The Impact of Research and Development Spending on Firm Value Moderated by Product Diversification

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Abstract

The objective of the study is to examine research and development spending on firm value. In addition, the study aims to examine whether the product diversification may moderate the impact of research and development spending on firm value. This study uses secondary data drawn from the company's financial statements and processed using SPSS software aplication with hierarchical regression analysis of the data. The results of the study show research and development spending has a significant impact on firm value. Product diversification strengthens the impact of the research and development on the firm value. This study supports the theory resource-based view stating that the company is able to manage the resources and capabilities and the company in this case is the innovation it is able to have a competitive advantage among its competitors.

I. Introduction

The Asean Economic Community (AEC) is a form of economic integration in free trade between ASEAN member countries. The AEC aims to achieve a safe ASEAN region with a fair level of development, stable economic growth and social progress. The implementation of AEC causes the freedom to distribute goods, services, investment and labor so that competition between companies in the industrial world, especially in the manufacturing industry, is getting tighter. The increasing level of competition requires companies to produce better performance.

The manufacturing industry is the pillar of a country's economy. Products produced in various manufacturing industries include food and beverage,ptextiles, furniture, metal goods, plastic goods, and so on. The manufacturing industry has an important role in advancing and prospering society. In addition to meeting human needs for the products consumed, it can also absorb labor. Products produced bypthe manufacturing industry have always been products that are generally consumed. Therefore, Indonesia with a large population is a potential market for the manufacturing industry.

Technologicalpinnovation is the main driving force of economic growth in country. As one important channel to generate new technology. the intensity research and development spending is found topbe positively associated with firm operating performance and market valuation (Eberhart, et. Al., 2004).

It is desired for every company to achieve the maximum benefit and prosperity for the company owners or shareholders. Furthermore, apcompany's goal is to maximize wealth or firm value. Firm value is very important because it reflects financial performance that may

affect the valuation of the company's investors.pInvestors that decide to invest in a company require stock assessment (Yuliana, 2012). Stock price is related to the value of the firm, where the higher the stock price is, the higher also the value of the firm and prosperity of shareholders.

According to Solikhah et al. (2010), businesses began to realize that the ability to compete is not only in the ownershippof tangible assets but also innovation, information systems, organizational management, and human resources. These conditions also affect the valuationpof the company to focus more onpintangible capital ratherpthan physical assets (Lu et al., 2010). This is supported by Salamudin et al. (2010), who suggest that investors prefer to invest in companies with high corporate value and high intangible capital.

Manufacturingpindustries that have innovations are able to get better returns, thereby increasing firm value (Basgoze, 2013). This causes the manufacturing industry to receive appreciation from investors. This positive appreciation can increase the value of the company which is reflected in its share price in the capital market (Raharjo, 2000). People are looking for a growing stock of manufacturing companies even though the company is in a loss. This shows that a company based on good research and development and technology will provide good benefits for investor.

The increase in corporate value is accompanied by effective and effiecient use of internalpresources to create a competitive advantage. The use of product diversification can increasepproduct innovation in the company. Because, companies that will create product diversity needpproduct innovation to be able to fulfill conumers needs.

Business competition is becoming tougher, demanding companies to have a competitivepadvantage in their industry. To achieve a competitive advantage, companies should be able to improve their performance. Society is also changing very quickly and in complexity due to the progress of scienceand technology. The market is also changing due to the influencepof information and global technology. The impact of these changes require a change in the pattern andpinstitutional management strategies that need to be more appropriate, which can provide an appropriate response toward existing challenges.

Demands and wishes of customers always evolve in accordance with developments in science, technology and information, because development of products, including product diversification, is a challenge that should be pursued. Customers need products that are always new and specific. To achieve this, continual innovation is required so that production units in companies will continue to thrive.

Currently, the implementation of innovation (discovery, planning, product design, and trial products) cannot be done separately from information technology. This is so that both synergize each other. Information system support for product innovation is measured by using the R&D intensity. R&D supports the company to continue to innovate and satisfy customer needs.

