**Proposal**

**Information Technology (IT) Capabilities, Firm Value and Firm Performance: A Resources Based View**

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# Introduction

It is undeniable that there have many been studies conducted to link IT capabilities and firm performance. This effort has been started since 1980’s (ie Cron and Sobol, 1983; Clemons, 1986; Kaplan, 1989). Even so this issue is still become interesting topic discussed by Information System (IS) researchers. The first reasons why this issue is still interesting to study is because most of businesses have spend considerable amount in IT, it contributes about 30% of all business investment (Saunders & Brynjolfsson, 2016). So that, understanding about whether and how IT has an impact on business performance is valuable research subject, as it allows the manager to know about the value of IT investment (Liang, You, & Liu, 2010).

The second reason is because of inconsistency result found on previous studies. Early studies conducted during the 1990’s showed inconclusive results regarding the relationship between IT and firm performance, in which some found that IT spending had either a slightly negative or no correlation with business performance ([Strassmann, 1997](#_ENREF_186); [Loveman, 1994](#_ENREF_110); [Mahmood and Mann, 1993](#_ENREF_115)), whilst some found a positive correlation between IT capabilities and business performance ([Brynjolfsson and Hitt, 1998](#_ENREF_30); [Mitra and Chaya, 1996](#_ENREF_125)). Even more, recent studies also show the inconclusive result, for example Mithas and Rust (2016); Ong & Chen (2013, 2014), Ndregjoni and Elmazi (2011), Byrd, Pitts and Adrian (2008), [Barua, Konana, Whinston, and Yin (2004)](#_ENREF_22), [Stratopoulos and Dehning (2000)](#_ENREF_187) and [Bharadwaj (2000)](#_ENREF_25) found the positive relationship between IT capabilities and firm performance, while on the other side Chae & Prybutox (2014) and Kohli, Devaraj and Ow (2012) found contradictory results in which there is no relationship between IT capabilities and business performance. The inconsistent result about this relationship certainly leads researchers to challenge the effect of IT on business performance.

The third reason due to lack of studies conducted in developing countries. Based on an extensive review of 303 papers related to IT contribution on performance, which were published between 1990 to 2013, conducted by Sabherwal & Jeyaraj (2015), it was shown that more than 80% of those studies were conducted in developed countries, while only less than 20% were conducted in developing countries. Then, among these 20% studies conducted in developing countries, mainly were conducted in certain developing countries, such as Africa and China. This condition certainly limit our understanding about the effect of IT investment on business in developing countries. As commonly known, there is a different between countries, not only between developing countries and developed countries, but also among developing countries or among developed countries. The differences are not only seen in regard to economic standpoint, but also in political, environmental and social cultural factors. These differences certainly have an impact on the application of technologies, models or strategies. The technologies, model or strategies initially developed and based on certain conditions, for example developed countries, cannot directly be applied to developing countries, as well as the research findings from developed countries condition cannot be generalized into developing countries (Rahayu, 2016). The limited studies conducted in developing countries become a great opportunity for researchers to study IT contribution on business in developing countries.

Based on the explanation above, it shows that the study of the impact of IT capabilities on business performance, especially for business in developing countries, is still relevant and still needs to be studied. Therefore, this study is generally aimed to investigate the impact of IT capabilities and business performance by using data from business in developing countries. In this regard, Indonesia has chosen to represent developing countries. The reason for choosing Indonesia will be explained in the next section.

# Research Objective and Research Question

Thus, based on the explanation above the specific objectives of this study are:

1. To investigate the impact of IT capabilities on firm performance
2. To investigate the impact of IT capabilities on firm value

Therefore, the research questions of this study are

1. Is there any impact of IT capabilities on firm performance?
2. Is there any impact of IT capabilities on firm value?

# Literature Review

## Resource Based Theory

There have many been theories developed and applied in order to study the effect of IT on business performance. Among the theories, the Resource Based Theory is considered as the most widely used by researchers in order to explain the relationship between IT capabilities and firm performance (Liang et al., 2010). Resources Based Theory was initially proposed by Wernerfelt (1984). However, according to Rivard, Raymond, and Verreault (2006) the original piece of work of RBT was found in Penrose (1959) study, which described the business as a “bundle of resources”. The resources itself is defined by Wade and Hulland (2004, p. 109) as “assets and capabilities that are available and useful in detecting and responding to market opportunities or threats”. Then Liang et al. (2010) describe that the assets are anything tangible or intangible that can be used by business in regard to design, produce and offer its product to a market; whilst capabilities are described as repeatable pattern in the use of assets to design, produce and offer its product to a market.

