

# The Impact of Intellectual Capital of Indonesian's High-Tech Company on Firm's Financial and Market Performance

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**Abstract** AEC (ASEAN Economic Community) enacted in ASEAN since the end of 2015. AEC is expected to improve the ASEAN to be more dynamic and competitive region. In the other hand, AEC may also make the competition between firms inside ASEAN region become increasingly competitive. This condition requires the firm to utilize its resources more effectively and efficiently so that the firm can create value added and compete on the AEC. Indonesia, as a country with the largest economy in the region, needs to address this issue so that the companies in this country can face AEC challenges. This study aims to examine the positive impact of intellectual capital on firm's financial and market performance of high-tech companies that are listed in Indonesia Stock Exchange. This study conducted with the observation period of 2008-2014. The final sample used in this study consists of 31 companies with the total of 144 observations. This study uses panel data regression model analysis, ie. fixed effect regression and random effect regression. The results showed that intellectual capital has a positive impact on firm's financial performance. This result indicate that the efficient and effective use of intellectual capital will make the firms able to achieve higher financial performance and will be useful for facing AEC. There's no evidence to support the impact of intellectual capital on market performance.

**Key words** Intellectual capital, family ownership, financial performance, market performance

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## 1. Introduction

The issue of ASEAN Economic Community (AEC) started to be discussed by many since the ASEAN Economic Community Blueprint (2008) which is the result the 13th ASEAN Summit in Singapore in 2007 was published. AEC has been enacted actively by the end of 2015. Although the AEC can improve ASEAN to be more dynamic and competitive region, it also will make the competition between firms inside ASEAN region become increasingly competitive. This condition requires the firm to utilize its resources more effectively and efficiently so that the firm can create value added and compete on the AEC.

For Indonesia, AEC gives opportunities and challenge to develop quality economies in Southeast Asia in the era of free market in late 2015. AEC is like two sides of a coin for Indonesia. On one hand, AEC is a good opportunity to demonstrate the quality and quantity of products and human resources of Indonesia openly to other countries. On the other hand, it can be a boomerang for Indonesia if Indonesia could not prepare well to face AEC properly. AEC will be a good opportunity for Indonesia because the trade barriers will tend to diminish even be non-existent. This will allow more exports easily, which in turn will increase the GDP of Indonesia. On the investment side, this condition can create a climate that supports the entry of Foreign Direct Investment (FDI), which can stimulate economic growth through technology development, job creation, human resource development and easier access to the world market.

According to the resource-based theory, intellectual capital (hereinafter referred to as IC) is a resource that serves as the core of value creation and competitive advantage for firm (Barney, 1991). Chen *et al.* (2005) and Wang (2008) explained that the sustainable competitive advantages from IC will make the firm won the competition with other firms and also create added value so that it will contribute to the firm's success. Previous studies have attempted to examine the relationship between IC and the firm's performance, but the results are still not consistent. The studies from Firer and Stainbank (2003), Chen *et al.* (2005), Tan *et al.* (2007), and Clarke *et al.* (2011) found that IC is positively related to the firm financial

performance and market performance. Meanwhile, the studies from Firer and Williams (2003), Chan (2009), Maditinos *et al.* (2011), Iranmahd *et al.* (2014) could not find any evidence to support the relationship between IC and the firm's financial or market performance. Due to the inconsistency in those results of previous studies and also because of limited number of studies that have been conducted on developing countries, particularly in Indonesia, this study aims to test the positive impact of IC on the financial and market performance of the firms operating in high-technology industry in Indonesia.

This study uses a monetary measurement to measure the firm's IC, namely value added intellectual coefficient (VAIC) developed by Pulic (2000, 2004). This study focuses on the companies that are operated in high technology industries and listed in Indonesia Stock Exchange. This study conducted with the observation period as long as 7 years, from 2008-2014. The high technology industry selected for this study because this industry relies on IC for its activities so that the firms in this industry tends to invest substantially in the IC. This study uses panel data regression model (i.e. fixed effect and random effect regression). This study contributes to the literature by testing the impact of IC on the financial and market performance of the firms operating in high-technology industry in Indonesia to face the AEC.

## 2. Literature review and hypotheses development

### **Resource-Based Theory (RBT)**

RBT provides an important framework to explain and predict what can be an underlying for competitive advantage and firm performance (Barney *et al.*, 2011). RBT explained that the creation of sustainable competitive advantage is closely related to the firm ability to maintain valuable, rare, and irreplaceable resources also allocate and deploy these resources effectively (Barney, 1991).

