Intellectual Capital, Financial Profitability, and Productivity: An Exploratory Study of the Indonesian Pharmaceutical Industry

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Abstract

The purpose of this research is to investigate empirically the impact of value added physical and intellectual capital (IC) efficiency on a company's financial performance. This research uses Nazari and Herremans (2007) Extended Value Added Intellectual Coefficient as the efficiency measure of physical and intellectual capital. The data drawn from three out of ten pharmaceutical industries listed in the Indonesia Stock Exchange for the years 2003-2009 was analysed using linear regression analysis. This research contributes to extant intellectual capital literature by evidencing the IC components' impact on company performance as well as the actual implementation of extended VAICTTM method in empirical study. It is shown that IC components impact profitability of the pharmaceutical industry in a significant and positive manner. Further, it is found that whilst physical capital employed shows a significant positive impact on profitability, the impact of IC components on productivity is not significant.

Keywords: Extended VAICTM, Intellectual Capital, Financial Performance, Profitability, Productivity

JEL Classification: M41

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1. Introduction

Within the last two decades, globalisation and technology innovations have shifted the way firms run their businesses (Serenko and Bontis, 2004). In order to prevail over competition, businesses started to introduce 'knowledge'. In this respect, labour and capital became the primary factors in determining corporate wellbeing (Firer and Williams, 2003; Shiu, 2006). This condition leads to a 'knowledge-based' economy known as The New Economy. The New Economy ignites a phenomenon within businesses that shows an increasing trend of an organisation's hidden value (the difference between company's market and book value) from time to time. This phenomenon was discovered through research conducted by Toumi in Sangkala (2006). According to Toumi's research (1999), in 1978 about 80% of company's assets were tangible assets and 20% were intangible assets. In 1988, the proportion changed to 45% tangibles and 55% intangibles. By 1998, only 30% of a company's assets were tangible, while the remaining 70% of them were intangible assets. This study was conducted in the United States and Western Europe.

In Malaysia, the attempt to transform into a knowledge-based economy was formally declared through the launching of the Knowledge-Based Economy Master Plan in 2002 (Salleh and Selamat, 2007). It contains various strategies to accelerate the transformation of Malaysia to a knowledge-based economy. Considering the similarities between Malaysian and Indonesian economics, the transformation was also expected to happen in Indonesia, though it might not be formally translated into regulations.

For companies with more value from intangibles, using traditional systems will only tend to confuse the interpretation of information in financial statements. Because traditional financial and management accounting instruments are not able to capture all aspects of these new values and report them to organisational managers and stakeholders, there is a high demand for an appropriate corporate reporting structure (Nazari and Herremans, 2007).

Extensive research also indicates the growing significance of intellectual capital (IC) in business. Pulic (in Nazari and Herremans, 2007) states that a firm's market values have been generated not only by the capital employed (physical & financial), but also by the inherent IC. Though the importance of IC has increased greatly in the last two decades

(Serenko and Bontis, 2004), many organisations are still struggling with better management of IC due to measurement difficulties (Nazari and Herremans, 2007). Over the past few years, many methods have been developed for the measurement and valuation of IC (Sveiby, 2010). One method generally used to measure IC is the Value Added Intellectual Coefficient (VAIC™) model. The VAIC™ concept was first introduced by Pulic in 1998 and further developed by Bornemann (1999). It claims to give new insights into the measuring and managing of the performance of intellectual potential within organisations.

Many studies examined this phenomenon. For example, Firer and Williams (2003), Chen et al. (2005), Shiu (2006), Bharathi (2008), Ghosh and Mondal (2009), Muhammad and Ismail (2009), Ting and Lean (2009), and Sharabati et al. (2010). Based on those studies, this research investigates the impact of IC components towards company profitability and productivity. The components of IC in this study refer to the components of the extended VAIC™ model published by Nazari and Herremans (2007) which is actually based on Skandia Navigator, one of the earliest models of IC introduced by Edvinsson and Malone (1997).

In line with those studies, this research aims to observe empirically the impact of each component of IC on the organisational performance of the Indonesian pharmaceutical industry, represented by profitability and productivity. The research question is stated as: "Does intellectual capital impact on financial profitability and productivity of the pharmaceutical industries listed in the Indonesia Stock Exchange?" This research contributes to the IC literature by providing a broader overview of IC components' impact on company performance as well as providing empirical evidence on actual implementation of the extended VAICT™ method.

The pharmaceutical industry is chosen for its extensive dependency on IC as a key source of innovation (Mehralian et al., 2012). In support of this statement, Daum (2005) also concluded that the pharmaceutical industry is a rich source of IC, since this industry is research intensive, highly innovative, and well-balanced in its use of human capital and technological knowledge. Considering these factors, the, the pharmaceutical industry, is therefore an ideal object for analysing IC components significant to company performance. The observation window is determined as seven years prior to the year of study.

2. Theoretical Framework and Hypotheses Development

2.1 Intellectual Capital

Research on IC began in the early 1980s. Since the beginning of the research, several definitions of IC have emerged. Until today, there is no generally accepted definition for IC. Itami (in Najibullah, 2005), a pioneer who publishes works on IC, defines IC as "intangible assets which include particular technology, customer information, brand name, reputation and corporate culture that are invaluable to a firm's competitive power". Meanwhile Edvinsson (1997), explains IC as "applied experiences, organisational technology, customer relationships and professional skills that provide a firm with a competitive advantage".

The definitions of IC below are summarised in Bontis et al. (2000). IC as being "the pursuit of effective use of knowledge (the finished product) as opposed to information (the raw material)". He also states that IC is elusive, but once it is discovered and exploited, it may provide an organisation with a new resource-base from which to compete and win (Bontis, 1996). Stewart (1997) stated: "IC is collective brainpower or packaged useful knowledge, consisting of intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth". While according to Roos et al. (1997), "IC includes all the processes and the assets which are not normally shown on the balance sheet and all the intangible assets (trademarks, patents, and brands) which modern accounting methods consider ... it includes the sum of the knowledge of its members and the practical translation of his/her knowledge".

