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INTELLECTUAL CAPITAL MEASUREMENT: EXTENDED-VAIC VS VAIC WHICH ONE IS BETTER?

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A B S T R A C T

This study aims to make comparison between two measurement model for Intellectual Capital and explore its impact on financial and stock performance. As many as 19 non-financial companies with 183 observations for the period of 2010-2020 (unbalanced panel) was used for regression model. Fixed Effect Model with robust is the most suitable model for panel data regression in this research. According to the results both models are fit to predict internal financial performance with ROA and ROE as proxy but not fit to predict stock valuation in the market with MBV as proxy. VAIC model is better for IC measurement than E-VAIC model. Human Capital is the most significant component both for VAIC and E-VAIC model. The result also indicated that Relationship capital efficiency has pure moderating role.

Keywords: *Intellectual Capital, Financial Performance, Value Added Intellectual Capital, Stock* Performance

Penelitian ini bertujuan membandingkan dua model pengukuran *Intellectual Capital* dan pengaruhnya terhadap kinerja keuangan dan saham. Sampel terdiri dari perusahaan non finansial yang terdaftar di BEI selama 2010-2020. Sebanyak 19 perusahaan dengan 183 observasi (*unbalanced panel*) digunakan dalam model regresi. Dari hasil pengujian model, ditemukan bahwa model yang paling tepat adalah model *Fixed Effect Model* dengan *Robust*. Dari hasil regresi ditemukan bahwa dua model yang dibandingkan dapat digunakan untuk memprediksi kinerja keuangan internal namun tidak cocok untuk memprediksi nilai saham yang ditangkap oleh pasar yang diproksikan oleh MBV. Model VAIC memiliki kemampuan yang lebih baik dalam mengukur IC daripada Model E-VAIC. Komponen *Human Capital* menjadi variabel yang berpengaruh paling signifikan baik pada model VAIC maupun E-VAIC. *Relationship capital efficiency* ditemukan menjadi variabel moderasi murni pada model E-VAIC.

Kata Kunci: Intellectual Capital, Kinerja Keuangan, Value Added Intellectual Capital, Kinerja Saham

INTRODUCTION

In this new era there is a disruption in business where access to gain more idea, creativity and knowledge (Intellectual Asset) become more important as success key replacing physical asset (Pedrini, 2007). Company's success on facing business competition is dependent on how good its ability to manage and utilize Intellectual asset (W. S. Chang & Hsieh, 2011). Intellectual Asset that can produce competitive advantage for company but cannot reflected on financial report directly is called Intellectual Capital (IC) (Bayraktaroglu et al., 2019).

One method for measuring IC Efficiency that mostly used is VAIC (Value Added Intellectual Coefficient) (Pulic, 2004). This method is the easiest to be used, furthermore the data source needed for the formula can be obtained from annual financial report which reported by the company (Bayraktaroglu et al., 2019; Soewarno & Tjahjadi, 2020). Previous studies using VAIC to measure IC efficiency are already done a lot, most of the result supported IC as important element that significantly impact company's financial performance (Andreeva & Garanina, 2016; Chowdhury et al., 2019; Inkinen, 2015; Nimtrakoon, 2015; Ozkan et al., 2017)

Most IC Research use Resource based

theory as a foundation to view IC as an asset that can be maximized to enhance competitive advantage (Bontis et al., 2015; Kohtamäki et al., 2019; Molodchik et al., 2012). One of the most important factors is the components of intellectual capital that made it valuable and unique. In VAIC method three components namely Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE) and Capital Employed Efficiency (CEE) are the core of IC. In line with the development of economic and technology condition, some researchers propose modification for VAIC method by adding new components such as Relationship Capital (RC) and Innovation Capital (INC). These modifications called Extended-VAIC (E-VAIC) (Bayraktaroglu et al., 2019; Phusavat et al., 2011; Soewarno & Tjahjadi, 2020; Vishnu & Gupta, 2014). The Development of E-VAIC intended to explore other components that previously neglected by VAIC (Bayraktaroglu et al., 2019). Some researchers also stated by using E-VAIC they found much better consistency than VAIC model (Nadeem et al., 2017; Soewarno & Tjahjadi, 2020). This development on E-VAIC is based on previous studies which used various sample across different sector like Bank (Ousama & Fatima, 2015; Ozkan et al., 2017; Soewarno & Tjahjadi, 2020), pharmacy (Chowdhury et al., 2019; Tiwari, 2020; Vishnu & Gupta, 2014) and healthcare (Ahman & Sohn, 2020).

From previous studies, the impact of RC and INC as additional components in E-VAIC are still inconsistent. Bayraktaroglu et al., (2019) found that INC has no significant impact on financial performance represented by ROA and ROE but Soewarno & Tjahjadi, (2020) found that INC has significant on company performance represented by ROA. Vishnu & Gupta (2014) found that RC has significant impact on company performance, while Nimtrakoon (2015) and Ahman & Sohn (2020) found the opposite. Because of this inconsistent research, a deeper study is needed to determine how to measure IC using secondary data. Based on these phenomena, this study tries to make comparison between two models, VAIC and E-VAIC to determine which model is more relevant to measure IC and its impact on company's performance. A comparison study between two IC measurement model is still rarely conducted, so this study will focus on that to make it difference from others (Soewarno & Tjahjadi, 2020).