According to Barney (1991) the firm’s resources will contribute to the competitive advantage if they have the following characteristics, which are:

1. Valuable, in which the resources must have strategic value to business
2. Rare, in which the resources must be unique and difficult to find
3. Imperfectly imitable, in which the resources must be difficult to copy, and
4. Non-substitutable, the resources are difficult to substitute by other resources.

In this theory if the firms have the resources with these characteristics, they potentially generate sustained competitive advantage. Then, Milgrom and Roberts (1995) added the concept of complementary in order to further explain about the role of resources and how these resources has an impact on business value. In this regard, the value of firm resources will be increased by the presence of other complementary resources (Bhatt & Grover, 2005; and Bharadwaj et al., 2007). It will be difficult for competitors to imitate the total effect of complementary resources. So, it means the joint value of complementary resources is greater than the individual value of resources (Liang et al., 2010).

In IS literature, information technology is increasingly considered as complementary resources that strengthen other firms’ resources and capabilities (Bharadwaj et al., 2007). In this view, IT is considered as valuable organizational resource that can enhance organizational capabilities and eventually lead to higher performance (Liang et al., 2010).

## The Differences between Firm Performance and Firm Value

Before explaining the impact of IT capabilities on firm, it is important to explain about the differences between firm performance and firm value. It is because in this study these two terms also reflect the two different concepts. In this regard, the firm performance is different from firm value.

The firm performance refers to the effectiveness of organization in regard to its financial and operational performance (Liang et al., 2010). Firm performance reflects the past information and not forward-looking (Ong & Chen, 2014; Tanriverdi, 2006; Bharadwaj, 1999) and it represents the past performance of assets (Tanriverdi, 2006). On the other side, firm value reflects firms’ future potential development and reflects long term situations (Ong & Cheng, 2014; Ravichandran et al., 2009; Tanriverdi, 2006). Firm value is also related to risk-adjusted measure which reflects the intangible value of firms’ assets (Ong & Cheng, 2014; Ravichandran et al., 2009; Bharadwaj et al., 1999;). So, it is clearly that the concept of firm performance is totally different from the firm value.

As the accounting-based measures focuses on past information and “backward-looking measures” (Tanriverdi, 2006), and it also focuses on short-term influences (Saeed et al., 2005), so it is certainly appropriate to be used for measuring firm performance. In contrast, as the financial market-based measures focuses on long term influence (Saeed et al., 2005) and “forward-looking measures” (Tanriverdi, 2006), so it is certainly appropriate to be applied for measuring firm value.

For more detail, Table 1 below shows the important differences between firm performance and firm value.

Table 1: The Main Differences between IT Performance and IT value

|  |  |  |
| --- | --- | --- |
| Characteristics | Firm Performance | Firm Value |
| Definition | Ex post evaluation of firm performanceHistorical measureFirms’ current valueShort term influenceBackward looking measuresRestropective firm performanceThe past performance of assets | Market valuation of returnFuture measureFirms’ future value Long-term influenceForward-looking measures Prospective measuresFirms’ future development potential |
| The difference of measurement methods | Only reflects the past informationNot Forward lookingNot adjusted for riskNot reflect time lag effectsNot record the intangible value of assets | Long-term situationsRisk adjusted measures reflect time lag effectsthe intangible value of assets |
| The indicators of measurement | Accounting based measuresBusiness performance ratiosFirm profitabilityOperational performance | Financial market based measuresFirm valuationStock markets returnThe multiple of stock priceMarket value to book value ratio |

Source: Ong & Chen (2014, p. 72)

## IT Capabilities, Firm Performance and Firm Value

IT capabilities are abilities to utilize and deploy IT based resources in combination with other organizational resources and capabilities using organizational processes (Chen et al., 2014). IT capabilities involve IT infrastructure which comprise hardware, software and communication technology; human IT resources including technical and managerial IT skills; and IT-enabled intangibles which include knowledge assets, customer orientation, and synergy (Bharadwaj, 2000). As explained previously, IT is viewed as a valuable organizational resource that can enhance organizational capabilities and eventually lead to higher performance.