The important underlying concepts in the definitions above include the notion that IC is something that is knowledge-based, captured in an identifiable form, and useful in organisations. IC is not simply available, free-floating human brainpower (Luthy, 2000).

2.2 Components of Intellectual Capital

There are many researchers in this field with various opinions regarding the components of IC. An exceptionally different concept of IC components is given in Brooking (1996). Brooking (1996) suggests that IC consists of four types of assets: human-centred assets, intellectual property assets, infrastructure assets, and market assets. On the other hand, Roos (2003) mentioned four main capitals constructing IC, namely: human capital, organisational capital, renewal and development

capital, and relational capital. Slightly different from Roos, Stewart (1997) identifies only three components, which are: human capital, structural capital, and customer capital. Meanwhile, Bontis's opinion of IC components is almost like a combination of both Roos's and Stewart's. He identifies four components: human capital, structural capital, intellectual property, and relational capital (Bontis et al., 2000). In general, however, the researchers of the field identify mainly three components of IC, which are: human capital, structural capital, and relational capital.

2.3 Human Capital

Bontis and Serenko (2009) state that human capital (HC) represents the competencies, tacit experiences and overall knowledge-base of individuals in an organisation. Edvinsson and Malone (1997) argue that HC is an organisation's combined human capability for solving business problems. In addition, Lynn (1998) defines HC as the raw intelligence, skills and expertise of the human actors in the organisations. To put it simply, HC represents the individual stock of knowledge of an organisation as represented by its employees (Bontis et al., 2000). Roos et al. (1997) argues that "...employees generate IC through their competence, their attitude, and their intellectual agility. Competence includes skill and education. Attitude covers the behavioural components of the employees' work. Intellectual agility enables one to change practices and to think of innovative solutions to problems".

HC is the most crucial dimension in IC since it becomes the source of all innovations and strategic renewal within organisation (Bontis, 1999). There is no way a company can operate without any HC. Stewart (1997) stated that HC is "the place where all the ladders start: the wellspring of innovation, the home page of insight". However, though the employees are considered the most important corporate assets in a learning organisation, they are not owned by the organisation (Bontis et al., 2000). This fact was also realised by Gary Becker, recipient of 1992 Nobel Prize in Economic Science, in the early 1960s. His argument, as cited by Nazari and Herremans (2007) is "...expenditures on education, training, and medical care, ...produce human, not physical or financial, capital because you cannot separate a person from his or her knowledge, skills, health, or values the way it is possible to move financial and physical assets while the owner stays put".

2.4 Structural Capital

Structural capital (SC) includes all the non-human storehouses of knowledge in organisations which include the databases, organisational charts, process manuals, strategies, routines, and anything whose value to the company is higher than its material value (Bontis et al., 2000). It also mentions that if the organisation has poor systems and procedures by which to track its actions, the overall intellectual capital will not reach its fullest potential. The stronger the SC that a company owns, the better environment it will be for individuals to try and learn new things.

Edvinsson and Malone (1997) argue SC is the supportive infrastructure that enables HC to function. On the other hand, Boisot (2002) states SC comprises all kinds of 'knowledge deposits', which are eventually created by HC. However, Chen et al. (2005) emphasises that "even though influenced by HC, SC exists objectively and independent of human capital". These arguments visualise Human Capital (HC) and Structural Capital (SC) as two components which are dependent on and yet independent of each other. An example of this relationship is the creation of patents, which in its process is highly dependent of human capital, but after the completion of the patent, it is considered as structural capital.

2.5 Relational Capital

The third dimension of IC is relational capital. This is the only component of intellectual capital which relates to the external parties of the company. Bontis (1999) in Cleary (2009) defines it as knowledge embedded in all of external relationships that a firm develops, whether it is with customers, competitors, suppliers, trade associations or government bodies. Marti (2001) defines relational capital as the ability of an organisation to interact positively with business community members to motivate the potential for wealth creation by enhancing human and structural capital. In addition to that, Bontis and Serenko (2009) tightened the definition of relational capital as being the knowledge embedded in relationships with customers and suppliers.

One of the main categories of relational capital is usually referred to as customer capital and denotes the "market orientation" of the organisation (Nazari and Herremans, 2007). Many researchers use *customer capital*, instead of relational capital, to represent the corporate capital related to external stakeholders. Edvinsson and Malone (1997) define customer capital as "the strength and loyalty of customer

relations. Customer satisfaction, repeat business, financial well-being, and price sensitivity may be used as indicators of customer capital". As for Bontis et al. (2000), 'customer capital' is the knowledge embedded in the marketing channels and customer relationships that an organisation develops through the course of conducting business.

2.6 Measurement of Intellectual Capital

IC measurement is an extension of the human resource cost accounting literature popularised in the 1960s (Bontis, 2002). Human resources met all criteria to be recorded as assets. However, it is difficult to measure the value of human resources so 'human resources accounting' is needed to solve the measurability aspect. Most accountants are interested in human resource accounting for its additional assistance in organisational reporting.