For research sample, non-financial industry in Indonesia is used because of its struggling efforts to maintain competitive advantage and to transform its business process according to industry 4.0 era. (Cabrita et al., 2019; Frank et al., 2019). We excluded financial sector because it has more regulation and highly protected industry so it has to be researched separately (El-Bannany, 2008; Ulum et al., 2014). In this study, we use data period from 2010-2020, because in late 2010 Industry 4.0 was introduced in Germany. This "new era" of industry focused on high efficiency good and service production with digital technology assistant. According to Cabrita et al (2019), IC model can be used to identify and enhance important component to speed up industry 4.0 transformation. With identifying relevant IC component and measurement, management can maximize potential profit from industry 4.0 era (Cabrita et al., 2019). Because of very challenging nature of business environment, IC measurement model urgently need to be reviewed (Amin et al., 2018; Kohtamäki et al., 2019; Phusavat et al., 2011; Vishnu & Gupta, 2014; Xu & Liu, 2020). Its main purpose is to determine which model is relevant to be used, so management and external user can easily measure efficiency level of non-financial company and its performance against competitor to face industry 4.0.

This research is consisted of introduction, followed by literature review and hypothesis, research method, analysis, and discussion. The last section consisted of conclusions, limitations and suggestions.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Resource Based Theory

Resource based theory is a view about how a company can maintain its competitive

advantage by using and mobilizing its resources that considered unique and not easily imitated (Lestari & Suryani, 2020). By identifying and maximizing this kind of resources a company can be a leader in its sector. One of the most important intangible asset that can be considered unique is Intellectual capital (IC) (Bayraktaroglu et al., 2019; Nimtrakoon, 2015). According to Molodchik et al., (2012), IC is considered rare and heterogenous resource, therefore it is important to classify what components included in IC. The easiest way to identify the components is by using VAIC method proposed by (Pulic, 2000b). He divided IC into three components namely Human Capital, Structural Capital and Capital Employed. Some researcher argued that there are different components that have to be included in the equation such as Relational Capital (Andreeva & Garanina, 2016; Molodchik et al., 2012; Obeidat et al., 2021) and Innovation capital (Ahman & Sohn, 2020; Bayraktaroglu et al., 2019; Ge & Xu, 2021; Phusavat et al., 2011).

Signaling Theory

In Signaling theory, all published information by company whether its good news or bad news can be used by investor to make decision (Yasar et al., 2020). Due to the large amount of information currently circulating, published information must be possessed high quality that considered reliable for investor. To make sure only high-quality information get published, company used a strategy called “Strategic Communication”. This strategy aims to make sure that every information is accountable so company’s reputations will get better and resulted in higher trust from external stakeholders. (Argenti & Robert, 2005; Hallahan et al., 2007; Thomas & Stephens, 2015; Yasar et al., 2020). Some of desirable impacts from better reputation and trust is to attract potential investor and higher stock price in the market (Ross, 1977; Solikhah et al., 2020). Financial report is one of the most reliable source of information, from it IC value can be measured (Pulic, 2000a, 2004; Solikhah et al., 2020). The higher the IC, the higher chance Company can attract many potential investors that resulted in better stock price performance and higher MBV. (Appuhami, 2007; Bayraktaroglu et al., 2019; Maditinos et al., 2011).

Intellectual Capital

Although it has often been discussed and used as the theme of many studies, the definition of IC itself is still a matter of debate (Bayraktaroglu et al., 2019). One of the initial definitions given to IC is anything that everyone knows that can contribute to increasing competitive advantage (Stewart, 1998). Along with the research conducted on IC, the definition is also growing such as "all knowledge that can be capitalized or made into profit" (Sullivan, 1999), “a collection of knowledge assets that are the main factors in supporting and improving operational performance” (Schiuma & Lerro, 2008), “all intangible and non-financial resources controlled by the company and support the creation of added value” (Roos et al., 2007). Based on the opinion of most researchers, it can be concluded that IC is an intangible asset based on the knowledge management and ability to create value for customers (Vishnu & Gupta, 2014). IC is considered as the main driver to maintain company competitiveness in the long term, thus making IC a very vital part (Phusavat et al., 2011). Several companies in America and Europe have started to report their IC management to stakeholders with the aim of improving their image in public, attracting customer attention, and recruiting new talents to increase innovation (Phusavat et al., 2011). Financially, the difference between the book value and the stock price on the stock exchange is a testament to the influence of IC on the economic value of an entity (Maditinos et al., 2011).

VAIC (Value Added Intellectual Coefficient)

IC Measurement can be done by many methods such as Balanced Score Card (Fatima & Elbanna, 2020; Kaplan & Norton, 1992; Mio et al., 2022; Tuan, 2020), Economic Value Added (EVA) (Iazzolino et al., 2014; Salehi et al., 2014), Human

Resource Accounting (Morady, 2013) & VAIC (Iazzolino et al., 2014; Iazzolino & Laise, 2013; Pulic, 2004). Of all the existing methods, VAIC is the most practical method in finding data, easy to compare and reliable because the data is taken from financial statements, the majority of which have been audited by independent auditors (Andes et al., 2020; Firer & Williams, 2003; Maditinos et al., 2011; Ranitawati, 2021).

