investments are often known as intellectual capital [4]. Since the new economy development emphasize the fact that value creation in more dependent on intangible assets to physical assets. Therefore, in these economies, Intellectual capital is considered as the main source of economic development and other traditional factors of production such as land, labor and financial capital are secondary in place of importance. In such circumstances, intellectual capital is the key factor in improving organizational performance. The most important issue in the intellectual capital context is how to conceptualize, percept, evaluate and measurement of these types of assets. Tools and methodologies of knowledge management and information technology help the organization to analyze and identify their capabilities and abilities to maintain and achieve sustainable competitive advantage and finally achieve the knowledge-based economy. Such evaluations can facilitate the performance adaptation and appropriate ways and also the growth of national knowledge systems for comprehensive development [1].

Due to the backwardness of Iran's banking system compared to developed countries and the lack of conditions for competition with global banking and taking advantage of the intellectual capital and modern knowledge, There is a wide area for progress in this field which considerable gains can be achieved with work and effort. Meanwhile, checking the performance of intellectual capital in banking industry is controversial to determine how much the organization's intellectual capital is focused. Take a look back at financial and economic crisis during 2008-2011 And its consequences in the next period, significantly placed the idea of analyzing the relationship between organizational performance and its resources at the center of attention [6].

The main question of this research is that is there any significant relationship between intellectual capital and financial performance evaluation criteria of the banks listed in Stock Exchange? And if yes, how is the nature and extent of this relationship? Performing this project tries to Provide concepts tailored to the banking system of the country about intellectual capital and its components as well as the organizational

performance banks. And after determining the indicators for measuring the main research variables, the relationship between intellectual capitals will be examined as an independent variable and the performance of banks listed on the stock exchange will be examined as a dependent variable. In other words, the main purpose of this research is investigating the relationship between intellectual capital and financial performance of banks listed in the stock exchange.

2. The Concept of Intellectual Capital

The term intellectual capital was first introduced in scientific communities in 1969 by economist named John Kenneth Galbrith to explain the gap between the book value and the market value of enterprises. According to Stewart, Intellectual capital includes knowledge and competence of all individuals in the organization which creates a competitive advantage and wealth for the organization[7].Intellectual capital includes knowledge, creativity, reputation, organizational capacities, customer relationship, suppliers, information technology, etc. [8]. The main focus of this capital is on the systems that create value for the organization[9].The measurement of intellectual capital is of vital importance for knowing the financial position of the company. Intellectual capital will be measured using Value Added Intellectual Coefficient (VAIC) method and its association with financial performance indicators, such as ROA,ROE,EPS and capital adequacy ratio. In modern economy, wealth creation and economic growth primarily stems from intangible (intellectual) assets. In such circumstances, intellectual capital is considered as a key factor in improving organizational performance. Intellectual capital increasingly plays the main role in organizational performance [10].Intellectual capital management has been detected very important for long-term success of the organization. Organizations with intellectual capital management primarily have better performance. Investment in intellectual capitals is critical in order that organizations know how to manage their operational strategy to increase their performance [11]. There are several researches that suggest that there is a significant positive relationship between intellectual capital and organizational performance. These studies referred in background.

2.1. Elements of Intellectual Capital

2.1.1 Structural Capital

Structural capital is the supportive infrastructure for human capital. It is the capital which remains in the factory or office when the employees leave at the end of the day. It includes organizational ability, processes, data and patents. Unlike human capital, it is company's' property and can

be traded, reproduced and shared by, and within, the organization [12].From the above definitions, it is clear that intellectual capital is an important asset which has not been fully recognized and reported in financial statements but contributes significantly to improved financial performance and transformation of organizations.

2.1.2 Human Capital

In line with the above, human capital has been recognized as one of the key determinants of growth today[13].This applies especially to modern economies such as Switzerland, United States of America, China, and Japan etc as companies with a large share of unskilled labor have moved to other countries of the world as a consequence of their comparative intellectual capital advantage[14].According to Ahangar (2011), human capital is recognized as the largest and the most important intangible asset in an organization which ultimately provides the goods and/or services that customers require or the solutions to their problems. It includes the collective knowledge, competency, experience, skills and talents of people within an organization. It also includes an organization's creative capacity and its ability to be innovative. Although investment in human capital is growing, there is still no standard measure of its effectiveness and reporting in companies' balance sheets.

3. Proposed Methods

The main objective of this research was to investigate the relation between intellectual and capital financial performance of banks listed on Tehran stock exchange.

The present study is a descriptive survey method in term of data collection and is an applied research in terms of the purpose of the study.