Information technology today is the key to improving corporate performance (Lee, Kima & Lee, 2011). Increased corporate performance is very important to increase the value of the company's shares in the stock market. In addition, performance improvement can increase firm value (Wang & Yung-Jang, 2002).

Management of research and development expenditure is the management of the decision-making functions of the use of funds and research and development funding. The decisions on the use of funds are related to allpactivities where the company allocates and invests funds; financing activities are related to the activities of the company to obtain funds and sources of funds. Success in performing these functions will increase the value of the company.

II. Review of Literatures

Sriram & Krishnan (2003) stated that corporate income and research and development expenditure are positively correlated with market value, meaning that if there is an increase in income and value of research and development, the stock price of the company will increase. Eliyani in Siregar (2019) states that taxpayer compliance is defined as entering and reporting in due time the information needed, correctly filling the amount of tax owed, and paying taxes on time without coercion. One taxonomy that is considered more appropriate to assess the quality of student responses is the taxonomy developed by Biggs and Collis in Mindayani (2019) known as the taxonomy of The Structure of Observed Learning Outcomes which will then be used by SOLO (as an abbreviation). Income is the amount received usually within a certain period of time is usually one year, community income is thus all receipts received in a particular year either from industry, trade and other sectors (Shah, 2020). Furthermore, it is said that the market reaction to information technology expenditure for companies with informationptechnology is four times greater compared to companies with low level of research and development expenditure. Investment in information technology according to Mita (1996) in addition to increasing sales can also lower costs. It is also said that higher investment in information technology is associated with lower average production costs.

From the results of empirical studies and existing theories, this is the depiction of the framework:
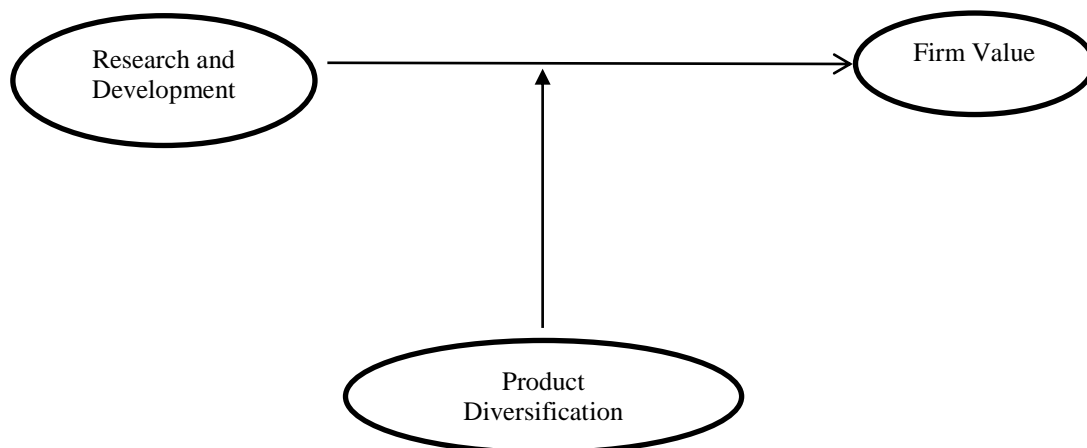
***Figure 1.** Research Framework*

The theory used in this research is the theory of resources. This approach is based on the view that a company should utilize resources effectively and efficiently. By optimally utilizing the resources that are owned, this will certainly increase the value of the company itself. One-way companies optimize their resources is to diversify (Montgomery, 1994).

Aboody & Lev (2001) studied 83 publicly-traded chemical companies, evaluating the return on R&D investmentspfrom 1980 to 1999. Results showed that a dollar invested in chemical R&D increased current and future operating income by two dollars. Gleason & Klock (2006) and Lu et al. (2010) provedpthe positive influence of research and development intensity on firm value. In view of the empirical literatures reviewed above, research and development are expected to have positive influence toward a firm's value.
H1: research and development has a significant positive impact on firm value

Product diversification provides potential for firms to achieve greater returns on innovations (larger and/or greater number of markets with different demand characteristics)

and thus, lowers theprisks of R&D investments. As a result, product diversification provides incentives for firms to innovate and thus, leads to more innovation. Additionally, Kobrin (1991) suggested that product diversificationpmay be necessary to generate the resources requiredpto sustain a large-scale R&D operation. Kotabe (1990) found that U.S. multinational firms with a higherplevel of integration and coordination ofpproduction and marketing on a globalpbasis were better able topretain their innovative capabilities.