Though initial IC reporting done by most firms is for internal purposes, the ultimate goal is to publish reports for external stakeholders (Bontis, 2002). The research for establishing the best method for measuring IC began in the middle of the 19th century. The first method was *Tobin's q*, developed by James Tobin in the 1950s. After that, more methods were suggested by different researchers. According to Sveiby (2010), there are four basic classifications for IC measurement methods:

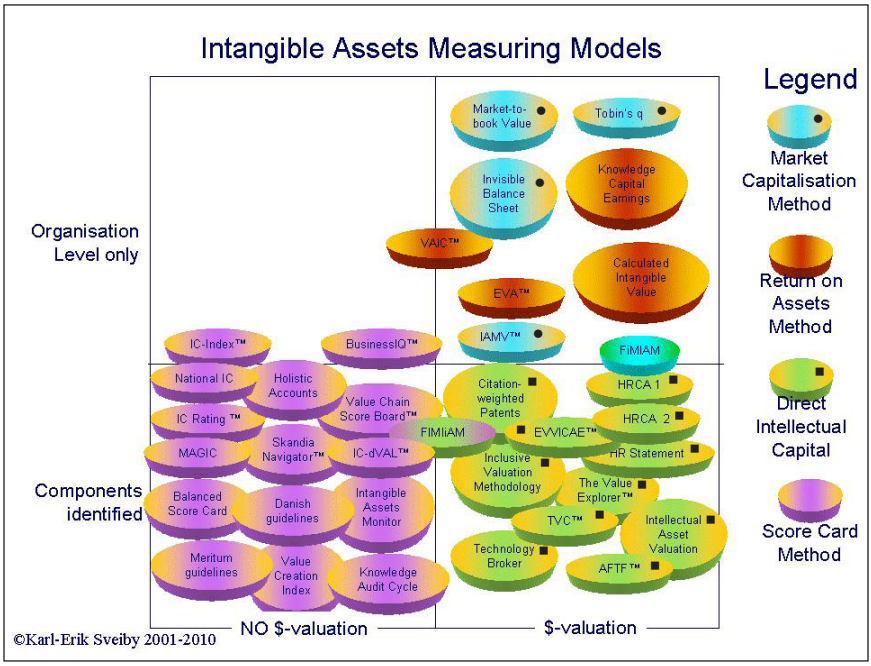
1. Direct Intellectual Capital methods (DIC).
2. Market Capitalization Methods (MCM).
3. Return on Assets methods (ROA).
4. Scorecard Methods (SC).

These methods can be differentiated by whether they result in a monetary or non-monetary, micro- or macro-level measurement (Nazari and Herremans, 2007). Figure 1 captures the classification of the existing IC measurement methods available, including VAIC™. This study uses an extended version of the VAIC™ method as a measurement of IC, therefore, further explanation about every method available for IC measurement is not included here.

2.7 Extended VAIC™

Extended VAIC™ introduced by Nazari and Herremans (2007) is an extended version of Value Added Intellectual Coefficient (VAIC™) introduced by Pulic in 1998. This method is designed to provide information about the value creation efficiency of tangible and intangible

Figure 1: Classification of IC measurements

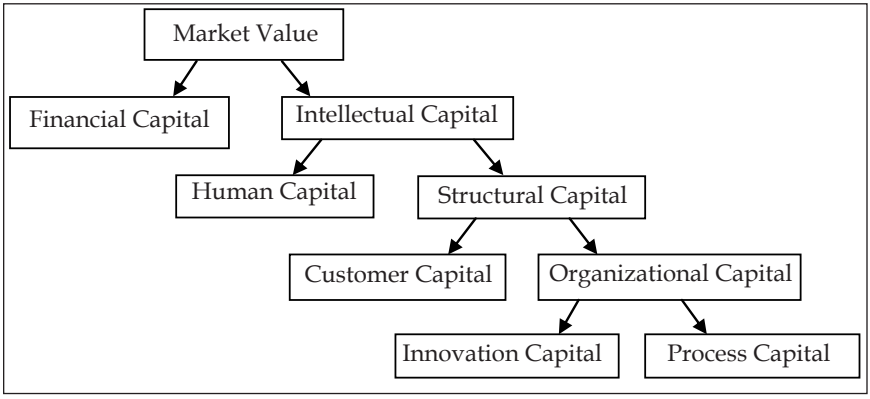


assets within a company (Tan et al., 2007). Instead of valuing the IC of a firm, the VAIC™ method mainly measures the efficiency of firms' three types of inputs: physical and financial capital, human capital, and structural capital, namely the Value Added Capital Coefficient (VACA), the Value Added Human Capital Coefficient (VAHU), and the Structural Capital Value Added (STVA). The sum of the three measures is the value of VAIC™. The later research by Firer and William (2003) has brought up new terms of VAIC™ components. Instead of VACA, VAHU, and STVA, they define VAIC™ as a composite sum of three separate indicators: Capital Employed Efficiency (CEE), Human Capital Efficiency (HCE), and Structural Capital Efficiency (SCE).

The extended version of VAIC™ introduced by Nazari and Herremans (2007) suggests that process capital and innovation capital are separate components. This concept is similar to the one applied in Skandia Navigator (see Figure 2), which is also used as the basis to formulate VAIC™ (Nazari and Herremans, 2007). Skandia Navigator addresses not only the three traditional IC components of human,

organisational, and relational capital, but also recognises renewal and development as a separate component. This research applies Extended VAIC™ instead of the original one in order to understand the significance of the relational (customer), innovation and process capitals separately, in determining corporate performance. This objective can only be attained by expanding structural capital into three distinct components. Further discussion about Extended VAIC™ method is included in the Research Method section.

Figure 2: Scheme of Skandia Navigator



2.8 Previous Research

The method of VAIC™ has been commonly used in many researches as an indicator of IC. Various industries have been used as the focus of those studies, as well as including various locations where the studies have taken place. Using data from 75 publicly traded companies in South Africa, Firer and Williams (2003) adopted the VAIC™ method to examine the relationship between IC and traditional financial measures of corporate performance, including profitability (ROA), productivity (ATO), and market value (M/B ratio). The purpose of this study is to determine the extent to which such measures may intrinsically capture the contribution from IC resources. Their research discovers that both Capital Employed Efficiency (CEE) and Structural Capital Efficiency (SCE) significantly influence the firms' market valuation. However, this study fails to discover any strong association between IC and profitability.