The VAIC method is divided into three components, namely Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE) and Capital Employed Efficiency (CEE). HCE is the contribution of individuals involved in the dynamics of the company to create added value (Bayraktaroglu et al., 2019). This contribution can be in the form of experience, knowledge, skills, ability to solve problems and thoughts that exist in everyone (Elrehail et al., 2020; Ulum et al., 2014). HC is the main source of every creativity, innovation and knowledge sharing place to improve skills (Bayraktaroglu et al., 2019; Xu & Liu, 2020).

SCE is an infrastructure built by the company to ensure that everyone involved in it can innovate and contribute his thoughts in the progress of the company (Anderson & Lawi, 2021; Damuri, 2017; Ngah & Ibrahim, 2009). SCE is considered successful if it can create a more productive atmosphere, accelerate the learning process, and increase employee creativity. Real examples of SCE are all procedures, rules, routines and aspects of corporate culture that are applied as a whole to support productivity (Bayraktaroglu et al., 2019).

CEE is an indicator of how efficiently a company creates added value from its physical & financial capital (Bayraktaroglu et al., 2019; Buallay, 2018; Dženopoljac et al., 2016).The assumption behind CEE is the main principle in doing business, which is required to create maximum added value from each nominal financial asset and from every physical asset under its control (Pulic, 2000a; Shahveisi et al., 2017; Tiwari, 2020).

Extended-VAIC

VAIC method began to be developed to accommodate business developments that occurred by including variables that were previously not considered (Soewarno & Tjahjadi, 2020; Vishnu & Gupta, 2014; Xu & Liu, 2020). There are two variables that considered appropriate for VAIC development, namely Relationship Capital (RC) and Innovation Capital (INC) (Bayraktaroglu et al., 2019).

Marketing a product or service is an inseparable part of a company such as the use of brand logos and mascots (Jhalugilang, 2018). Because it is an inseparable part, promotion and marketing are often one of the variables added to the IC calculation model (Nimtrakoon, 2015; Ulum et al., 2014; Vishnu & Gupta, 2014). This variable is often represented by the costs of marketing, promoting or maintaining good customer relationships (Bayraktaroglu et al., 2019). RC is considered as one of the important components in IC because it is through this path that the company forms an image and maintains a good name to ensure that customers continue to believe in the quality of the services or products offered. (Bayraktaroglu et al., 2019). The addition of RC is believed to improve the quality of VAIC to predict IC efficiency (Ulum et al., 2014).

Research & innovation conducted by the company to obtain a new product or service is also considered as one of the important points that must be included in the VAIC model (Ge & Xu, 2021).This resource is also known as INC (Phusavat et al., 2011). The main objective of INC management is for companies to be able to create an intellectual property that can be used to increase competitiveness. The role of the INC is very important because if it is not managed properly then a company will not be able to find and adapt to the developments that occur (Aljanabi, 2020; Dachyar et al., 2013; Xu & Liu, 2020).

IC and Financial Performance

Fundamentals derived from IC are used as the basis for creating company strategies in facing market challenges and creating added value to customers (Bayraktaroglu et al., 2019). Because one of the main bases

of strategy is IC, it needs to be managed properly in order to achieve the most optimal performance (Marr et al., 2003). Research on IC influence on company performance has been done quite a lot in various specific industrial sectors such as banks (El-Bannany, 2008; Ousama & Fatima, 2015; Ozkan et al., 2017; Ulum et al., 2014), tourism (Bontis et al., 2015; Khalique et al., 2020), pharmacy (Tiwari, 2020; Vishnu & Gupta, 2014), Health (Ahman & Sohn, 2020) and Manufacture (Phusavat et al., 2011; Pucar, 2012; Xu & Li, 2020) in different countries with different levels of technological progress and infrastructure. Most of these studies describe the findings that there is a significant impact of IC on financial performance as measured using financial performance indicators and stock prices. Based on previous research and theory the following hypotheses are proposed For VAIC and E-VAIC Model:

H1 : VAIC Components have significant effect on the company's financial performance (ROA)
H1a : HCE has significant effect on ROA
H1b : SCE has significant effect on ROA
H1c : CEE has significant effect on ROA
H2 : VAIC Components have significant effect on the company's financial performance (ROE)
H2a : HCE has significant effect on ROE
H2b : SCE has significant effect on ROE
H2c : CEE has significant effect on ROE
H3 : VAIC Components have significant effect on the company's financial performance (MBV)
H3a : HCE has significant effect on MBV
H3b : SCE has significant effect on MBV
H3c : CEE has significant effect on MBV
For E-VAIC Model
H4 :E-VAIC Components have significant effect on the company's financial performance (ROA)
H4a : E-HCE has significant effect on ROA
H4b : E-SCE has significant effect on ROA
H4c : E-CEE has significant effect on ROA
H4d : E-RCE has significant effect on ROA
H4e : E-INCE has significant effect on ROA
H5 :E-VAIC Components have significant effect on the company's financial performance (ROE)
H5a : E-HCE has significant effect on ROE
H5b : E-SCE has significant effect on ROE
H5c : E-CEE has significant effect on ROE
H5d : E-RCE has significant effect on ROE
H5e : E-INCE has significant effect on ROE
H6: E-VAIC Components have significant effect on the company's financial performance (MBV)
H6a : E-HCE has significant effect on MBV
H6b : E-SCE has significant effect on MBV
H6c : E-CEE has significant effect on MBV
H6d : E-RCE has significant effect on MBV
H6e :E-INCE has significant effect on MBV