H2: Product diversification strengthens the impact of research and development spending on firm value

The population in this study was all manufacturing companies on the Indonesian Stock Exchange. Companies selected as the sample are companies in the manufacturing sector listed on the Indonesian Stock Exchange for four years from the period of 2016 to 2019. The reason manufacturing companies are used is because manufacturing company are companies that dominate the companies listed on the Indonesia Stock Exchange (IDX), which are grouped into several sub-categories. The manufacturing industry is one of the most developed industries, providing the largest contribution to the Gross Domestic Product (GDP) of Indonesia compared to other industries. The number of manufacturing companies, as well as current economic conditions has created fierce competition among manufacturers.

The samples in this study were obtained by the purposive sampling method; samples were taken based on criteria used by the researcher. Thus, the samples in this study had to meet criteria as established by the researcher. The criteria were:

1. The manufacturing companies were those that published financial statements by the closing date of December 31 in 2016, 2017, 2018, 2019
2. The financial statements in the sample had been audited by a Public Accountant.
3. The companies disclosed research and development expenditure. This criterion is used to measure company innovation.
4. The companies had more than one type of business reported in the records of financial statements during the years of 2016-2019. This criterion is used to know the diversification of the company during the observation period.

Research and development is measured with R&D intensity. R&D intensity can be calculated by the formula:

$$\frac{\text{Research and development expense}}{\text{Sales}}$$

R&D intensity has been defined as "the ratio of expenditures by a firm on research and development to the firm's sales" (Meyer, 2005). William (2007) has described research intensity as being usually measured by R&D expenditure/sales to gains in variables such as productivity, profits, and sales. R&D intensity is therefore a measure of a company's R&D spending toward activities aimed at expanding sector and product knowledge, manufacturing, and technology (Cohen, 1990).

The moderating variable in this study was product diversification. Diversification is defined as the level of development through a number of companies that are managed as one or the ownership of at least two business segments at the segment level (Cakrabakti *et al.*, 2007). Data for this variable are obtained from annual reports published by the company. Being able to directly compare results with those in the literature, the entropy index is used to estimate product diversity.

Entropy index captures the degree of diversification on the basis of how sales volumes in multiple product segments are distributed. Specifically, the entropy measure of product diversification is defined as:

$$\sum_{i=1}^{N} Pi.\ln\left(\frac{1}{Pi}\right.$$

Where Pi is the percentage if firm sales in business segment i, and ln (1/Pi) is the weight of each segment. The component of related diversity is the weighted average of the firms' degree of diversification within related business segments. N is the number of the company's business segments. If the entropy index is close to zero, then the sales of the company is concentrated on specific business segments. Conversely, if the entropy index is close to 1, then the sales of the company are diversified.

The research model was broken down into three regression models for calculating the coefficients to test the direct and moderating effects. The regression model is presented in the following equations:

Model 1: $Y = \alpha + bX + e$

Model 2: $Y = \alpha + bX + bZ + e$

Model 3: $Y = \alpha + bX + bZ + bX*Z + e$

In this study, the hypothesis was tested using SPSS. Model 1 was used to test hypothesis 1 on the effect of IS support for product innovation to firm value. Models 2 and 3 were used to test the direct and moderating effects.

III. Results and Discussion

3.1 Results

Descriptive statistics were used to demonstrate the value of the average, minimum, maximum, and standard deviation of each variable used in the study. These are the results of the descriptive statistics of each variable in this study.