3.1. Variables

3.1.1 In-Depended Variable

In this paper, value added intellectual coefficient (VAIC) is used as independent variable. IC has been defined variedly, but the most commonly accepted definition classifies it into human, structural and customer capital. These three components would be used as IC in this study. The value added intellectual coefficient (VAIC) is used as a measure to reflect the intangible assets of the firm. The detailed analysis of the concept is given below:

Value added is the difference between the output and input in the organization.

Value Added = Output - Input

Outputs are products and services of the organization while inputs are all the expenses which incurred in producing the products or services.

It is also expressed as

VA = I + DP + D + T + M + R + W = W + I + T + NI…….. (1)
Where,
I = Interest expenses;
DP = Depreciation expenses;
D = Dividends;
T = Taxes paid;
M = Equity of minority shareholders in net income of subsidiaries;
R = Retained profits;
W = Wages and salaries and
NI = Profits after taxes.

The first step is to determine the efficiency of the human capital efficiency on the value creation of the firm. This is obtained by estimating the ratio VAHU; this is the ratio of VA of the firm to the expenditure made by the firm on its human capital. These expenses are reflected in the salaries and wage cost of the firm in their annual reports:

$$VAHU = VA / HC$$

Where,
VA = Value added for the firm;
HC = Total wages and salary costs for the firm and VAHU = Human capital coefficient for the firm. The next measure captures the efficiency of the structural capital on the VA by the firm. This is the ratio of structural capital and value added of the firm represented as SCVA. The SC is calculated as follows

$$SC = VA – HC$$

Where,
SC = Structural capital for the firm;
VA = Value added for the firm and
HC = Total wages and salary costs for the firm.

Then the relationship is shown as:

$$SCVA = SC / VA$$

Where,

VA = Value added for the firm;
SC = Structural capital for the firm and
SCVA = Structural capital VA for the firm.

Pulic (2000) argues that there is a proportionate inverse relationship between HC and SC, in the value creation process attributable to the entire IC base. Therefore, the measure of SCE is slightly different from other ratios.

The next measure is used to measure the efficiency of the capital employed (VACA). This is the ratio of the value added to the total capital employed by the firm;

$$VACA = VA / CA$$

Where,

VA =Value added of the firm and;

CA = Capital employed of the firm and

VACA =Value added capital coefficient of the firm

The sum of these three ratios would generate a value, which can be denoted as VAIC – an indicator of the firms' intellectual ability and performance. If the VAIC of any firm is higher than others it means that the IC efficiency of this firm is higher:

$$VAIC = VAHU + SCVA + VACA$$

Where,

VAIC = Value added intellectual coefficient for the firm;

VAHU = Human capital coefficient for the firm;

SCVA = Structural capital value added for the firm and

VACA = Value added capital coefficient for firm.

3.2.1 Dependent Variables

Financial dependent variables of the study includes ROA, ROE, EPS and capital adequacy ratio, the definitions are as below:

$$\text{Return On Assets} = \frac{\text{Net Income}(\text{After tax})}{\textit{Total Assets}}$$

$$\text{EPS} = \frac{\text{net income}}{\text{average outstanding common shares}}$$

$$\text{Return On Equity} = \frac{\text{Net Income}(\text{Before tax})}{\text{Shareholder's Equity}}$$

$$\text{CAR} = \frac{\text{Tier 1 Capital} + \text{Tier 2 Capital}}{\text{Risk Based Assets}}$$

3.3.1 Control Variables

For the purpose of examining the association, this study uses correlation and OLS and GLS regressions as the underlying statistical tests. In conducting the liner multiple regression analysis, following

Control variables have been included:

- Size of the firm (SALES): Size of the firm

As measured by the natural log of total sales, used here to control for the impact of size on wealth creation.

Leverage (DER): Financial leverage as measured by total debt divided by total equity used to control for the impact of debt servicing on corporate performance and wealth creation. It is calculated as follow:

DER = Total dept. / Total equity

Physical capacity (PC): This ratio measures physical intensity i.e. how much fixed assets are there in proportion to total asset, calculated as:

Pc = Fixed assets / Total assets

3.2. Hypotheses

- There is a significant relationship between intellectual capital and financial performance of banks listed on the stock exchange.
  - ✓ There is a significant relationship between human capital and financial performance of banks listed on the stock exchange.
  - ✓ There is a significant relationship between structural capital and financial performance of banks listed on the stock exchange.
  - ✓ There is a significant relationship between physical capital and financial performance of banks listed on the stock exchange.