Relationship Capital and IC

According to the research of Pucci et al., (2015) the existence of marketing assets can strengthen the influence of IC on the company's financial performance (ROA). with the existence of organized marketing assets, it can strengthen the influence of IC on the company's competitive advantage. The same thing was stated by Aguirrezabalaga et al., (2020) who thought that RC was very important in strengthening the IC component because marketing efforts in retaining and attracting new customers had become an important element in maintaining company performance. According to research by Wang & Chang, (2005), the existence of RC is important in strengthening the influence of IC on financial performance as proxied by ROE. Wang & Chang, (2005) also argue that the presence of an RC component related to promotional activities will strengthen IC and have an impact on increasing financial performance. Sussan, (2012) also states that every good relationship with customers is a part that strengthens IC and will ultimately help increase sales. Based on the results of these studies, the following hypothesis is drawn:

H7: E-RCE positively moderates VAIC Components impact on the company's financial performance (ROA)
H7a: E-RCE positively moderates the effect of E-HCE on ROA
H7b: E-RCE positively moderates the effect of E-SCE on ROA
H7c: E-RCE positively moderates the effect

of E-CEE on ROA

H8: E-RCE positively moderates VAIC Components impact on the company's financial performance (ROE)

H8a: E-RCE positively moderates the effect of E-HCE on ROE

H8b: E-RCE positively moderates the effect of E-SCE on ROE

H8c: E-RCE positively moderates the effect of E-CEE on ROE

H9 : E-RCE positively moderates VAIC Components impact on the company's financial performance (MBV)

H9a: E-RCE positively moderates the effect of E-HCE on MBV

H9b: E-RCE positively moderates the effect of E-SCE on MBV

H9c: E-RCE positively moderates the effect of E-CEE on MBV

Innovation Capital and IC

Based on the research of Amin et al., (2018) and Bayraktaroglu et al., (2019) knowledge and innovation assets have significant effect in strengthening the influence of IC on financial performance. These knowledge assets make the IC component more effective in influencing company performance (Amin & Aslam, 2017). The same thing was expressed by Obeidat et al., (2021) that Innovation increases the influence and relationship of IC on the creation of competitive advantage which in turn contributes to improving financial performance. Örnek & Ayas, (2015) revealed that innovation efficiency can increase the influence of IC on financial performance. In addition to using the ROA proxy, Amin et al., (2018) also use ROE as a proxy for financial performance which also produces similar results, that innovation strengthens the influence of the IC component on ROE. Amin & Aslam, (2017) and Bayraktaroglu et al., (2019) also reveal that Innovation and IC influence the creation of competitive advantage, and the sustainability of the company's business. Based on the results of these studies, the following hypothesis is drawn:

H10: E-INCE positively moderates VAIC Components impact on the company's financial performance (ROA)

H10a: E-INCE positively moderates the effect of E-HCE on ROA

H10b: E-INCE positively moderates the effect of E-SCE on ROA

H10c: E-INCE positively moderates the effect of E-CEE on ROA

H11: E-INCE positively moderates VAIC Components impact on the company's financial performance (ROE)

H11a: E-INCE positively moderates the effect of E-HCE on ROE

H11b: E-INCE positively moderates the effect of E-SCE on ROE

H11c: E-INCE positively moderates the effect of E-CEE on ROE

H12: E-INCE positively moderates VAIC Components impact on the company's financial performance (MBV)

H12a: E-INCE positively moderates the effect of E-HCE on MBV

H12b: E-INCE positively moderates the effect of E-SCE on MBV

H12c: E-INCE positively moderates the effect of E-CEE on MBV

RESEARCH METHOD

Population and Sample

In this study the population used is non-financial companies listed on the Indonesia Stock Exchange (IDX). Sample selection using purposive sampling method with the criteria used are: (1) Listed on Indonesia Stock Exchange for the span year of 2010 - 2020; (2) Published full financial report from 2010 to 2020; (3) Include research and development expenses account in the financial statement; (4)Include Advertisement and promotions expenses in the financial statemen. From these criteria there are 19 companies that are used as samples. The number of observations obtained is 183 observations in the form of Unbalanced Panel Data (Hun, 2011).