Several studies have tried to investigate the impact of IT on business performance. For instance, [Stratopoulos and Dehning (2000)](#_ENREF_187) attempted to link the IT capabilities with business performance by comparing financial performance of companies that were categorized as successful IT users with companies that were less successful IT users. The result of this study showed that the financial performance, which was measured by profitability and efficiency, of successful IT users companies was greater than for the less successful IT users in the same industry.

Similarly, [Bharadwaj (2000)](#_ENREF_25) investigated whether firms with superior IT capabilities also had superior performance or not. In this study, firms with superior IT capabilities were identified by using data provided by InformationWeek, and firm performance was measured by five measures: Return on Asset (ROA), Relative Market to Book Value (RELMV), sales, growth and risk. The study found that firms with superior IT capabilities demonstrated superior firm performance and lower cost than firms in the control group. This result was also reaffirmed by [Santhanam and Hartono (2003)](#_ENREF_175). By extending the Bharadwaj study, they also found that firms in the IT leader group showed superior performance than other groups.

[Barua, Konana, Whinston, and Yin (2004)](#_ENREF_22) also found that the level of digitization on the customer side has a positive correlation with financial performance. Then, based on meta analysis of 50 published studies (between 1990 – 2009) that investigated a relationship between IT investment and firm performance, [Liang, You, and Liu (2010)](#_ENREF_103) found that the relationship between IT investment with firm performance can be explained by an indirect model, in which the IT resources can enhance firm capabilities, and then the firm capabilities can improve firm performance.

In addition, recent studies conducted by [Ong and Chen (2013)](#_ENREF_141) and [Ong and Chen (2014)](#_ENREF_140) also found that firms with superior IT capabilities also have superior firm performance and firm value than their counterparts. Then, based on data 148 Chinese manufacturing firms, Chen, Wang, Nevo, Benitez, & Kou (2015) also found that there is a significant correlation between IT and firm performance.

Besides affecting firm performance, Kohli, Devaraj, & Ow (2012) also found that the IT investment has significant impact on firm value. This result were based on 146 non-publicly trade healthcare firm in USA. Then, Ong & Chen (2014) conducted longitudinal study by using 869 pairs of IT leader and control firms to investigate the impact of IT on firm performance and firm value. In their study, it was found that the IT investment has a greater impact on firm value rather than firm performance.

According to Porter (2001) and Mithas & Rust (2016) firms can enhance their performance by leveraging their IT capabilities to decrease cost, increase revenue or both. First, IT capability can reduce cost by increasing business productivity and efficiency. For example, by creating interactive Website, company can market their products and services broadly and can open their business to open 24 hours a day, 7 days a week and 365 days a year without any additional cost. Hence, superior IT capability is potentially an important source for reducing marketing cost and customer loyalty.

Then, IT capability can also be used to increase revenue by fully exploiting opportunities through existing customers, channels, and products/ services and by finding or creating new customers, channels, and products/services (Mithas & Rust, 2016). For example, some companies have created a Website to market their product globally and they can enter global market easily, so that they can increase their sales. Fahy and Hooley (2002) study found that firm with superior IT capability increased their revenue by gaining valuable resources such as patents

Furthermore, superior IT capability can allow a firm to gain exclusive access to customer information and their preferences and reduce the search costs for future business (Straub and Watson 2001). This proprietary information can be a valuable resource for a firm in expanding its business into a new business area without incurring a heavy toll (Sampler 1998). These are just several examples of how IT capability impacts firm performance and firm value. Hence, based on the explanation above, the following hypothesis is proposed

***Hypothesis 1****: Firms with superior IT capabilities tend to have higher firm performance than control firm*

***Hypothesis 2****: Firms with superior IT capabilities tend to have higher firm value than control firm*

# Research Methodology

## Population and Sample

The population of this study are all companies listed on the Indonesia Stock Exchange during 2014 to 2016. Samples were selected by using “matched sample comparison method” that proposed by Bharadwaj (2000). The similar method is also used by Chae et al. (2014).