Table 1. Descriptive Statistics

Variable	Maximum	Minimum	Mean	Standard Deviation
1. Research and development	4.05	0.00	0.54	1.15
2. Product Diversification	0.37	0.003	0.17	0.12
3. Firm Value	6.71	0.04	1.66	1.53

Above shows the results of descriptive statistical analysis of the variables of the study. The value of R&D was the lowest in the samples for Wijaya Karya Beton Tbk in 2017 and Alaska Industrindo Tbk in 2017. The highest value of R&D was for Lion Metal Tbk in 2018.

Value product diversification as measured using the entropy index was the lowest in the study sample for the entropy firm value of Semen Indonesia Tbk. The highest value in the samples was for the entropy of Semen Indonesia Tbk in 2017.

The firm value proxy using the ratio of the Tobin's Q value was lowest in the sampled companies for Tiga Pilar Sejahtera Tbk, while the highest value in the study sample was for Kalbe Farma Tbk in 2016.

This study used moderated regression analysis through the hierarchical regression analysis method. Regression Model 1 was used to test hypothesis 1, research and

development on firm value, in order to test the direct relationship between the variables of research and development and the firm value. The second model was used to test whether the moderating variable in this study could be used as a predictor for the independent variable. The third model was used to test hypothesis 2, namely whether product diversification strengthened the relationship between research and development and firm value. This is a summary of the results of regression analysis in this study.

Table 2. Hypothesis Testing Results

	t Coefficient	Significance	Hypothesis Testing	Conclusion
R&D →FM	0.51	0.01	Significant	H1 accepted
R&D*PD → FM	4.12	0.0	Significant	H2 accepted

Based on information from table above, the significance value for the first hypothesis was > 0.05, which means that the first hypothesis is accepted. The positive coefficient indicated a value of 0.51 which means that a 1% change in research and development is able to increase the company's value by 0.51%, so the relevant research and development is information that enhances the firm value.

Based on information from Table bypothesis and testing, the significance value for the second hypothesis was > 0.05, which means that the second hypothesis is accepted. The positive coefficient indicated a value of 4.12 which means that a 1% change in product diversification can improve the research and development by 4.12%, and as such product diversification is able to strengthen the relationship between research and development and firm value. The result of a company diversifying its products can improve the innovation by the company. This will be able to increase sales of the company; an increase in sales of the company yields a positive response from the market, enhancing shareholder value.

Table 3. Adjusted R-Squared Values

Model	Model 1	Model 2	Model 3
Adjusted R-Squared	0.125	0.352	0.564

Hypothesis testing in the study was also supported by the increase in the adjusted R-squared values. In the first hypothesis testing using Model 1, the adjusted R-squared value was 0.125. This means research an development spending variable is able to explain the firm value variable by an amount of 12.5%. Then, the second hypothesis testing with model 2 and 3 showed an increase of adjusted R-squared value to 35.2% when the variable of product diversification was added as an independent variable and 56.4% when the variable of diversified products was added as a moderating variable.

Based on the three test models, it has been proven that the product diversification variable is a quasi-moderator variable. A quasi-moderator variable is moderating variable that serves as an independent variable and could also serve as a moderating variable (Ghozali, 2013: 215).

a. Classical Assumption Tests

A good regression model is a regression model that is free from the problems of classical assumptions. Classical assumption test results are presented in the following sections.

b. Normality Test

The data normality test is performed to determine whether or not the residual value of distribution of data is normal. Normality testing is done in three ways, namely by looking at the histogram and normal probability plots, and using the Kolmogorov-Smirnov test.

Table 4. Kolmogorov-Smirnov Goodness of Fit Test (K-S Test) Results

Sig. Standardized Residual	0.875

Based on the K-S test results, all the research data were found to have normal distribution for the entire set; the K-S test of significance was shown to have passed the test of normality, being greater than 0.05. The same result is shown in the histogram and normal probability plots, showing the normal distribution pattern. K-S test results, the histogram, and normal probability plots for the overall test can be found in the Appendix.