3.3. Target Community

The statistical population of this study including the bank listed in Stock Exchange which had the following conditions as a statistical sample, were selected as sample:

- The target bank must be listed in Stock Exchange from 2009 and must be active in Stock Exchange by the end of 2014.
- There must not be any change in the financial year ended in March and during the study period.
- The company during the study period is not removed from the list of companies listed on the stock exchange.
- The banks that are reported their audited financial statements to stock exchange during the study period.
- Information needed to carry out the research must be fully provided during the period.

Banks with these conditions include Eghtesad-Novin, Ansar, Pasargad, Tejarat, Sina, Saderat, Kar-Afarin, Mellat, Parsian branches and Post Bank during 2009-2014 (6 year period). Sampling was not performed for selecting these banks and each of the banks studied as sample.

3.4. Data Collection Tool

To measure the financial performance, a six-year data for regression of the dependent variables, ROA, ROE, EPS we used Rah-Avard Novin software for the years 2006 to 2013 and required data to measure intellectual capital variable and the capital adequacy ratio, financial statements and attached notes related to the bank listed in Tehran Stock Exchange on www.rdis.ir website were used. Audited financial statements related to 2014 also extracted from the Stock Exchange.

3.5. Data Analysis Method

Since the research data is a combination of cross-sectional data and time series, we used regression models based on panel data.

4. Discussion

For taking in-depth view on the relationship between intellectual capital and financial performance measures, OLS and GLS regressions have been applied. Both Fixed effect and Random effect model has been applied on panel data. Hausman specification test has been used to check which model should be used for analysis. In case, if Hausman X2 result found significant, then fixed effect model is used and when it is found insignificant then Random effect model is used for the analysis. Models used to study primary and subsidiary research

hypotheses are as follows: Models used to study primary and subsidiary research hypotheses are as follows:

H1: There is a significant relationship between intellectual capital and financial performance of banks listed on Tehran stock exchange.

$$Financial\ Performance = \alpha_{i,t} + \beta_1 vaic_{i,t} + \beta_2 lev_{i,t} + \beta_3 pc_{i,t} + \beta_4 size_{i,t} + \varepsilon_{i,t}$$

This model also consists of 4 other models of financial variables and measurement of their relationship with intellectual capital is as follows.

Model 1: There is a significant relationship between intellectual capital performance and return on assets of banks listed on the stock exchange.

$$ROA_{i,t} = \alpha_{i,t} + \beta_1 vaic_{i,t} + \beta_2 lev_{i,t} + \beta_3 pc_{i,t} + \beta_4 size_{i,t} + \varepsilon_{i,t}$$

Model 2: There is a significant relationship between intellectual capital performance and return on equity of banks listed on the stock exchange.

$$ROE_{i,t} = \alpha_{i,t} + \beta_1 vaic_{i,t} + \beta_2 lev_{i,t} + \beta_3 pc_{i,t} + \beta_4 size_{i,t} + \varepsilon_{i,t}$$

Model 3: There is a significant relationship between intellectual capital performance and capital adequacy ratio of banks listed on the stock exchange.

$$CAR_{i,t} = \alpha_{i,t} + \beta_1 vaic_{i,t} + \beta\beta_4 size_{i,t_2} lev_{i,t} + \beta_3 pc_{i,t} + +\varepsilon_{i,t}$$

Model 4: There is a significant relationship between intellectual capital performance and earning per share of banks listed on the stock exchange.

$$EPS_{i,t} = \alpha_{i,t} + \beta_1 vaic_{i,t} + \beta_2 lev_{i,t} + \beta_3 pc_{i,t} + \beta_4 size_{i,t} + \varepsilon_{i,t}$$

Table 1-regression results for 4models: the relation between VAIC and financial performance

	effect	type	value			R^2	- Watson statistic	statistic)
Model 1	**Random**	**GLS**	**0.671**	**0.0002**	**0.55**	**0.46**	**1.62**	**0.0003**
Model 2	**Fixed**	**OLS**	**76.682**	**0.64**	**0.000**	**0.58**	**1.68**	**0.000**
Model 3	**Random**	**GLS**	**6.748**	**0.376**	**0.23**	**0.41**	**1.78**	**0.02**
Model 4	**Fixed**	**OLS**	**1182.5**	**0.426**	**0.0042**	**0.45**	**1.55**	**0.0003**

Table 1 represents the results taking into account H01 respectively. This table presents the results of OLS and GLS panel regression, where according to models ROA,ROE,CAR and EPS are taken as dependent variable. Assessment of the table reveals that adjusted R2 of the models in order are 0.46,0.58,0.41 and 0.45 percent (in case of fixed and random effect) which indicates that the models have good explanatory power. These numbers indicate that the fixed effect and random effect model is able to explain the variance in the dependent variable for the whole sample. Result of Hausman test accepts the

hypothesis of the test; From the table 1, it is clear that intellectual capital is playing significant role for financial performance of the banks.