Data Analysis

This study used panel data regression to examine the effect of IC (measurements with VAIC and E-VAIC) on financial performance and compares the level of significance and suitability of the regression model to draw conclusions

which method is more relevant to be used as a measurement of IC efficiency in non-financial industries in Indonesia. The statistical tool used is STATA 15. There are three panel data models, namely Common Effect Model (CEM), Fixed Effect Model (FEM) and Random Effect Model (REM). To determine the most suitable panel regression model, each model will be tested with the Chow Test, Hausman Test, and Breusch-Pagan LM Test. (Hun, 2011; Maulana & Muchtar, 2018; Zulfikar, 2018).

VAIC

In this study, IC was proxied using conventional VAIC (Pulic, 2004; Soewarno & Tjahjadi, 2020) and E-VAIC (Bayraktaroglu et al., 2019). Conventional VAIC is used because this model is the initial measurement model proposed to measure VAIC efficiency. For conventional VAIC measurements it is calculated using the following formula:

VAIC = HCE + SCE + CEE

Before calculating HCE, SCE and CEE, it is necessary to first calculate VA (Value Added) with the following formula (Soewarno & Tjahjadi, 2020)

VA = OP + HC + D + A

Explanation:

OP = Operation Profit; HC = Employee Expense (salary, wage, incentive, and bonus); D = Depreciation; A= Amortization

HCE = VA / HC

To calculate SCE, it is necessary to first calculate SC (Structural Capital). SC has an inverse relationship in the creation of VA (Pulic, 2004) so it is formulated as follows:

SC = VA – HC

SCE = SC / VA

For CEE (Capital Employed Efficiency) it is calculated by the following formula:

CEE = VA / CE

Explanation

CE (Capital Employed) = Book value of company net assets.

E-VAIC

For the measurement of IC efficiency using E-VAIC, it is calculated using almost the same formula but added with two additional variables, namely RCE (Relationship Capital Efficiency) and INCE (Innovation Capital Efficiency) (Bayraktaroglu et al., 2019).

E-VAIC = E-HCE + E-SCE + E-CEE + E-RCE + E-INCE

E-VA = OP + HC + MP + RD

Explanation:

OP = Operational Profit ; HC = Wages and Salaries ; MP = Marketing Expense and promotion ; RD = Research and Development Expense,

E-HCE = E-VA / HC

E-SCE = (E-VA - HC - MP - RD) / E-VA

E-CEE = E-VA / CE

E-RCE = E-VA / MP

E-INCE = RD / E-VA

Company Performance

In this study company performance is measured by three different proxies that represent financial performance and stock price performance in the market. The ratios used as proxies are Return on Assets (ROA), Return on Equity (ROE) and Market to Book Value (MBV). The formulas used in calculating these ratios are 1) ROA is the ratio of net income and total assets (Bayraktaroglu et al., 2019); 2) ROE Is the ratio between net income and equity (Soewarno & Tjahjadi, 2020); 3)MBV is the ratio between market value and book value (Bostanci et al., 2018). The proposed regression models used to test the hypothesis are as follows:

For VAIC Model

ROA = α + β1 HCE + β2 SCE + β3 CEE + e

ROE = α + β1 HCE + β2 SCE + β3 CEE + e

MBV = α + β1 HCE + β2 SCE + β3 CEE + e

For E-VAIC Model

ROA = α + β1 E-HCE + β2 E-SCE + β3 E-CEE + β4 E-RCE + β5 E-INCE + e

ROE = α + β1 E-HCE + β2 E-SCE + β3 E-CEE + β4 E-RCE + β5 E-INCE + e

MBV = α + β1 E-HCE + β2 E-SCE + β3 E-CEE + β4 E-RCE + β5 E-INCE + e

For E-INCE as moderator

ROA = α + β1 E-HCE + β2 E-SCE + β3 E-CEE + β4 E-RCE + β5 E-INCE + β6 E-HCE x E-INCE + β7 E-SCE x E-INCE + β8 E-CEE x E-INCE + e

ROE = α + β1 E-HCE + β2 E-SCE + β3 E-CEE + β4 E-RCE + β5 E-INCE + β6 E-HCE x E-INCE + β7 E-SCE x E-INCE + β8 E-CEE x

E-INCE + e

MBV = α + β1 E-HCE + β2 E-SCE + β3 E-CEE + β4 E-RCE + β5 E-INCE + β6 E-HCE x E-INCE + β7 E-SCE x E-INCE + β8 E-CEE x E-INCE + e

For E-RCE as moderator

ROA = α + β1 E-HCE + β2 E-SCE + β3 E-CEE + β4 E-RCE + β5 E-INCE + β6 E-HCE x E-RCE + β7 E-SCE x E-RCE + β8 E-CEE x E -RCE + e

ROE = α + β1 E-HCE + β2 E-SCE + β3 E-CEE + β4 E-RCE + β5 E-INCE + β6 E-HCE x E-RCE + β7 E-SCE x E-RCE + β8 E-CEE x E -RCE + e

MBV = α + β1 E-HCE + β2 E-SCE + β3 E-CEE + β4 E-RCE + β5 E-INCE + β6 E-HCE x E-RCE + β7 E-SCE x E-RCE + β8 E-CEE x E -RCE + e

ANALYSIS AND DISCUSSION

Table 1 shows the descriptive statistics for all the variables tested. For the dependent variable the average ROA is 0.096, ROE is 0.144 and MBV is 3.136. In the sample taken, the lowest value for ROA is owned by PT Indosat Tbk in 2013 because the company was modernizing the equipment on a large scale and providing many price discounts to maintain customer loyalty during the modernization period and the highest is owned by PT Merck Tbk in 2018 due to an increase in net profit caused by the sale of some business segments.