c. Autocorrelation Test

The autocorrelation test was conducted to test whether a regression model has no relationship between error variables from period t to period t-1. The test is carried out with the Durbin-Watson (DW) Test. A regression model can be said to be free of autocorrelation problems if the DW value is between 1.65 and 2.35. Based on the DW test, the DW value was 2.169. The results of this test showed that the regression model was free from the problem of autocorrelation. The Durbin-Watson test results can be seen in the results of regression tests in the Appendix.

d. Multicollinearity Test

The multicollinearity test is aimed to test whether or not the regression model formed high or perfect correlation among independent variables. A good regression model is a model that is free from multicollinearity problems. The absence of symptoms can be seen if the multicollinearity VIF value is no greater than 10. The following is the multicollinearity test results for this study:

Table 5. Multicollinearity Test Results

Variable	VIF
R&D	1.000
Product Diversification	1.021

The results of these tests showed that each variable has a value of VIF less than 10, so it can be said that the regression model was free from multicollinearity problems.

e. Heteroscedasticity Test

The heteroscedasticity test aims to test whether the regression model had inequality of residual variance from one observation to another. A good regression model has homoscedasticity or is without heteroscedasticity. A regression model can be said to have no heteroscedasticity issues when in the scatterplot graph, the points are spread above and below the Y axis and do not form a clear pattern. Based on these tests, all the points on the regression scatterplot graph did not show a clear pattern and the points were spread above and below the Y axis, so it can be inferred that the regression model in this study was free of heteroscedasticity problems.

3.2 Discussion

In testing hypothesis 1, the results show that research and development affected firm value. Research and development intensity, as a proxy to the costs of research and development, can increase firm value. Research and development activities are of a commercial interest in relation to pure scientific research and development in the field of applied technology. This is supported by empirical evidence stating that an innovative company oriented by R&D is proactive in applying the latest technology and quickly uses technologies for the company's new product developments (Cooper, 1994 in Panigyrakis *et al*., 2009). Through research and development, the company is given the opportunity to develop products and production processes and to create innovation for effective sales (Padgett and Galan, 2010). Thus, research and development can increase firm value through improving the company's prospects in the future. R&D activities are done in order to attract consumers so that an increased number of customers and consumers become loyal to the company, which will impact by increasing the income of the company.

This study is similar to research conducted by Zhu & Huang (2012). According to Zhu & Huang (2012), R&D is known as one of the strategic factors to achieve sustainable competitive advantages for the company. It is important for companies to understand the relationship of the intensity of R&D on corporate performance because it will have an impact on the strategic policy adopted by the company. Based on the literature study conducted by Tubbs (2007), the empirical evidence suggests that an increase in R & D activities in a five-year period can cause a company to increase its performance, followed by a rise in abnormal returns.

This shows that if there is an increase in the intensity of R & D, then there is a performance improvement demonstrated by increased sales of innovative products, such that it will improve profits. Increased corporate profits will be responded positively by the market. The positive response will increase firm value. Firm value will be able to grow in a sustainable manner if the company's financial performance is also increased because with a greater ability of the company to generate profits, the firm value that is reflected in the stock price will also increase.

Rapid and unexpected changes in the industry require companies to continuously develop new resources and capabilities to handle the demands of a new market to survive and thrive (Teece *et al*, 1997). Development of new resources and capabilities in turn requires dynamic organizational capabilities that allow companies to "integrate, build, and reconfigure internal and external competence" (Teece *et al*, 1997). Some studies have revealed the dynamic capability of value creation, such as product innovation (Eisenhardt & Martin, 2000; Adner & Helfat, 2003). Product innovation is seen as a dynamic organizational capability because it is one of the company's organizational routines which will combine, recombine, or update different skills, assets, and processes to create revenue from products and services (Eisenhardt & Martin, 2000). Meanwhile, information systems support their product innovation.

According to the Board of Directors of Kimia Farma, the pharmaceutical business is facing even tighter competition with the enactment of the ASEAN Economic Community; Kimia Farma Corp. needs to implement the three important aspects of strengthening competency, using a precise and accurate information system, and becoming tireless in innovation.