The matched sample comparison method consists of several steps. First, we have to identify companies that are considered as superior IT capabilities. In previous studies (e.g.,Mithas & Rust, 2016; Chae et al., 2014; Ong & Chen, 2014; Muhanna, 2009; Bharadwaj, 2000) firms with superior IT capabilities were identified from InformationWeek. Information Week (IW) is one of digital magazines published in U.S. Every year, this magazine has selected 500 companies as leaders in business technology innovation. IW is considered as a reliable barometer for firm’s IT capability and it has been widely use in previous studies.

In Indonesia, there is TOP IT and TELCO award, held by ITech Magazines and six IT Telco associations that provide awards to companies that have been identified as leaders in IT innovation. Therefore, in this study, the companies that have been selected as award recipients of TOP IT and TELCO award (since 2014-2016) are considered as superior IT capabilities firms.

Then, the next step is to find matched sample. After the superior IT leaders firms are identified, the next step is to find control firm that match with superior IT leader firms. According to Bharadwaj (2000), in order to find control firm sample, the average sales can be used. In this regard, the average sales of the control firms must be within 70% to 130% of those of the IT leader firm. In addition to this, the control firms should come from a similar industry as the IT leader. The SIC number is used to check whether the firm comes from the same industry or not.

Finally, we have two main groups of samples, which are IT leader firm and control firm.

The samples selection procedures are described in Table 1 below:

**Tabel 1**

**Langkah – langkah pengambilan sampel**

|  |  |  |
| --- | --- | --- |
| **No** | **Kriteria** | **Jumlah Perusahaan** |
| 1 | The company that won the TOP IT & TELCO award in the TOP IT category – *Corporate Best Practice* dari tahun 2014 – 2016. | 64 |
| 2 | Superior IT Companies that do not publish financial statements and stock prices. | 17 |
| 3 | Companies that do not have control companies | 24 |
|  | **Number of sample companies that have full information on Company Performance** | 23 |
|  | **Number of control Companies Jumlah sampel perusahaan kontrol Kinerja Perusahaan** | 23 |
| **4** | **Companies not listed on the IDX** | **10** |
|  | **Number of samples that have Company Value** | **13** |
|  | **The number of control company samples that have firm value** | **13** |

##  Variables and Operational Definition

In this study there are two dependent variables, namely firm performance and firm value and two independent variables, namely IT capabilities and IT strategy.

***Firm Performance***

Firm performance refers to the effectiveness of organization in regard to its financial and operational performance (Liang et al., 2010). In this study, ROA and ROS are used to measure the firm performance.

***Firm Value***

Sudiyatno & Puspitasari (2010) states that Tobin's Q is an indicator to measure the value of a company, where Tobin's Q values ​​describe a condition of investment opportunities that the company has or the company's growth potential. Tobin's Q ratio is used in measuring company value as well as that of Ong & Chen (2013,2014) and Saunders & Brynjolfsson (2016). The Tobins Q formula is described as follows:

$$Q= \frac{(MVE+Debt)}{TA}$$

Dimana :

Q = Firms Value

MVE = Nilai pasar ekuitas

Debt = Nilai buku dari total hutang

TA = Total asset

***IT Capabilities***

IT capabilities refer to firms’ ability to assemble, integrate and deploy IT based resources (Chae, Koh, & Prybutok, 2014). In this study, the companies that have been selected as award recipients of TOP IT and TELCO award (since 2014-2016) are considered as superior IT capabilities firms.

**Data Sources**

In this study, data are collected from separate sources. The first data source is ITech Magazine. This data source is used to identify the firms with superior IT capabilities. After firms IT leader are identified, we then use Indonesian Capital Market Directory (ICMD). ICMD contains financial statement of companies listed on the Indonesian Stock Exchange. It is used in order to select control firm and also to calculate firm performance and firm value.