For ROE, the lowest value is owned by PT Ricky Putra Globalindo Tbk in 2020 which experienced a decrease in profit due to a decrease in sales because of the large-scale Social Restrictions policy, while the highest value is owned by PT Merck Tbk in 2018 due to an increase in net profit caused by the sale of some business segments. For MBV, the lowest value is owned by PT Kalbe Farma Tbk in 2011 while the highest is owned by PT Indofarma Tbk in 2018. Based on the annual report, PT Indofarma Tbk experienced a higher share price increase during 2018 reaching 300%. Overall,

Table 1.
Descriptive Statistic

Variable	Mean	Std. Dev	Min		Max	
ROA	0.0965	0.1037	-0.049	PT Indosat Tbk	0.921	PT Merck Tbk
ROE	0.1445	0.2042	-0.208	PT Ricky Putra Globalindo Tbk	2.245	PT Merck Tbk
MBV	3.1366	5.0751	0.039	PT Kalbe Farma Tbk	40.563	PT Indofarma Tbk
HCE	3.0233	2.4275	0.913	PT Indofarma Tbk	14.252	PT Indosat Tbk
SCE	0.5471	0.1942	-0.095	PT Indofarma Tbk	0.930	PT Indosat Tbk
CEE	0.5102	0.1992	0.168	PT Indocement Tunggal Prakasa Tbk	1.320	PT Hanjaya Mandala Sampoerna Tbk
EHCE	2.8633	1.4187	0.968	PT Mandom Indonesia Tbk	8.953	PT Semen Indonesia Tbk
ESCE	0.4032	0.2113	-0.219	PT Indosat Tbk	0.852	PT Semen Indonesia Tbk
ECEE	0.5423	0.2387	0.118	PT Indocement Tunggal Prakasa Tbk	1.469	PT Hanjaya Mandala Sampoerna Tbk
EINCE	0.0087	0.0147	0.000	PT Semen Indonesia Tbk	0.070	PT Kalbe Farma Tbk
ERCE	24.5435	49.0777	1.726	PT Indosat Tbk	353.208	PT Champion Pacific Indonesia Tbk

pharmaceutical companies dominate the maximum value for the independent variables tested for both financial performance and stock performance.

For VAIC component, the average HCE is 3.023, the SCE is 0.54 and the CEE is 0.510. The lowest score for HCE is owned by PT Indofarma Tbk in 2013 and the highest is owned by PT Indosat Tbk in 2011. For SCE the lowest score is owned by PT Indofarma Tbk in 2013 while the highest score is owned by PT Indosat Tbk in 2011. For CEE the lowest value is owned by PT Indocement Tunggal Prakasa Tbk in 2018 while the highest is owned by PT Hanjaya Mandala Sampoerna Tbk in 2014.

For the E-VAIC component, the average E-HCE is 2.863, E-SCE is 0.403, E-CEE is 0.542, E-INCE is 0.008 and E-RCE is 24.543. The lowest value for E-HCE is owned by PT Mandom Indonesia Tbk in 2020 and the highest is owned by PT Semen Indonesia Tbk in 2010. For E-SCE the lowest value is owned by PT Indosat Tbk in 2018 while the highest value is owned by PT Semen Indonesia Tbk in 2011. For E-CEE the lowest value is owned by PT Indocement Tunggal Prakasa Tbk in 2018 while the highest is owned by HMSP in 2014. For E-INCE the lowest value is owned by PT Semen Indonesia Tbk in 2012 while the highest is owned by PT Kalbe Farma Tbk in 2013. For E-RCE the lowest value is owned by PT Indosat Tbk in 2018 while the highest is owned by PT Champion Pacific Indonesia Tbk in 2020. From the two additional components included for the E-VAIC model, innovation activity is still very low when compared to marketing.

To make sure multicollinearity is not significantly impact the model we use Eigenvalue & Conditional Number testing method, and the result is none of the model had more than 100 Conditional number (Das, 2019).

From the results of the regression test using VAIC in table 2, it was found that the regression model with the dependent variables ROA and ROE showed a significant F test value (<5%) which

Table 2.
VAIC Model Regression

VAIC	ROA		ROE		MBV	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
HCE	0.014	0.015*	0.027	0.001*	0.223	0.513
SCE	0.223	0.051	0.057	0.785	-3.133	0.471
CEE	0.032	0.603	0.206	0.309	0.921	0.696
Constant	-0.085		-0.074		3.656	
F Prob	0.000		0.000		0.874	
Adj R^2	0.142		0.057		0.026	

Table 3.
E-VAIC Model Regression

EVAIC	ROA		ROE		MBV	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
EHCE	0.256	0.007*	0.038	0.159	0.407	0.385
ESCE	0.041	0.717	-0.052	0.865	-1.750	0.613
ECEE	0.030	0.568	0.145	0.438	-1.235	0.555
ERCE	0.000	0.786	0.000	0.870	-0.003	0.757
EINCE	1.143	0.072	1.924	0.155	10.947	0.790
Constant	-0.020		-0.039	0.730	3.270	
F Prob	0.000		0.000		0.958	
Adj R^2	0.137		0.045		0.008	

indicated that the regression model could be used to predict the effect of the VAIC component on performance as proxied by ROA and ROE. Of all the components of VAIC, only HCE has a significant positive effect on company performance as proxied by ROA and ROE.