Kozlenkova *et al.* (2014) explained that the basic logic of this theory is based on two fundamental assumptions regarding the firm resources and explain how these resources can generate sustainable competitive advantage and why some firms can consistently outperform other firms. First, the firm has a different set of resources, even within the same industry (Peteraf and Barney, 2003). Assumptions regarding the heterogeneity of these resources shows that some firms have better expertise in completing certain activities, because it has unique resources (Peteraf and Barney, 2003). Second, differences in resources will remain there due to difficulties in exchanging resources between firms (resource immobility assumption), which will lead to the advantage of the heterogeneity of these resources continue to occur from time to time (Kozlenkova *et al.*, 2014).

Valuable, rare, imperfectly imitable, organization (VRIO) characteristics shows four conditions to assess how potential a resource will be able to generate sustainable competitive advantage (Kozlenkova *et al.*, 2014). The following are VRIO characteristics:

a. *Valuable*. A firm resource can be said as valuable if the resource enables firms to develop and implement strategies that can reduce corporate costs and/or increase the firm revenue more than when the resources are not present.

b. *Rare*. Rare resources are resources that are controlled only by a small number of competing firms. If these resources are valuable but not rare, the utilization of those resources will produce competitive equality, because the other firms that also having these resources also have the ability to utilize it.

c. *Imperfectly imitable*. Imperfectly imitable resources cannot be obtained through duplication or direct substitution by firms that do not have it.

d. *Organization*. The firm resources should be able to be organized so that the potential competitive of those resources can be utilized maximally. Organizations act as an adjustment factors which allow the firms to fully use the benefits contained in the resource.

Based on the explanation above, according to RBT, IC has great potential to meet the VRIO characteristics so it can create a competitive advantage for the firm. By the competitive advantage from IC, firms can use it to compete in a competitive market and achieve optimal performance.

### **Value Added Intellectual Coefficient (VAIC)**

Pulic (2000, 2004) build a model to measure how components of IC can create values and competitive advantage for the firm, the model is called Value Added Intellectual Coefficient (VAIC). VAIC

offers a relatively simple quantitative approach based on the firm accounting information to measure the IC and its components (Pulic, 2000). Important concepts of VAIC is the corporate intellectual ability that refers to the efficiency of the total value creation created by two resources, namely IC resources and physical resources that work simultaneously on the business environment (Pulic, 2004). The basic assumption of VAIC is that the IC itself cannot operate independently without the support of financial and physical capital (Pulic, 2004). VAIC is a combination of several components or elements, namely Human Capital Efficiency, Structural Capital Efficiency, and Physical Capital Efficiency.

VAIC model started by calculating a firm's ability to create value added (VA). VA is the difference between the output (OUT) and the input (IN) and formulated in the following equation:

$$VA = OUT - IN \quad (1)$$

The output (OUT) represents revenue that covers all products and services sold by firm. Input (IN) including all expenses incurred to generate revenue with the exception of employee costs. It is important to note that in this model, employee costs are not included in the IN. Due to its active role in the process of value creation, intellectual potential represented by employee costs are not counted as an expense. Thus, a key aspect of VAIC method is by treating employee as value creating entity. The calculation resulted in VA which reveals the wealth of firm in the period. VA is influenced by both the efficiency of human capital (HC) and structural capital (SC).

The first relationship of VA is between VA and HC known as Human Capital Efficiency (HCE). HCE shows the ability of HC to create value in the firm. Similarly, when HCE compared to some group of firms, HCE serve as an indicator of the quality of human resources owned by the firm and their ability to generate VA for each unit of money spent on the HC. Pulic (2000) argues that the total cost of salaries and wages can be an indicator of HC because the market determines the salaries and wages as a result or impact of the firm performance, then it would be logical if the success of the HC declared with the same criteria. The relationship between VA and HC can be formulated as follows:

$$HCE = VA/HC \quad (2)$$

The second relationship is Structural Capital Efficiency (SCE), which shows contribution of structural capital (SC) in the value creation. In VAIC model, SC is calculated by subtracting VA with HC. The smaller the contribution of HC in value creation, the greater the contribution of SC. In other words, the relationship between VA and SC are calculated in different ways because HC and SC are in inverse proportion in the firm value creation. SCE measures the amount of SC required for one unit of money of VA and serve as an indication of how SC success in value creation. Unlike HCE, VA is the denominator for SCE. Thus, the relationship between VA and SC is calculated by the following equation:

$$SCE = SC/VA \quad (3)$$

The third relationship of VA is with the physical capital (CE), known as the Capital Employed Efficiency (CEE). CEE is an indicator for VA created by a unit of physical capital. CEE can be formulated as follows:

$$CEE = VA/CE \quad (4)$$

Pulic (2000, 2004) assumes that if one-unit of CE generates greater profits in the firm than others, then the firm is better in utilizing its CE. Thus, a better utilization of CE is also part of firm's IC. When compared to a group of firms, CEE serve as an indicator of firm intellectual ability to utilize physical capital more optimally.