##  Data Analysis

The main hypothesis proposed in this study is to compare whether firms with superior IT capabilities tend to have higher ROA and ROS than firm in control group. In order to test the hypotheses, ANOVA test is used. The ANOVA test is a statistical techniques used to explore the differences between variables. According to [Pallant (2013)](#_ENREF_143), there are two type of the ANOVA, which are between group ANOVA and repeated-measures analysis of variances. The former is used for a study that has different participants or cases in each group, while the latter is used for a study that has the same participants in different situation. In this case, because the participants of each group in this study are different, hence in this research the former is the correct choice.

In this test, the means of firm performance variables value for firms in superior IT capabilities group and firms in control group are compared. To be able to do this test, we should asses the homogeneity variance. The homogeneity of variance test provides information about Levene statistic, degree of freedom and the significance value. These information are used to identify whether a variant on scores of each groups are the same or not. In this case, it is desired that there is equality in the variance of scores in each groups. According to [Pallant (2013)](#_ENREF_143), if the significance value is greater than 0.05, it means that the homogeneity of variance exists, however, if the significance value is less than 0.05, it means that there is differences between variances in population.

Besides the ANOVA test, this study also uses Data Envelopment Analysis (DEA) technique. This technique is used for this study because it enables to measure the relative efficiency of an entity than others. In the accounting field, this technique is commonly used to analyse audit risk, (Bradbury and Rouse, 2002), the performance and accountability of the public sector (Chalos and Cherian, 1995), and also the performance of investment in information technology (Shao and Lin, 2002; Chen and Zhu, 2004).

DEA was developed by Charness, Cooper and Rhodes (1978). It uses linear programming approach in order to estimate the efficiency of companies in the same industry. In DEA, Total Employee, CGS, Operating Expense, Total Asset, and Equity are considered as an input, , while Sales, Operating Profit and Net Profit are considered as an output. Both input and output are then processed by using CMOM (Computer Model for Operation Management) software.

1. **Result**

5.1 Descriptive Statistics

In Table 2 below, the average company performance is measured using ROA and ROS for each sample group. As explained earlier, the number of companies for each sample group was 23 companies.

**Tabel 2**

**Average firm Performance measurement**

|  |  |  |
| --- | --- | --- |
| **Group of sample** | **Rata-rata ROA** | **Rata-rata ROS** |
| Companies with superior IT capabilities | 0,403 | 0,176 |
| Control Companies | 0,430 | 0,196 |

From the table above, it can be seen that the mean value of ROA of companies with superior IT capabilities is 0.403 and this number is smaller than the ROA of control companies (that is 0.430). This shows that the ROA of a company with superior IT capability is lower than the ROA of a control company. The same thing is also seen in the average ROS, which shows that the average ROS of companies with superior IT capabilities is 0.176 and the average ROS of control companies is 0.196. This shows that the ROS of companies with superior IT capabilities is lower than the control ROS of companies. This result is certainly quite surprising, because in theory companies with superior IT capabilities have higher performance compared to companies that do not have high IT capabilities.

Furthermore, to see the value of the company measured by Tobins Q for each sample group (which consists of 13 pairs of sample companies) can be seen in Table 3 below Table 3

**Table 3**

**Average Firm Value**

|  |  |
| --- | --- |
| **Group of sample** | **Tobins Q score on averave** |
| Companies with superior IT Capabilities | 1,178 |
| Control Companies | 1,123 |

In contrast to company performance, the average value of the company in a group of companies with superior IT capabilities is higher than the average value of the company in the sample group of companies. It can be seen from the table above that the average firm value in the group with superior IT capabilities is 1,178, while the average firm value in the control group is 1,123. This result can certainly be explained simply by using RBV theory.

Although on average it appears that the performance of control companies is higher than that of companies with superior capabilities, but we cannot conclude that statistically the performance of companies of control companies is indeed higher than the performance of companies with superior capabilities. To be able to conclude this we need to do a statistical test t test. The same thing applies to company value.