Further research by Chen et al. (2005) focuses on Taiwanese listed companies for the period of 1992-2002. This research uses VAIC™ components together with R&D and advertising expenditures as independent variables. Their research provides empirical evidence that the firms' IC has a positive impact on market value and financial performance, and may be an indicator for future financial performance. In addition, Chen et al. (2005) presented evidence that R&D expenditure, which they believe may capture additional information on structural capital, has a positive effect in a firm's value and profitability.

Zhang et al. (2006) who examines the association of IC with a company's profitability in 32 firms of the automobile sector in China's Shanghai Stock Exchange, discovers that IC significantly influences company profitability. The result of the study provides empirical findings that VAIC, VACA, VAHU, and STVA have significantly positive influences towards ROA.

Shiu (2006) applies VAIC™ and examines its correlation with corporate performance, based on the 2003 annual report from 80 Taiwanese listed technological firms. After modifying the model, applications show that the index of VAIC had a significantly positive correlation with profitability (ROE) and market valuation (MB), and a negative correlation with productivity (ATO), i.e. three aspects of a firm's performance.

Among Malaysian financial institutions, Ting and Lean (2009) discover how VAIC, CEE, HCE, and SCE significantly associate with profitability. Still using the financial sector in Malaysia, Muhammad and Ismail (2009) also find a relationship between IC and profitability (ROA). In addition to that, they also discovered how different sectors in finance have different reliance towards IC. During their study, the Malaysian banking sector had the highest reliance, followed by the insurance and brokerage sectors.

In Indonesia, Razafindrambinina and Anggreni (2008) examine the companies listed in Indonesia Stock Exchange in general. They discover that (1) IC is associated with financial performances, except in growth, (2) greater IC generates greater financial performance and growth, and (3) CEE and SCE are the most influencing components in increasing future performance of the firms.

In the pharmaceutical sector, there are also several studies on IC. Kamath (2008) focuses his research on 25 firms of the Indian pharmaceutical industry to discover how firms with higher human capital tend to have significantly better profitability and productivity.

This result is supported by the findings that VAHU is significantly positive towards ROA and ATO, but negative towards M/B ratios. In contrast, SCVA (STVA) negatively influence ROA and ATO, but positively influence M/B ratios. Unfortunately, this research can only discover insignificant influence of VACA on company performance. Overall, this research discovered how VAIC significantly associates with M/B (market valuation) in a negative direction.

Ghosh and Mondal (2009), using samples from 80 firms in software and pharmaceutical industries in India for the period of 2002-2006, find out how IC performance can only explain profitability but not productivity and market valuation. The value of VAIC has a significantly positive influence on profitability (ROA). However, their research fails to discover any significant relationship between either VAIC and productivity (ATO), or between VAIC and market valuation (M/B ratio).

On the other hand, Sharabati et al. (2010) focus on 15 members of the Jordanian Association of Pharmaceutical Manufacturers. Using an IC questionnaire form established by Bontis (1998), they explain how Jordanian pharmaceutical firms are managing IC effectively and how that, in turn,is influencing business performance positively.

2.9 Hypotheses Formulation

Extensive research has uncovered the importance of intellectual capital used by firms in attempting to create value. Even Pulic, as cited by Nazari and Herremans (2007), states that a firm's market values are generated not only by the capital employed (physical & financial) but also by its intellectual capital. It means that if the market is efficient, investors will place higher value on firms with greater intellectual capital (Firer and Williams, 2003). In addition, if IC is a valuable resource for a firm's competitive advantages, it will contribute to that firms' financial performance (Chen et al., 2005). Therefore, it is expected that IC plays an important role in enhancing both corporate value and financial performances.

A company's financial performance can be measured through several alternatives, and one of the most common actions is by calculating financial ratios. Basically there are four common aspects assessed using financial ratios, such as, profitability, productivity (activity), leverage, and liquidity ratio. The leverage and liquidity ratios are related to a firms' ability to meet its financial obligation which is irrelevant in

respect of this study. Therefore, this research only focuses on the first two aspects in financial performance: profitability and productivity.

Bontis et al. (2000) argue that leveraging knowledge assets is the key to a firm's prosperity. Furthermore, previous studies regarding IC have discovered how IC components significantly influence financial profitability. Such findings can be observed in Malaysia (Muhammad and Ismail, 2009; Ting and Lean, 2009), Taiwan (Chen, 2005; Shiu, 2006), India (Kamath, 2008; Ghosh and Mondal, 2009), and China (Zhang et al., 2006). Assuming the same phenomenon also happens in Indonesia by using Extended VAIC™ as a measure for IC capability, the first hypothesis regarding profitability is formulated as follows:

> $H_{1:}$ Capital Employed Efficiency (CEE), Human Capital Efficiency (HCE), Customer Capital Efficiency (CCE), Innovation Capital Efficiency (InCE), and Process Capital Efficiency (PCE) have partially significant influence on the financial profitability of pharmaceutical companies for the period of 2003 – 2009.

According to Patton (2007), the productivity of a firm lies more on its IC and system capabilities rather than on its physical assets. Kamath (2008) discovered how companies with higher IC have significantly better profitability and productivity. In Indonesia, previous study by Razafindrambinina and Anggreni (2008) also discovered the association of IC with financial performances (as proxied by ROA, ATO, and OCF). Based on those results, the second hypothesis concerning productivity is stated as follows:

> $H_{2:}$ Capital Employed Efficiency (CEE), Human Capital Efficiency (HCE), Customer Capital Efficiency (CCE), Innovation Capital Efficiency (InCE), and Process Capital Efficiency (PCE) partially has significant influence towards financial productivity of pharmaceutical companies for the period of 2003 – 2009.

The research framework containing the two hypotheses above is depicted in the Figure 3.

