



Managerial Efficiency, Innovation and Firm Value of the Pharmaceutical Industry in Indonesia

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Abstract

This study examined the effect of managerial efficiency, innovation and firm value. Managerial efficiency is reflected in optimal input and output management, while the innovation indicator is a comparison of research and development (R&D) expenditures with sales, while the firm value uses Tobin's Q. The object of this research is 9 out of 10 pharmaceutical companies listed on the Indonesia Stock Exchange, with pooling data during ten years. The results of this study indicate that, managerial efficiency has a positive effect on innovation and firm value. R&D is the main activity of the pharmaceutical industry to create patents and exclusive rights in maintaining its market. The more efficient the manager manages inputs to produce maximum output, the greater investment can be made in the R&D crowd. The higher the allocation of R&D costs will encourage the number of patents produced, to strengthen companies in the pharmaceutical market. The higher the level of sales, the greater the profit that can be generated and increase investor trust

Keywords: *Firm Value; Innovation; Managerial Efficiency; Pharmaceutical Industry; Research and Development (R&D).*

1. Introduction

Firm value reflects public trust in the firm through a process of activities for several years. Increasing firm value is an achievement, which is expected by stakeholders. Firm value is the investor's perception of the firm, can be reflected in the stock price. This research is based on stakeholder theory that focuses on stakeholders, to create shared value on a number of dimensions and firm performance (Harrison & Wicks, 2015) to increase investor trust. The concept of value in this study refers to the concept of the value of equality (Arslan & Ms, 2014). Tobin's Q is used because it is considered to have the advantage of profit Margin, ROA or financial indicators based on other historical accounting performance because it reflects market expectations so that it is relatively free from the possibility of manipulation by company management. Some previous research shows that corporate value is influenced by corporate governance mechanisms La Rocca (2007), Brooks & Oikonomou (2018). Innovation in pharmaceutical companies is the basis for growth. R&D in pharmaceutical companies will determine competitiveness in the production market that spurs profits and can increase firm value (Pérez-Rodríguez & Valcarcel, 2012)

1.1. Agency Theory and Stakeholder Theory

Discussing the value of the firm cannot be separated from the agency theory and stakeholder theory. Agency Theory examines the relationship between agent and principal (Jensen & Meckling, 1976). The principal receives agents for the benefit of the principal, including authorizing delegation of decision making from the principal to the agent. In companies whose capital consists of shares, shareholders act as principals, and Chief Executive Officer (CEO) as their agent. CEO share ownership for needs in accordance with the interests of the principal.

Stakeholder theory influences the relationship between organizations and their stakeholders. To approve and regulate this relationship, managers must provide funding to all stakeholders in the organization (Elijido-Ten, 2007). The main stakeholders consist of customers, workers, local communities, suppliers and distributors, and shareholders. In addition, other groups and individuals including stakeholders are the media, the general public, business partners, future generations, past generations (founders of an organization), academics, competitors, private organizations or activists, representatives of stakeholders who can be involved and engage in Trade, shareholders (creditors and bondholders),



governments, regulators and policymakers (Elijido-Ten, 2007), (Harrison & Wicks, 2015). Stakeholder theory emphasizes important value from a managerial perspective because managers emphasize focusing on things that lead to improving performance. In addition, in the interest of the economy, stakeholders measure the value of the company to the company (Kaplan, & Norton, 1992)