Kimia Farma also received an award from *Warta Ekonomi* magazine, the Special Mention Award for Continuous Innovation, which is awarded to companies that perform the best sustainable innovations throughout 2017. The company also received an award for Best Financial Performance, an award for companies that have the best financial performance

throughout 2017 (GEMAKAEF Magazine, 2017). This information suggests that use of innovation can improve the financial performance of companies in Indonesia.

In addition, Astra Otoparts kept innovating in producing automotive parts and motorcycles. Innovation that had been committed by Astra Otoparts since about 13 years ago is already showing results. As of June 2016, Astra Otoparts managed to record a net profit of Rp. 518,610,000,000.00 (Kompasiana, 2016).

The information above is indicating that use of innovation in a company is able to improve the financial performance of the company. This is evidenced by Kimia Farma Corp. being awarded the best financial performance in 2017. In addition, the innovations made by Astra Otoparts also increased the company's net profit. The information supports signaling theory which states that companies that give a positive signal to the market will be responded positively by the market.

According to Jogiyanto (2000: 392), the information published as announcements would give a signal to investors in making investment decisions. If the announcements contained a positive value, it is expected that the market would react the same way when the announcement is welcomed by the market. When the information is announced and all market participants have received the information, market participants must first analyze and interpret the information as good news or bad news. If the announcement of the information is considered as a good signal for investors, then there is a change in the volume of stock trading.

The results of this study also support the study by Zhang (2011) which states that IS support for product innovation can improve financial performance as measured by the value of ROS (return on sales) and ROA (return on assets). In addition, the study by Salamuddin *et al.* (2010) shows that research and development has a positive impact on firm value. It was stated that investors choose to invest in companies that have a high intangible capital with the assumption that intangible capital will increase firm value.

The results also support the RBV theory which states that sustainable competitive advantage is based on the organization's resources that are very valuable, rare, hard to imitate, and non-substitutable in organizational settings that have policies and procedures to exploit resources (Barney, 1991). In addition, the RBV theory focuses attention on the knowledge and skills of individuals, both employers and employees, contributing to competitive advantages (Davidsson & Honig, 2003).

The competitive advantage gained by an intangible asset and abilities are reflected in superior performance for business owners, while superior performance is reflected in financial capability as in higher profits, increased sales and market share (Fahy, 1999).

Penrose (1959) has found that intangible assets (client trust, reputation, network, and intellectual property) and capabilities (knowledge, organizational culture, skills, and experience) are valuable resources, which are unique and hard to replicate. The value of these intangible assets and capabilities can be customized by the company because of their unique combination of the company's philosophy, knowledge and skills of employees, and other special abilities that are difficult to be separated or transferred.

a. Product Diversification Strengthens the Effect of IS Support for Product Innovation on Firm Value

Based on testing of model 2, it has been shown that the variable of product diversification as a moderating variable in this study has a direct relationship to the dependent variable. That is, the product diversification variable has a significant effect on firm value. This is supported by Qiu (2014) who proved that diversification of products had a significant positive effect on the market value. Qiu (2014) used a sample of 485 companies from 17 cities in California within 2006-2009. It was found that

uncertainty avoidance had a significant positive impact on the product diversification of large international firms. The findings highlighted the notion that high uncertainty avoidance should be a strategic guideline for global marketers if product diversification is on the firm's strategic agenda. To maintain the momentum of growth and effectively diversify into multiple product segments, global marketers must be sensitive about environmental uncertainties and develop reasonable measures to reduce risks.

With a resource-based theory, companies that are able to process their valuable, scarce, and difficult to replicate resources will be able to create competitive advantages in the industry. Companies must constantly develop new resources and capabilities to meet market demand in order to survive and prosper, to fulfill the market demand for companies to diversify their products. Diversification of products is done to control the market with the deployment of a variety of products in order to receive as many consumers as possible. In addition, the use of diversified products can replace saturation on one particular product.

Stimpert & Duhaime (2007) argued that firms operating in industries characterized by and few growth opportunities tended to expand by entering new businesses. Hence, diversification becomes a means of escaping the poor profitability of the firm's industry (Montgomery, 1994), and in competitive industries with slow growth rates, product diversification may be the only prospect for improving the profitability of the firm.