2.10 Research Models

In order to answer the research questions in the previous section, a linear regression model is being used in this research. The research models in this study are based on the Extended VAIC™ model that will be

explained further in the next two sections. However, the measurement model of Extended VAIC™ introduced by Nazari and Herremans (2007) involves a circular logic within its equation (to calculate PCE, see the next two sections). To avoid the possibility of complicated calculations within the data, the linear regression model is divided into three separate models without changing the basic essence:

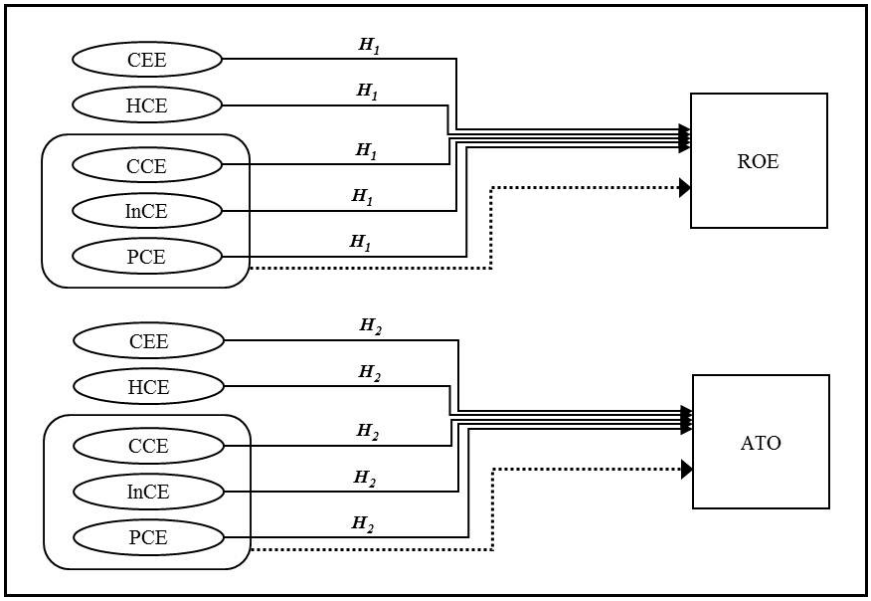
$$Y_i = \alpha + \beta_1 \text{CEE} + e \ldots\ldots \quad \text{[Eq.1]}$$

$$Y_i = \alpha + \beta_2 \text{HCE} + e \ldots\ldots \quad \text{[Eq.2]}$$

$$Y_i = \alpha + \beta_3 \text{CCE} + \beta_4 \text{InCE} + \beta_5 \text{PCE} + e \ldots\ldots \quad \text{[Eq.3]}$$

where: Y_i represents *dependent variable* (ROE and ATO); α represents a *constant*; β_1, β_2, β_3, β_4, β_5 represent regression coefficients; and *e* represents *standard errors*.

Figure 3: Conceptual Framework of the Research



The first model will be used to explain the impact of Capital Employed Efficiency of a firm on its financial performances. Similarly, the second model will explain the impact of Human Capital Efficiency on a company's financial performances. Both are formulated as simple regression models. As for the third model, it basically explains the

impact of Structural Capital Efficiency on a company's performances. However, the Extended VAIC™ model expanded the Structural Capital Efficiency further into Customer Capital Efficiency (CCE), Innovation Capital Efficiency (InCE), and Process Capital Efficiency (PCE) (for better explanation, see the next two sections below). In this respect, the third research model is formulated as a multiple regression model consisting of CCE, InCE, and PCE as independent variables.

3. Research Method[1]

The first part of this section will describe the proxies used to measure each dependent and independent variable used in this research. The methods of sampling and descriptive statistics are presented immediately after.

3.1 Dependent variables

To conduct a relevant analysis related to this study, two dependent variables are selected in respect of two dimensions: profitability and productivity. These variables are: (1) ROE and (2) ATO. The selection of the proxies used for these variables are based on the ones commonly used in literatures (Firer and Williams, 2003; Ghosh and Mondal, 2009; Kamath, 2008; Mehralian et al., 2012; Muhammad and Ismail, 2009; Shiu, 2006). The respected proxies are defined as follows:

(1) Return on Equity (ROE): the ratio of Net Income After-Tax divided by Shareholders' Equity stated in the firms' quarterly financial statement.

(2) Assets Turnover (ATO): the ratio of Sales divided by Average Total Assets stated in the firms' quarterly financial statement.

3.2 Independent variables

The extended Value Added Intellectual Coefficient (VAIC™) methodology developed by Nazari and Herremans (2007) is basically an extended version of the VAIC™ model. In Shiu (2006), Firer and

1 Some researches regarding IC in the past used some control variables such as SIZE, LEVERAGE, and INDUSTRY TYPE (Firer and William, 2003). However, we believe that a control variable would not be needed in this research because the companies used as samples are very few (only three companies) and each of them differs insignificantly.

Williams define VAIC™ as a composite sum of three separate indicators named Capital Employed Efficiency (CEE), Human Capital Efficiency (HCE), and Structural Capital Efficiency (SCE).

Another study related to Intellectual Capital reveals that the components of IC can be classified further. Bontis et al. (2000) divide the structural capital into Relational (Customer) and Organisational Capital. The Organisational Capital itself, however, can be divided further into Innovation and Procedure (Process) Capital (Huang and Wang, 2008). In those studies, Nazari and Herremans (2007) formulate an extended version for VAIC™ using new indicators as Customer Capital Efficiency (CCE), Innovation Capital Efficiency (InCE), and Process (Procedure) Capital Efficiency (PCE) in replacement of SCE.

The equation below formulises the Extended VAIC™ mathematically:

$$VAIC™_i = CEE_i + HCE_i + CCE_i + InCE_i + PCE_i \quad \text{[Eq.4]}$$

where:

CEE_i: indicator coefficient for value added (VA) efficiency of capital employed in $firm_i$.