From the results in table 3 of the regression test using the E-VAIC model, the results show that the regression model with the dependent variables ROA and ROE shows a significant F test value (<5%) which indicates that the regression model can be used to predict the effect of E-VAIC component on performance, which is proxied by ROA and ROE. For the E-VAIC component, only E-HCE has a significant effect on ROA.

For the model with the moderating variable E-INCE in table 4, the results show that E-INCE as the moderating variable has no significant effect on all dependent variables and does not significantly strengthen the effect of E-HCE, E-SCE and E -SCE on all dependent variables. For the model with the moderating variable E-RCE in Table 5, the results show that E-RCE is a pure moderating variable that significantly strengthens the effect of E-CEE on ROA.

ANALYSIS AND DISCUSSION

Based on the regression results, only H1a, H2a, H4a and H7c are supported. Human Capital is the only component that has significant impact on performance. Most of the accepted hypotheses relate to the human resource component, these results indicate that human resources become an important role that should be seriously managed by the company (Elrehail et al., 2020; Maditinos et al., 2011; Mariz-Perez et al., 2012; Ousama & Fatima, 2015). HCE and E-HCE are the only components of VAIC and E-VAIC that have a significant impact on financial performance. These findings indicate that human resources are a component that plays an important role in shaping IC.

According to Chowdhury et al., (2019) companies with the best performance tend to focus on human resources and always try new ways to maximize their effectiveness. Kalkan et al., (2014) also stated that human resources are a key element in improving the quality of assets owned by the company and maintaining a competitive advantage in the competition. As viewed from descriptive statistics, HCE is the highest average among the other two VAIC model components, this indicates that the sample companies have realized that human resources are a very valuable asset to be developed. As for E-VAIC Model, this result is quite interesting when viewed from the descriptive statistics which illustrate that the largest component in E- VAIC is from E-RCE instead of E-HCE. Even though it is not

Table 4.
EINCE Moderation Model

EVAIC	ROA		ROE		MBV	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
EHCE	0.027	0.025	0.045	0.179	0.072	0.893
ESCE	0.028	0.839	-0.118	0.752	0.861	0.841
ECEE	0.045	0.398	0.188	0.333	0.032	0.990
ERCE	0.000	0.779	0.000	0.473	-0.001	0.895
EINCE	2.689	0.280	5.869	0.315	147.068	0.492
EINCEXEHCE	-0.337	0.611	-1.549	0.176	94.596	0.162
EINCEXESCE	1.910	0.802	11.016	0.499	-586.731	0.261
EINCEXECEE	-1.604	0.612	-4.087	0.557	-300.871	0.232
Constant	-0.029		-0.061		2.364	
F Prob	0.000		0.000		0.919	
Adj R^2	0.125		0.038		0.028	

the highest component, it is proven that the human resource component still has a significant impact on financial performance. This phenomenon is closely related to the assumption that without the trust of the human resources involved in the company related to marketing messages conveyed to customers, a strong relationship will not be built (Callahan, 2004).

Elrehail et al. (2020), gives another perspective that human resources play an important role in three things related to competitive advantage, namely cost reduction, service quality and the type of service or product produced. The regression results support human resources position in a knowledge-based economy to be main factor in generating more efficient processes and new profitable business schemes (Soewarno & Tjahjadi, 2020).

In Indonesia itself, human resources have indeed become a special concern by the government, especially in facing the industrial era 4.0. This special attention is evidenced by the existence of a roadmap called "Making Indonesia 4.0" which was declared in 2018 (Setiono, 2019). This roadmap is needed as guidelines because of changes in business processes that depend on the intensive use of new digital technologies that require education updates for new workforces and retraining for existing workers (Hartarto, 2018).

It can be said that when viewed from either VAIC or E-VAIC measurement model, the non-financial industry is still very dependent on human resources. For other components such as SCE, conditions in Indonesia are still not optimal, especially in providing supporting infrastructure services for industry, especially for digitization transformation (Anderson & Lawi, 2021). The limitations of internet network infrastructure facilities and also the transformation of digital culture are still the main obstacles in addition to the limitations of infrastructure facilities such as electricity network (Anderson & Lawi, 2021; Damuri, 2017).