The last step is calculating the firm overall intellectual ability. This calculation is the sum of the coefficients mentioned earlier. This resulted in a new and unique indicator, namely:

$$VAIC = HCE + SCE + CEE \quad (5)$$

Several studies and literature showed that VAIC is a promising measurement mechanism for measuring IC. Firer and Williams (2003) have mentioned the advantages of VAIC method, namely VAIC provide a consistent and standardized measurement basis that allows effective comparative analysis between firms and between countries; Data used in VAIC calculation is based on data that has been audited in the financial statements so that the calculation will be more objective. In addition, VAIC also has been used in several studies with the different industry settings that listed in the various countries stock exchanges, for example, the Johannesburg Stock Exchange, Taiwan Stock Exchange, Singapore Exchange, Hong Kong Stock Exchange, Athens Stock Exchange, Australian Stock Exchange, and Tehran Stock Exchange (Firer and Williams, 2003; Chen *et al.*, 2005; Tan *et al.*, 2007; Chan, 2009; Maditinos *et al.*, 2011; Clarke *et al.*, 2011; Iranmahd *et al.*, 2014). The literature also indicates that the VAIC has been used in the study of developing countries, like Taiwan, Greece, South Africa, and Iran to examine the relationship between IC and firm performance (Chen *et al.*, 2005; Maditinos *et al.*, 2011; Firer and Williams, 2003; Iranmahd *et al.*, 2014).

### ***Intellectual Capital and Firm Performance***

IC perform an important role in value creation and sustainable growth of the firm. This is in line with the resource-based theory (RBT), which explains that IC is the core of value creation and competitive advantage of the firm (Barney, 1991). From the RBT perspective, the creation of a sustainable competitive advantage is closely related to the firm ability to maintain asset resources that are valuable, rare and irreplaceable and also allocating and deploying these resources effectively (Barney, 1991). Firms that have the sustainable competitive advantage will be able to win the competition in the market industry so that they can create value and achieve optimal business performance.

Several previous studies examining the relationship between IC and firm performance managed to find the relationship between IC and firm performance. Chen *et al.* (2005) found that IC owned by firm has a positive effect on market value and firm financial performance, and also can be an indicator for future financial performance. Meanwhile, Clarke *et al.* (2011) also found that there is a direct relationship between IC and firm performance of firms listed in the Australian Stock Exchange. Several other studies have also found evidence that IC has a positive impact on firm performance (Tan *et al.*, 2007; Firer and Stainbank, 2003). Based on above explanation, the hypotheses proposed in this study are as follows:

*H1a: Intellectual capital has positive impacts on the firm financial performance of high-technology firms in Indonesia.*

*H1b: Intellectual capital has positive impacts on the firm market performance of high-technology firms in Indonesia.*

## **3. Methodology of research**

### **3.1. Sample**

The sample of this study is the firms engaged in high technology industries that listed in Indonesian Stock Exchange. The type of industry that is considered as high-technology industry refers to the industrial classification based on the Standard Industrial Classification (SIC), namely:

- Computer hardware (SIC Codes 3570-3579)
- Electronic and other electrical equipment (SIC Codes 3610-3699)
- Photographic, optic and medical equipment (SIC Codes 3810-3873)
- Communications (SIC Codes 4810-4899)
- Computer software (SIC Codes 7371-7379)

The initial sample consists of 38 firms with years of observations from 2008 to 2014. Due to incomplete data on the variables selected, the final sample used in this study is amounted to 31 firms with a total of 141 firm-year observations. Table 1 shows the final sample used and its distribution by industry.

Table 1. Sample Distribution Based on Industries

Industries	No. of Companies
Communications	18
Electronic and other electrical equipment	2
Computer hardware	1
Computer software	9
Photographic, optic and medical equipment	1
Total	31

### 3.2. Variables

#### a. Independent Variable

- Intellectual Capital (VAIC). IC measured using VAIC which was developed by Pulic (2000, 2004). VAIC measured by the following equation:

$$VAIC_t = HCE_t + SCE_t + CEE_t \quad (6)$$

Where:

$VAIC_t$  = Value added intellectual coefficient at t

$HCE_t = VA_t / HC_t$ ; human capital efficiency coefficient at t

$SCE_t = SC_t / VA_t$ ; structural capital efficiency coefficient at t

$CEE_t = VA_t / CE_t$ ; capital employed efficiency coefficient at t

$VA_t = OUT_t - IN_t = OP_t + EC_t + D_t + A_t$ ; VA is the calculation of output ( $OUT_t$ ) calculated from total sales reduced by Input ( $IN_t$ ) calculated from bought-in materials or cost of goods or services sold; or it could be the calculation of operating income ( $OP_t$ ); employee costs ( $EC_t$ ); depreciation ( $D_t$ ); and amortization ( $A_t$ ).