HCE_i: indicator coefficient for VA efficiency of human capital in $firm_i$.

CCE_i: indicator coefficient for VA efficiency of customer capital in $firm_i$.

$InCE_i$: indicator coefficient for VA efficiency of innovation capital in $firm_i$.

PCE_i: indicator coefficient for VA efficiency of process capital in $firm_i$.

The first step in calculating the efficiencies of IC is to calculate the company's total value added (VA). Based on the VAIC™ model, the value added is defined as the difference between output and input. Specifically, Value Added (VA) can be calculated from the company's accounts using the following formula (Nazari and Herremans, 2007):

$$VA = OP + EC + D + A \quad \text{[Eq.5]}$$

where: OP is operating profit; EC is employee costs; D is depreciation; and A is amortisation.

The first VAIC™ component and also the first independent variable is Capital Employed Efficiency (CEE), which represents the coefficient of VA efficiency of physical and financial capital in a firm. The efficiency of capital employed can be obtained in the following way:

$$CEE = VA/CE \quad \text{[Eq.6]}$$

where: VA is value added and CE is the book value of a firms' net assets. The next variable, Human Capital Efficiency (HCE) is the ratio between total VA divided by the total Human Capital. HCE can be calculated by using the following formula:

$$HCE = VA/HC \quad \text{[Eq.7]}$$

where: VA is value added and HC is the total wages and salaries for the firm.

Another component in original VAIC™ is Structural Capital Efficiency (SCE), a ratio between total Structural Capital divided by total VA. Mathematically, it can be stated as follows:

$$SCE = SC/VA \quad \text{[Eq.8]}$$

where: SC is equal to VA deducted by HC from [Eq.7] and VA is value added.

According to Skandia Navigator, in the taxonomy of IC presented in Edvinsson and Malone (1997), SC is composed of Customer Capital (CC) and Organisational Capital (OC). Furthermore, OC is also composed of Innovation (Renewal) Capital (InC) and Process Capital (PC). From these compositions, it can be stated mathematically that SC is equal to the sum of CC, InC, and PC. Based on this formula, Nazari and Herremans (2007) introduce the Customer Capital Efficiency (CCE) as the third component of Extended VAIC™ and also as the third independent variable. The formula is as follows:

$$CCE = CC/VA \quad \text{[Eq.9]}$$

where: CC is marketing cost and VA is value added.

The fourth independent variable is Innovation Capital Efficiency (InCE). This component of Extended VAIC™ is calculated based on the following formula:

$$InCE = InC/VA \quad \text{[Eq.10]}$$

where: InC is equal to total R&D expenditure and VA is value added.

The last variable used in this study is Process Capital. As stated before, the SC is equal to the sum of CC, InC, and PC. From this composition, it can also be stated that SCE is equal to the sum of CCE, InCE, and PCE. Therefore, PCE is calculated using following formula:

$$PCE = SCE - CCE - InCE \quad \text{[Eq.11]}$$

3.3 Sample Selection and Descriptive Statistics

The data collected is from the 2003 – 2009 quarterly published financial statements of the firms listed in the pharmaceutical sector of the Indonesian Stock Exchange (IDX). Due to some specific requirements set in the purposive sampling method, especially the third criterion, only three of ten companies met the requirements for this study. The details of requirements are stated as follows:

(1) It has already made Initial Public Offering (IPO) in 2003 on Indonesia stock market and did not record any delisting activities during the observation period.
(2) It has issued financial statements quarterly in the period of 2003 – 2009.
(3) It discloses the Research and Development (R&D) expenditure in the independent account during observation period. These criteria are made to guarantee that all variables, especially Innovation Capital Efficiency, can be calculated from the data.

From the data collected from three companies' quarterly published financial statements from 2003 – 2009, there are 84 data points used in this research. The descriptive statistics for each of the variables are summarised in Table 1.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
CEE	84	0.0459	1.0694	0.3303	0.2115
HCE	84	1.2963	4.7538	2.2938	0.9654
CCE	84	0.0769	1.4007	0.4913	0.2906
InCE	84	0.0000	0.1233	0.0188	0.0185
PCE	84	-0.9907	0.4057	-0.0124	0.3184
ROE	84	0.0057	0.3649	0.0796	0.0831
ATO	84	0.1003	1.8223	0.7477	0.4435
Valid N (listwise)	84				

Source: data processed

4. Results

Hypotheses will be tested using a Linear Regression analysis in SPSS version 17. Before testing the hypotheses, data should be tested as to whether it fulfils the classical assumption test. A good regression model fulfils some basic assumptions, such as, no multicollinearity between dependent variables, no autocorrelation between disturbing components, disturbing variance must meet homoscedasticity requirement, and fulfil normality assumption. Table 2 and 3 summarises the result of the tests.

From Table 2 and 3, it can be concluded that the data already fulfils the classical assumption test, which means that the models used in this research are considered reliable and therefore, can be used in the analysis.

Table 2: Classical Assumption Test Results

ROE as Dependent Variable							
Normality				**Multicollinearity**			
	Model 1	Model 2	Model 3		CCE	InCE	PCE
K-S Sig.	0.638	0.973	0.934	Tolerance	0.282	0.934	0.273
Sig. Level	0.050	0.050	0.050	VIF	3.550	1.07	3.662
Conclusion	Fulfilled	Fulfilled	Fulfilled	Conclusion		Fulfilled	
Autocorrelation				**Homoscedasticity**			
	Model 1	Model 2	Model 3		Model 1	Model 2	Model 3
D-W value	1.227	1.769	1.537	Scatterplot	See Figure 4 (appendix)		
Conclusion	Fulfilled	Fulfilled	Fulfilled	Conclusion	Fulfilled	Fulfilled	Fulfilled

Source: data processed

4.1 The Impact of IC on Profitability

The results show that IC of a company has a significant impact on its profitability (see Table 4 and 5). In addition to that, the correlation between all five independent variables with ROE and the explanatory power of all three regression models involving ROE as dependent variables is considered high (see table 5). These values emphasise how crucial the role of IC is in determining a firms' profitability. This result is consistent with the previous researches conducted by Ghosh and Mondal (2009), Muhammad and Ismail (2009), and Ting and Lean (2009).