Testing of model 3 was performed to test whether variable product diversification strengthened the link between innovation made by the company and the firm value. The results showed that the product diversification variable moderated the relationship between IS support for product innovation and firm value.

The results support the research of Jandik & Makhija (2005). They examined the impact of diversification on the performance of companies in the electrical industry in the United States. The results showed that diversification can lead to improved performance and there was a significant diversification. This is because the characteristics of the electrical industry that experienced maturity and inefficiency as well as the overinvestment that occurred on their business. Diversification into different business segments would open up new investment opportunities, namely investment in innovation. Companies innovate to meet new market share. When a company is able to meet the desires of consumers and have resources that cannot be replicated by a competitor, the company will achieve competitive advantage. Competitive advantage makes the company able to dominate the market. Resources that cannot be replicated are one example of continuously made innovation.

Porter (1980) claims that:

"… the decline in rate of return to R&D spending in the United States in 1980s is rooted in the large, diversified American corporations". If true, this would be a serious charge, since conglomerates account for more than 50% of corporate R&D spending in the U.S. In fact, in 2004, 10 out of the 15 top R&D spenders in the U.S. were diversified conglomerates. Even if Porter's charge were to stick, there is still the curious observation made by Business Week magazine in 2005: "… [Diversified] firms exist on both sides of the innovative spectrum. While firms like G.E. and 3M are among the most innovative, a host of other conglomerates produce the least innovative R&D".

This research is supported by Seru (2007), who in evaluating R&D measures for Compustat firms over 1980-1998, found that while the average multi-segment firm is twice as large in terms of sales as the average single-segment firm, they have a similar degree of research intensity, as measured by R&D expenses to sales ratio. However, the average single-segment firm generates 5 patents per year vs. 3 for the average multi-segment firm. What is more, each such patent garners about 1.06 citations (adjusted for time and technology class

effects) as compared to about 0.84 citations for the average patent obtained by the multi-segment firms.

The resource-based view contributes to the huge flow of research on diversification strategy (Ramanujam & Varadarajan, 1989) in three areas: first, the resource-based approach considers the growth limitations of diversification (through internal development, mergers and acquisitions). The rising cost of internal development coupled with the shortening of product life cycles has rendered acquisition-based diversification increasingly attractive to firms. A number of studies, therefore, on acquisitions and mergers as a strategy of growth.

IV. Conclusion

Research aimed to examine and explore the effect of innovation on firm value. Research was conducted on a sample of 39 companies that meet certain criteria. The method of analysis of data using multiple linear regression analysis.

This study showed that companies that innovate will be able to increase the value of the company. Investors assume that companies that innovate on the product will be able to provide good prospects in the future. Product innovation is supported by the use of technology and information systems that can improve company performance through increased total sales. Good corporate performance will be responded positively by investors and will increase the value of the company.

Product diversification variables in this study was to determine whether the product diversification can improve the relationship between product innovation and value of the company. This study proves that companies with diversified products will increase the use of innovation to a positive effect on firm value. This is due to a variety of products and the use of innovation before it decided to diversify products to increase market share and dominate the market. Consumers will be attracted by the diversity of innovative products. This is because a company can dominate the market, so as to increase sales growth. The sales growth is an indication that the company's performance also improved. Improved performance would increase firm value, as investors assume that the innovation-oriented company will have good prospects in the future and it will be responded positively by investors.

References

Aboody, D., & Lev, B. (2001). R&D productivity in the chemical industry. Working paper, New York University, New York.

Başgoze, Pinar & Cem, Sayin. (2013). The Effect Of R&D Expenditure (Investments) on Firm Value: Case of Istanbul Stock Exchange.Turkey, Ankara: Department of Business Administration. Journal Of Business. Economic And Finance, 2 ISSN: 2146 7943.

Gemakaef, Kimia Farma. Majalah. Edisi 38 Tahun 2017

Gleason, Katherine I. & Mark, Klock. (2006). Intangible Capital in the Pharmaceutical and Chemistry Industry. The Quarterly Review of Economics and Finance, 4, 300-314

Huang, Cheng J & Liu, Chun J. (2005). Exploration for the relationship between innovation, IT, and performance. Journal of Intellectual Capital, 6 (2), 237-252.