$HC_t$  = total salaries and wages at t

$SC_t = VA_t - HC_t$ ; structural capital at t

$CE_t$  = book value of the net assets at t

- Human Capital Efficiency (HCE). HCE is a component of VAIC which represent the efficiency of human capital or the ability to apply the skills and expertise efficiently (Pulic, 2000, 2004).
- Structural Capital Efficiency (SCE). SCE is a component of VAIC which represent the efficiency of structural capital and relational capital (Pulic, 2000, 2004).
- Capital Employed Efficiency (CEE). CEE is a component of VAIC that represent efficient use of physical and financial capital (Pulic, 2000, 2004).

#### b. Dependent Variable

- Firm Performance (Firm\_Perf). Same with the study from Chen et al. (2005), the firm performance is measured by using two proxies' namely financial performance and market performance. The financial performance is measured by ROA (return on assets ratio) and the market performance is measured using MB (market capitalization ratio). Each proxy is calculated by the following equation:

$$ROA = \text{Profit before tax} / \text{Average total assets} \quad (7)$$

$$MB = \text{total market capitalization} / \text{book value of net assets} \quad (8)$$

#### c. Control Variable

- Firm Size (FSize). Firm size is measured by using firm's total assets at year t, and then calculated the natural logarithm.
- Leverage (Lev). Leverage is calculated by dividing long-term liabilities to total assets.
- Years (Year). Years are proxied by dummy variables for each year of the study period minus one period.

### Regression Model

This study uses panel data regression model analysis, namely fixed effect or random effect regression. This study uses Hausman test to find out which is the most suitable panel data regression model between fixed effect and random effect regression.

The hypotheses testing in this study were using two equation models. Model (1) was used to examine the impact on IC on financial performance. Meanwhile, model (2) is used to examine the impact of IC on market performance.

Hypothesis 1a is supported if the independent variable of  $\beta_1VAIC$  is positively significant related to ROA. Meanwhile, hypothesis 1b is supported if the independent variable of  $\beta_1VAIC$  is positively significant related to MB. The equation models used to test all of the hypotheses in this study are as follows:

**Model 1.** The Impact of Independent Variable VAIC on Dependent Variable Firms Financial Performance

$$ROA = \beta_0 + \beta_1VAIC + \beta_2FSize_t + \beta_3Lev_t + \beta_4Year_t + \varepsilon_t \quad (9)$$

**Persamaan 2.** The Impact of Independent Variable VAIC on Dependent Variable Firms Market Performance

$$MB = \beta_0 + \beta_1VAIC + \beta_2FSize_t + \beta_3Lev_t + \beta_4Year_t + \varepsilon_t \quad (10)$$

Where:

ROA = Financial performance

MB = Market performance

VAIC = Intellectual Capital

FSize = Firm Size

Lev = Leverage

Year = Years (Dummy)

$\varepsilon_t$  = error term

## 4. Results and discussions

### 4.1. Descriptive statistics

Table 2 shows the descriptive statistics of the selected variables in this study. ROA has a mean value of 0.1100 which indicates that the firms have a fairly good profitability. Meanwhile, the variable MB has a mean value of 2.6180 and may be implied that the firms have a pretty good market capitalization ratio value. VAIC which is the proxy of the firm's intellectual capital has a mean value of 8.0824. Overall, the descriptive statistics of each variable can be seen in Table 2 below.

Table 2. Descriptive Statistics of Selected Variables

Variable	Minimum	Maximum	Mean	Median	Std. Dev.
ROA	0.0010	0.8940	0.1100	0.0730	0.1200
MB	0.1160	14.7130	2.6180	2.0010	2.6330
VAIC	1.7129	51.8033	8.0824	6.2574	6.9931
FSize	7.3985	16.2630	12.3579	12.5883	2.1230
Total Assets	1633.48	11558795.67	1198687.69	293182.03	2422921.854
Lev	0.0000	0.7180	0.2140	0.1800	0.1805

### 4.2. Hypotheses Testing

Hypotheses 1 of the study aims to answer the question whether there is a positive impact of intellectual capital on firm performance of high-tech companies that are listed in Indonesia Stock Exchange. The firm performance is proxied by two proxies, namely financial performance and market performance. Therefore, hypotheses 1 is divided into two, namely hypothesis 1a and 1b.