**4.2 Hypothesis Testing**

To be able to conclude whether the average company performance and the average value of the company in the group with superior IT capabilities is lower or higher than the control group, it is necessary to do an independent t-test. The following are the results of the independent t-test for each variable.

**Tabel 4**

**Independent t-test: Companies Performance - ROA**

|  |  |  |
| --- | --- | --- |
|  | Levene's Test for Equality of Variances | t-test for Equality of Means |
| F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |
| Lower | Upper |
| ROA | Equal variances assumed | ,208 | ,651 | -,195 | 44 | ,846 | -,00269 | ,01382 | -,03055 | ,02516 |
| Equal variances not assumed |  |  | -,195 | 42,737 | ,846 | -,00269 | ,01382 | -,03057 | ,02518 |

Based on the table above it can be seen that homogeneous ROA data is seen from the value of Levene's Test where 0.651> 0.05 so that there is no difference in the variance in the ROA data of companies in the superior IT capabilities and control companies. Furthermore, the significance value (2-tailed) 0.846> 0.05 indicates that there is no difference in ROA between companies in the superior IT capability group and the control company. Based on the results of this t-test, it can be concluded that hypothesis 1 which states that companies with superior information technology capabilities tend to have higher company performance than control companies, is not acceptable.

Furthermore, if the company's performance is measured using ROS, then the independent t test in this study can be seen in the following table 5.

**Tabel 5**

**independent t-test Companies Performance-ROS**

|  |  |  |
| --- | --- | --- |
|  | Levene's Test for Equality of Variances | t-test for Equality of Means |
| F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |
| Lower | Upper |
| ROS | Equal variances assumed | 1,274 | ,265 | -,498 | 44 | ,621 | -,02030 | ,04073 | -,10238 | ,06179 |
| Equal variances not assumed |  |  | -,498 | 41,454 | ,621 | -,02030 | ,04073 | -,10253 | ,06193 |

Based on the table above it can be seen that the homogeneous ROS data which is seen from the Levene's Test value where 0.265> 0.05 so that there is no difference in the variance in the ROS data of the leader company and the control company. Furthermore, the significance value (2-tailed) 0.621> 0.05, this shows that there is no difference in ROS between companies with superior information technology capabilities and control companies. This shows that the performance of companies that have superior information technology capabilities are not different from control companies. Based on the results of the t-test, it can be concluded that hypothesis 1 which states that companies with superior information technology capabilities tend to have higher company performance than control companies, is not acceptable. Next related to company value, the following are the results of independent t-test results.

**Tabel 6**

**Independent Sample t-test : Firm’s Value**

|  |  |  |
| --- | --- | --- |
|  | Levene's Test for Equality of Variances | t-test for Equality of Means |
| F | Sig. | t | Df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |
| Lower | Upper |
| Tobins\_Q | Equal variances assumed | ,005 | ,946 | ,168 | 24 | ,868 | ,05444 | ,32459 | -,61548 | ,72436 |
| Equal variances not assumed |  |  | ,168 | 23,794 | ,868 | ,05444 | ,32459 | -,61579 | ,72466 |

Based on the table above it can be seen that the homogeneous Tobins Q data is seen from the value of Levene's Test where 0.946> 0.05 so that there is no difference in variance in the Tobins Q data of companies with superior information technology capabilities with control companies. Furthermore, the significance value (2-tailed) of the t test is 0.868> 0.05, where it shows that there is no difference in Tobins Q between companies with superior information technology capabilities and control companies. Based on the results of the t-test, it can be concluded that hypothesis 2 which states that companies with superior information technology capabilities tend to have higher firm values ​​than control companies, is not acceptable.

1. **Conclusion**

Based on the results of the independent t-test above, it can be concluded that both hypothesis 1 and hypothesis 2 cannot be accepted. This means that IT capabilities have no influence on company performance or on firm value. This result is different from some previous studies such as Bharadwaj (2000), Santhanam & Hartono (2003), Ong & Chen (2013), Turulja & Bajgoric (2016), where they found that IT capability has an influence on performance and firm value. However, this study supports the results of research conducted by Amrul & Hardy (2010), Chae, Koh & Prybutok (2014) and Ong & Chen (2014).

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