Jandik, Tomas., & Makhija, Anil K. (2005). Leverage and the complexity of takeovers. The Financial Review, Eastern Finance Associaton, 40 (1), 95-112

Kompasiana. Aspira: Inovasi Astra, Terobosan Indonesia. (2016). http://www.kompasiana.com/issonkhairul/aspira-inovasi-astra-terobosan-indonesia_55296092f17e6178678b457a

Lee, Jungwoo. (2011). Discriminant Analysis of Technology Adoption Behavior:a case of internet technologies in small business. Journal of Computer Information System, Oktober, pp, 57-66.

Mindayani, N., Hadi, W., and Amb, B. (2019). The Development of SOLO Taxonomy Based Assessment Tool on Text of Observation Reports of X Grade Students of Senior High School 1 NA. IX-X. Budapest International Research and Critics in Linguistics and Education (BirLE) Journal Vol 2 (4): 371-381.

Montgomery, C.A. (1994). Corporate Diversification. The Journal of Economic Perspectives. 8, pp. 163-178

Padgett, Robert C. & Jose I. Galan. (2010). The Effect of Research and Development Intensity on Corporate Social Responsibility. Journal of Business Ethics, 93, pp. 407-418.

Penrose, E.T. (1959). The Theory of the Growth of the Firm. Oxford:Basil Blackwell

PSAK No.19 Biaya Riset dan Pengembangan, diakses tanggal 20 Juli 2016, <http://www.akuntansi.info/PSAK/PSAK19Biayarisetdanpengembangan.p f >

Ramanujam, Vasudevan., Varadarajan, P. (1989). Research on Corporate Diversification: A Synthesis. Strategic Management Journal, 10, pp. 523-551

Sanchez, Ron. (2005). Strategic Flexibility in Product Competition. Strategic Management Journal, 16, pp. 135-159

Shah, M.M., Sirojuzilam, and Maas, L.T. (2020). The Development Impact of PT. Medco E & P Malaka on Economic Aspects in East Aceh Regency. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 3 (1): 276-286.

Siregar, R., Nasution, I.R., and Arifin, M.A. (2019). The Effect of Corporate Taxpayer Compliance, the Increase of Corporate Taxpayers' Number and Tax Audits on Income Tax Receipts of Article 25 with Taxation Sanctions as a Moderating Variable in KPP Pratama Medan Petisah. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 2 (4): 385-400.

Som, O. (2012). Innovation without R&D, Heterogeneous Innovation Patterns of Non R&D Performing Firms in the German Manufacturing Industry.

Stimpert, J. L. & Duhaime, Irene M. (2007). Seeing the Big Picture: The Influence of Industry, Diversification, and Business Strategy on Performance. The Academy of Management Journal, 40 (3), pp. 560-583

Teece, D.J., Pisano, G. & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18, pp. 509-33

Tobin, James. (1969). A general Equilibrium Approach To Monetary Theory. Journal of Money, Credit and Banking, 1(1), pp. 15-29

Tubbs, Michael. (2007). The Relationship Between R&D and Company Performance. Research and Technology Management.

William N. Leonard. (2007). Research and Development in Industrial Growth. Journal of Political Economy, 79 (2), pp. 232–256.

Yuliana, Tanti. (2012). Analisis Pengaruh DER dan Intensitas R&D Terhadap Nilai Perusahaan (Studi Pada Perusahaan Manufaktur yang Terdaftar di Bursa Efek Indonesia Periode Tahun 2008-2011. Universitas Negeri Surabaya.

Zahra, S. A. & Das, S. R. (1993). Innovation Strategy and Financial Performance in Manufacturing Companies: An Empirical Study, Production and Operation Management, 2 (1), pp, 15-37.

Zhang, M. J. (2011). Firm Level performance impact of IS support for product innovation. European Journal of Innovation Management, 14(1). pp. 118-132.