Table 3 showed the results of overall hypothesis testing in this study. The result showed that VAIC has a significant positive impact on ROA as the proxy of firm financial performance with a coefficient amounted to 0.01854 at a significance level of 5%. This indicates that if a firm can use its IC more efficiently, it can lead to improved financial performance of the firm. Therefore, hypothesis 1a which states that intellectual capital has positive impacts on the firm financial performance of high-technology firms in Indonesia, supported at the level of  $\alpha = 5\%$ .

The result indicates that efficient and effective use of IC will lead the firm to achieve higher financial performance. This means that in the era of AEC, companies should be more aware of efficient and effective use of intellectual capital so that they can face AEC challenges. The result of this study is consistent with previous studies conducted by Firer and Stainbank (2003), Chen et al. (2005), and Clarke et al. (2011) which found that intellectual capital is positively related to ROA which is the proxy of firm financial performance.

Meanwhile, the hypothesis testing of hypothesis 1b failed to find any relationship between VAIC and MB which is the proxy of market performance as shown in Table 3. This indicates that the market does not consider the value of intellectual capital of the firm. According to Holland and Johanson (2003), different capital markets may have a different focus on various aspects of firm performance and may considering or not considering the IC. There may be a difference between investors' awareness of IC importance in value creation of the firms, which may exist in different areas or countries where the capital markets are located. Thus, the impact of IC on market valuation may be different from a market in a country to another. This explain why some previous studies which also failed to find any relationship between intellectual capital and market performance are having the similar country characteristics. This study is consistent with results of the research conducted by Firer and Williams (2003) in South Africa, Chan (2009) in Hong Kong, Maditinos *et al.* (2011) in Greece, and Iranmahd *et al.* (2014) in Iran that are conducted in similar characteristic of developing countries.

Table 3. Hypotheses Testing Results

Variable Independent	Model 1	Model 2
	Variable Dependent	
	ROA	MB
Const	1.33530 (2.74)*	3.04338 (1.58)
VAIC	0.01854 (3.61)*	0.01096 (0.28)
FSize	-0.11905 (-2.71)*	-0.12951 (-0.82)
Lev	-0.04777 (-2,23)	-0.46454 (-0.26)
Year	Included	Included
R <sup>2</sup> Within	0.48440	0.0949
F	1789.81	
Prob > F	0.0000	
Wald X <sup>2</sup>		8.41
Prob > X <sup>2</sup>		0.4938

Notes: \*\* indicates significant at the 1%; \* indicates significant at the 5%

Source: Output from STATA

## 5. Conclusions, limitations and suggestions

### 5.1. Conclusions

The objective of this study is to examine the positive impact of IC on the performance of the firms operating in high-technology industry in Indonesia. The empirical results showed that intellectual capital has a positive impact on firm financial performance. This indicates that efficient and effective use of intellectual capital will make the firm achieve higher financial performance. This implies that in the era of AEC, companies should be more aware of efficient and effective use of intellectual capital so that they can

face AEC challenges. The results of this study are consistent with previous studies conducted by Firer and Stainbank (2003), Chen *et al.* (2005), and Clarke *et al.* (2011) which found that intellectual capital is positively related with firm financial performance. On the other hand, the results failed to support the relationship between intellectual capital and market performance. This indicates that the market does not consider the value of firm's intellectual capital.

### 5.2. Limitations and suggestions

This study has several limitations. First, this study only uses samples of the firms that operates in high-technology industry in Indonesia, so the results of this study may not be generalizable to the firms with different types of industries. Further research can use several firms from various industries and compared them in order to determine the complete picture of relationship between intellectual capital and firm performance from the standpoint of a more comprehensive range of industries.

Second, this study uses VAIC which is a measurement of intellectual capital from accounting information of the firm. Further research can use another proxy for measuring the firm's intellectual capital by combining measurements of intellectual capital using monetary and non-monetary methods.

Finally, the implementation of ASEAN Economic Community in late 2015 makes this study could not test the differences of the intellectual capital impact on firm performance between the period before the implementation of AEC and after the enactment of the AEC because of data limitations. Further research can add comparisons of ex-ante and ex-post AEC implementation to examine the impact of IC on the firm performance in the period prior to the enactment of AEC and after the enactment of AEC.

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