$H_{1\text{-}1}$: There is a significant relationship between human capital and financial performance of banks listed on the stock exchange.

$H_{2\text{-}1}$: There is a significant relationship between physical capital and financial performance of banks listed on the stock exchange.

$H_{3\text{-}1}$: There is a significant relationship between structural capital performance and financial performance of banks listed on the stock exchange.

The following model is used to examine the mentioned hypothesis.

Model1:

$$ROA_{i,t} = \alpha_{i,t} + \beta_1 hce_{i,t} + \beta_2 cee_{i,t} + \beta_3 sce_{i,t} + \beta_4 lev_{i,t} + \beta_5 pc_{i,t} + \beta_6 size_{i,t} + \varepsilon_{i,t}$$

Model 2:

$$ROE_{i,t} = \alpha_{i,t} + \beta_1 hce_{i,t} + \beta_2 cee_{i,t} + \beta_3 sce_{i,t} + \beta_4 lev_{i,t} + \beta_5 pc_{i,t} + \beta_6 size_{i,t} + \varepsilon_{i,t}$$

Model 3:

$$CAR_{i,t} = \alpha_{i,t} + \beta_1 hce_{i,t} + \beta_2 cee_{i,t} + \beta_3 sce_{i,t} + \beta_4 lev_{i,t} + \beta_5 pc_{i,t} + \beta_6 size_{i,t} + \varepsilon_{i,t}$$

Model 4:

$$EPS_{i,t} = \alpha_{i,t} + \beta_1 hce_{i,t} + \beta_2 cee_{i,t} + \beta_3 sce_{i,t} + \beta_4 lev_{i,t} + \beta_5 pc_{i,t} + \beta_6 size_{i,t} + \varepsilon_{i,t}$$

Models	Random/Fixed effect	Model type	Constant value	HCE	CEE	SCE	Significant	Adjusted R^2	Prob(F-statistic)
Model	Random	GLS	201.796	0.176	0.04	0.00	0.008	0.35	0.000
Model2	Fixed	OLS	224.02	0.195	0.87	0.21	0.05	0.59	0.000
Model3	Random	GLS	67.45	0.02	0.002	0.43	0.172	0.42	0.003
Model4	Fixed	OLS	3879.2	0.03	0.007	0.029	0.176	0.45	0.000

Table 2-Regression Results For 4models: The Relation Between HCE,CEE,SCE And Financial Performance

Table 2 represents the results taking into account H1-1 , H2-1 , H3-1 respectively. This table presents the results of OLS and GLS panel regression, where according to models ROA,ROE,CAR and EPS are taken as dependent variable And HCE,CEE and SCE considered as independent variables. Assessment of the table reveals that adjusted R2 of the models in orde are 0.35 , 0.59 , 0.42 and 0.45 precent (in case of fixed and random effect) which indicates that the models have good explanatory power.These numbers indicate that the fixed effect and random effect model is able to explain the variance in the dependent variable for the whole sample. Result of Hausman test accepts the hypothesis of the test; From the table 2, it is clear that human capital,capital employed and structural capital are playing significant role for financial performance of the banks.

5. Conclusion

Because of the increasing knowledge-based economy and knowledge management in modern

organizations; this study was oriented toward the organization's intangible assets. Because of the increasing knowledge-based economy and knowledge management in modern organizations; this study was oriented toward the organization's intangible assets. In models that were used to test the hypothesis it was concluded that intellectual capital and its components has a significant relationship with the financial performance of banks is the target population. The results of the study support from this fact that intellectual capital is an important strategic asset for sustainable competitive advantage.

According to the research results, suggestions are provided as follows:

The banks should take action to promote intellectual capital to improve their performance. We recommend investors in order to make investment decisions and provisions; they should asses the intellectual capital situation and measure it in banks and other organizations more carefully, besides using the basic financial statements.

Attracting, hiring and employment of competent people in the bank: Bank employees, particularly those who are in direct contact with the customer, Must be competent and have the required nobility.

The banks should invest in Physical expansion of organization, Equipment, tools and especially technology In the Office Automation and relationship with customers. Since the role of physical equipment (The physical facilities such as cooling, heating and ventilation inside the bank, decoration ...) is inevitable On customer attraction, the banks should be equipped with suitable working environment.

in modern banking Customer demands are criteria for the operation of the banking activities. Therefore Business Process Reengineering (bpr) is recommended for banks up with identifying and elimination of non-productive processes with employees who are responsible for it and simplification of the process try to attract more and more customer satisfaction.

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