Table 3: Classical Assumption Test Results

ATO as Dependent Variable							
Normality				**Multicollinearity**			
	Model 1	Model 2	Model 3		CCE	InCE	PCE
K-S Sig.	0.232	0.150	0.333	Tolerance	0.282	0.934	0.273
Sig. Level	0.050	0.050	0.050	VIF	3.550	1.07	3.662
Conclusion	Fulfilled	Fulfilled	Fulfilled	Conclusion		Fulfilled	
Autocorrelation				**Homoscedasticity**			
	Model 1	Model 2	Model 3		Model 1	Model 2	Model 3
D-W value	1.098	1.676	1.893	Scatterplot	See Figure 5 (appendix)		
Conclusion	Fulfilled	Fulfilled	Fulfilled	Conclusion	Fulfilled	Fulfilled	Fulfilled

Source: data processed

Table 4: Summary of Linear Regression Results

Simple Regression Results				
Independent Variables	**Profitability**		**Productivity**	
	t-statistic	Sig.	t-statistic	Sig.
CEE	14.252	0.000	8.309	0.000
HCE	12.175	0.000	-0.953	0.343
Multiple Regression Results				
	Profitability		**Productivity**	
N	84		84	
F-Statistic	38.230		2.838	
Significance	0.000		0.043	
Independent Variables	t-statistic	Sig.	t-statistic	Sig.
CCE	8.783	0.000	-2.117	0.037
InCE	2.946	0.004	1.882	0.064
PCE	10.660	0.000	-1.535	0.129

Source: data processed

The first regression model involving CEE resulted in a negative constant value (-0.030). Therefore, if the CEE is equal to zero, the profitability will be negative. This result reflects how the profitability of the Indonesian pharmaceutical industry cannot be separated from

Table 5: Summary of Regression Coefficients

	Constant	CEE	HCE	CCE	InCE	PCE	R	R-Square
ROE as Dependent Variable								
Model 1	-0.030	0.332					0.844	0.712
Model 2	-0.081		0.070				0.815	0.663
Model 3	-0.101			0.339	0.979	0.382	0.768	0.574
ATO as Dependent Variable								
Model 1	0.279	1.418					0.676	0.457
Model 2	0.858		-0.048				0.105	0.011
Model 3	0.967			-0.647	4.948	-0.435	0.310	0.062

investment in capital employed. The significant influence is also positive. These findings are consistent with the previous studies in IC (Razafindrambinina and Anggreni, 2008; Shiu, 2006; Zhang et al., 2006).

Human Capital Efficiency (HCE) also significantly influences the profitability in a positive way (coefficient equal to 0.070). Similar to CEE, the negative value of the constant indicates the importance of human capital investment in determining profitability in the pharmaceutical industry. It means that in Indonesia, pharmaceutical companies are capable of significantly increasing their profitability through their investment in HC. This result also supports the previous researches on IC (Razafindrambinina and Anggreni, 2008; Zhang et al., 2006).

Customer Capital Efficiency (CCE) also has a significant positive influence on profitability. It means that in the Indonesian pharmaceutical industry, good maintenance of marketing expenditures can significantly increase the company's profit. This result is inherent with the main purpose of investment in marketing activities, which is meant to attract new customers and develop customer satisfaction, and will eventually increase the company's value and revenue. However, over-expenditure in marketing costs will also reduce a company's profit. This kind of result occurred in the research done by Chen et al. (2005) providing empirical evidence of how investment in advertising had a significantly negative influence on profitability in a company. This difference was possibly caused by the model of the research, in which Chen (2005) involved Taiwanese listed companies in general instead of in one specific industry. In an industry with flexible sales volumes like in consumer goods and service delivery, marketing activities indeed affect their sales. But in

non-flexible industries like mining or any other industry supplying raw materials, marketing activities will not be very necessary. The mix of these companies, as used as samples by Chen et al. in their research, has most likely caused different results as compared to this research.

InCE also has a significant positive influence on financial profitability. This result is compatible with the research conducted by Chen et al. (2005) that indicates a positive significant influence on ROA and ROE. This result also supports the assumption in the beginning of this study that the pharmaceutical industry relies highly in research activities. Therefore, an increase in research expenditure will lead to an increase in financial profitability of the firms.

The last component, Process Capital Efficiency (PCE), has a significantly positive influence on company profitability. In other words, an increase in process capital investment will increase profitability significantly.

On the other hand, the result of an F-test shows that simultaneously, CCE, InCE, and PCE significantly influences profitability (ROE). The logical explanation for this phenomenon most likely lies within the characteristics of the pharmaceutical industry, which are: (1) an industry which sells and produces consumer goods, hence an extra investment to fund the marketing activities can cause a significant change in profitability; (2) an industry that relies highly in research activities in expanding its products, hence extra investment in R&D expenditures will increase the pharmaceutical firms' profitability; and (3) an industry with highly competitive business environments, hence it becomes necessary to keep developing techniques, procedures, and programs to increase the company competitiveness from time to time, which eventually can attract new customers. Together, those three components of structural capital, affects the profitability of the firm significantly. This result is also supported by the fact that the constant value of this multiple regression model is equal to -0.101, which means that the industry's profitability also relies highly on investments in marketing, research, and process activities.