From the regression results it was also found that E-RCE is more appropriately classified as a pure moderating variable because it does not have a significant impact on company performance but has a significant impact on strengthening the influence of the IC component, namely E-CEE on company performance so H7c is supported (Hammond & Webster, 2014; Sugiono, 2004). This phenomenon is related to how a brand and company image that is strongly attached to a company can cause customers to remain loyal beyond their objective assessment (Chang & Tseng, 2005; Scott, 2020). With a brand and image that is already firmly attached, it will have an impact on the high potential for product sales, thereby strengthening the influence

Table 5.
ERCE Moderation Model

EVAIC	ROA		ROE		MBV	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
EHCE	0.029	0.007	0.047	0.139	0.234	0.710
ESCE	0.014	0.903	-0.106	0.750	-1.397	0.713
ECEE	0.010	0.851	0.111	0.575	-1.349	0.558
ERCE	-0.001	0.050	-0.002	0.265	-0.010	0.845
EINCE	1.236	0.110	1.872	0.257	8.459	0.847
ERCEXEHCE	0.000	0.112	0.000	0.305	0.006	0.701
ERCEXESCE	0.002	0.071	0.003	0.387	-0.029	0.805
ERCEXECEE	0.002	0.027*	0.004	0.144	0.020	0.808
Constant	-0.010		-0.029		3.638	
F Prob	0.000		0.000		0.995	
Adj R^2	0.134		0.037		0.011	

of physical and financial resources used to improve company performance.

For the E-INCE as moderating variable, there is no significant impact. This result is different from Bayraktaroglu et al., (2019) which states that research and development have a moderating effect on the IC component. This finding is caused by the condition of most non-financial companies in Indonesia that have not been consistent in conducting research and development. Several indicators report such as the 2020 Global Innovation Index (IIG) states that Indonesia ranks 85th, far behind other Southeast Asian countries such as Singapore, Malaysia, Vietnam, and Thailand as well as the 2018 UNESCO report which states that the contribution private sector contribution in research is still relatively low, only 12%. It further illustrates that research has not become an industry priority in Indonesia (Satria, 2021).

For the dependent variable MBV, it can be seen from the regression results that neither VAIC nor E-VAIC components have a significant impact. This is contrary to the research of Soewarno & Tjahjadi, (2020), Nimtrakoon, (2015) and Wang, (2011), This phenomenon is closely related to the character of capital market players in Indonesia who tend to prefer to rely on technical analysis based on price trends and news rather than company fundamentals itself (Bayu et al., 2014; Sappar, 2015). In addition, the motivation of capital market participants who want to get capital gains in a short time causes them to dislike financial statement analysis because they are considered unable to provide information quickly to respond to price changes (Alamsyah & Sarra, 2019). In terms of regression results, both the VAIC and E-VAIC models are not suitable to be used as models to explain the stock value captured by the market as proxied by MBV.

The regression results show that both VAIC and E-VAIC models can be used to predict company's financial performance as proxied by ROA and ROE, but both have low ability to explain the variables in question. This is indicated by the value of adjusted R^2 for both models which is quite low If viewed from the value of adjusted R^2. The VAIC model is still better than the E-VAIC model in explaining financial performance. The difference between the two is not very significant. This result is different from the conclusions of Bayraktaroglu et al., (2019) and Soewarno & Tjahjadi, (2020), which revealed that the addition of other variables such as innovation and marketing can improve the quality of the VAIC model in explaining financial performance.

CONCLUSIONS

Based on the regression results, it was found that the VAIC model is better in terms of explaining the company's financial performance than the E-VAIC model. Both the VAIC model and the E-VAIC model both can be used to predict financial performance as proxied by ROA and ROE but are not appropriate for stock performance proxied by MBV. Both models are only able to explain less than 20% of financial performance while the rest is explained by other factors.

Referring to the regression results, the component that has the most significant effect in both models is human resources. This shows that the company still relies heavily on the quality of human resources to improve IC and ensure that competitive advantage is maintained. The addition of new components, namely Innovation Capital (INC) and Relationship Capital (RC), has no significant impact on financial performance or stock performance. However, there is a significant moderating effect for RC on one of the E-VAIC components, namely E-CEE.

Based on the research results, it is better for companies to prioritize development in the field of their human resources and recruit potential employees, by improving the quality of human resources, it can create more competitive advantage values both in terms of procedures, culture, marketing methods and product development.

Due to inconsistent research results and the low level of explanation that can be given by the model to the dependent variable of financial performance and

stocks, it is necessary to conduct further research regarding the suitability of the model to measure IC in the non-financial industrial sector.

LIMITATIONS AND SUGGESTIONS

The biggest limitation of this study is most companies listed on the IDX do not include research and development costs, this has a significant impact on the number of samples. In addition, not all samples are consistent in conducting development and research every year.

For Future research, it is highly advised to use other proxy for research and development variable. A new measurement is needed for this variable because most of the time it takes more than one year for research to produce any significant result (Bayraktaroglu et al., 2019). For company performance we also suggest other uncommon proxy such as ROI because it is rarely used (Ge & Xu, 2021; Xu & Liu, 2020). Future research using control variables also highly advised (Buallay, 2018; García Castro et al., 2021). In addition, using other samples especially from developed country can be used to compare the result and to gain more evidence about VAIC relevancy (Janušk aite & Užiene, 2018).

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