4.2 The Impact of IC towards Productivity

Different from the previous results, the results of the impact of IC on productivity are relatively mixed. Some of them are significant, and some others are not significant. The first component (CEE) is similar to the one towards profitability, which indicates a significantly positive impact

on productivity. This result is consistent with the previous researches established by Razafindrambinina and Anggreni (2008) yet contradicts the research by Shiu (2006) that fails to discover any significant impact of CEE towards productivity. However, it is consistent with the fact that as manufacturers, pharmaceutical companies' efficiency in maintaining their capital assets is crucial in determining their financial performance, including productivity. This fact is also supported by the correlation coefficient (R) and explanatory power (R-square) of model CEE towards ATO that are the highest among the three existing regression models.

In contrast, HCE is proven to not be significantly influential over company productivity. Empirical findings also suggest that this association is negative (-0.048). The negative impact is inherent with the result of the research conducted by Firer and Williams (2003). An explanation of this phenomenon is that the pharmaceutical companies in Indonesia possibly dictate a trade-off between tangible assets and human capital in seeking to increase productivity. In other words, the focus of Indonesian pharmacy companies in maintaining productivity is by maintaining tangible assets, not their human capital (Firer and Williams, 2003). This fact is also supported by the low value of correlation coefficient between HCE and ATO, as well as the low value of explanatory power for the model involving those two variables.

The third component of IC, CCE, indicates significant influence towards ATO. The value of regression coefficient of CCE towards ATO indicates a negative impact. It means that the extra spending in marketing activities causes productivity to decrease. This result is consistent with the research of Kamath (2008). In his research, he discovers how structural capital efficiency, in which CCE is the part of it, influences productivity and MB ratio negatively.

The InCE has no significant influence towards productivity. The logical reasoning for this result is most likely because the companies in the Indonesian pharmaceutical industry focus R&D activities on formulating new products, not in pursuing new innovations in maintaining a company's operational efficiency. This way, the relationship between innovation activities (represented by R&D cost) and productivity is not as closely-related. Therefore, the impact of InCE on ATO is also not significant because the indicator used to measure productivity may not be appropriate for this research.

The last component, PCE, also has no significant impact on productivity. This result indicates that investment in process capital does not have a significant impact on productivity. One possible reason

is again, because the indicator used for productivity is not suitable for this research. That way the indicator fails to capture meaningful empirical analysis.

Simultaneously, however, CCE, InCE, and PCE affect productivity significantly. However, the significance of all three variables on productivity is considered weak. This result is also supported by the correlation and determination coefficients that are relatively weak compared to the ones in the multiple regression model involving profitability.

5. Conclusion, Implication and Limitation

The main purpose of this paper is to investigate the impact of the efficiency of value added by the company's physical and intellectual capital components towards two traditional dimensions of corporate performance, profitability and productivity, in the pharmaceutical industry listed in Indonesia's Stock Exchange. The empirical findings on linear regression analysis discover that the impact of VA efficiency towards profitability is significant and positive, while the results towards productivity are varied. The explanatory power, overall, is relatively high for the models involving profitability, yet is relatively poor for the models involving productivity. There are several possible causes for this phenomenon, which are: (1) the dimension of productivity is not quite related to the concept of IC, especially in the pharmaceutical industry in Indonesia; or (2) the limited number of samples used in this research , may not represent the actual phenomenon happening in the industry population.

A possible implication for policy-makers within the related organisation due to these findings is that they may have to put greater consideration toward Intellectual Capital in decision-making efforts since this study has proven that IC can significantly affect a corporate's profit. This study is also dedicated to providing more information that would be a point of interest for academicians for further research in this area. In the future, however, further improvements are deemed necessary for the fact that this study also has its own limitations. One limitation is in respect of research samples that are probably too small in numbers, and yet focus only in one IC reliant sector. Future researchers must consider using a larger number of samples for a better representation of the actual phenomenon happening in reality. Also, to provide better insight towards the impact of IC, a comparison

between two/more business sectors with different characteristics can be an option.

Another limitation is related to the measurement of IC used in this research (Extended VAIC™) that is lacking in information for each of its components, especially with respect to Process Capital Efficiency (PCE) with no definite proxy embedded. The possible reason for this condition is that when developing the concept of the Extended VAIC™ model, Nazari and Herremans (2007) may use proxies that do not match the existing definitions of the related components (i.e. existing definitions for PC that should include R&D expense as one of its proxy, while in this model R&D is becoming a proxy of InC). Hopefully, in the future, there will be an effort to cover the limitation of the Extended VAIC™ model in order to avoid misinterpretation.

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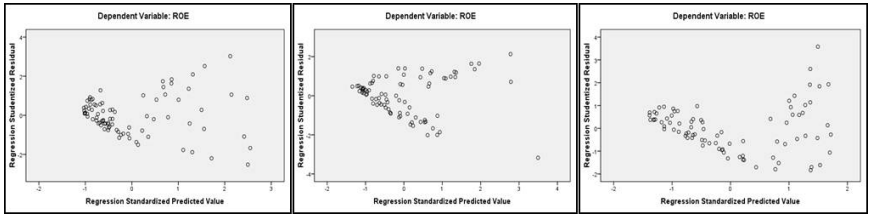
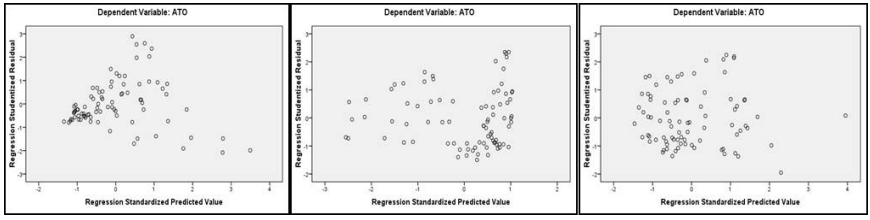
Apppendix

Figure 4: SRESID*ZPRED with ROE as Dependent Variable



Model 1 Model 2 Model 3

Figure 5: SRESID*ZPRED with ATO as Dependent Variable



Model 1 Model 2 Model 3