1.2. Managerial Efficiency, innovation, and firm value

Cho & Lee (2017) consider the dimensions of managerial efficiency and firm value. They try to focus on efficiency that proxies optimal spending in producing maximum output for companies related to CSR. Regarding Managerial Efficiency, considering managerial wisdom as a key moderator in investing is based on the upper echelon theory (Mason & Hambrick, 1984). This theory shows that the quality and characteristics of top managers (that is, the upper echelons of an organization) determine the strategic decisions of a company. This research sees CSR activities as a combination of relatively non-economic CSR and economical CSR that are identical to R&D spending. In pharmaceutical companies, institutional change has significantly affected innovation performance, how innovation can be improved in this sector is an important policy consideration for management (Majumdar, 2012). The survival of the pharmaceutical industry is innovation (Khemka & Gautam, 2010) managerial efficiency strongly supports the availability of research and development funds to increase innovation. Regarding innovation, Sheikh (2012) tested whether CEO compensation has an effect on corporate innovation. Investigate the effectiveness of each component of the compensation incentive portfolio in driving innovation. With a system of simultaneous equations to model the interdependence between compensation incentives and innovation measures the company shows compensation results positively related to investment in R&D expenditure, although there are weaknesses in measuring the output of difficult innovations because innovation has many dimensions, including business model innovations, which do not appear in patent data.

Demerjian, Lev, & McVay (2008) quantify managerial efficiency measures, that manager efficiency in generating profits. They expect managers to be better able to understand technology and industry trends, be reliable in predicting product demand, able to create higher investments in innovation and be able to manage their employees more efficiently. The development of new products is one of the most important outcome indicators for managerial efficiency in Iranian pharmaceutical companies. Historically, the Iranian pharmaceutical industry has demonstrated its ability to develop new medicines by developing 3,095 new products from around 100 companies (Demerjian et al., 2008)(Yousefi, Mehralian, Rasekh, & Tayeba, 2016). Efficiency is indeed contrary to R&D investment. Recent studies in the accounting literature have investigated the economic consequences of the capitalization of research and development costs. R&D capitalization also impacts on the marginal costs of the company and product market competition. The company's R&D is not only strategically created but also used to convey proprietary information to competitors. This model provides a reason for a company to distort the level of R&D to get more profits and meet its revenue targets. Equilibrium results show that with high investment in R&D, it has the opportunity to get higher profits in the future and achieve revenue targets (Hsiao, Liao, Su, & Sung, 2017)

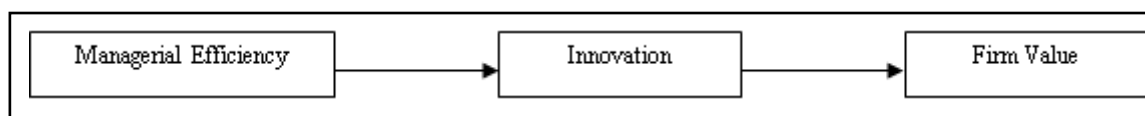


Figure 1. Theoretical Framework Effect of Managerial Efficiency, Innovation and Firm Value

Figure 1 shows managerial efficiency in managing company resources, can increase higher investment in innovation activities, which can introduce new products, open new markets, increase sales so that in the end it will make the company's value in the view of investors better.



1.3. Managerial Efficiency and Innovation

Managerial efficiency is the ability to manage managing expenses optimally. Managerial efficiency has a positive impact on spending which will focus on spending on Research and development that will increase product innovation and increase sales, thus managerial efficiency orientation is how management is able to optimize research and development expenditures (Pérez-Rodríguez & Valcarcel, 2012) Managers with a level higher efficiency will be able to manage and coordinate all resources effectively and efficiently to achieve organizational goals. Ciliberti, Carraresi, & Bröring (2016) found that managers have an effect on company choices such as acquisition or expenditure on research and development

H₁: Managerial Efficiency has a positive effect on Innovation

1.4. Managerial Efficiency and Firm Value

Specifically, in the perspective of stakeholder theory states that stakeholders expect financial performance by managers with high capabilities will provide increased investor trust. So, in addition to focusing on economic performance, investors measure a firm value in increasing investor trust in financial reports. In the perspective of stakeholder theory, Harrison & Wicks (2015) also emphasize that the process of creating the value of the firm is generally reflected in the financial reporting process. Having CFO and CEO who have good spending efficiency will increase profits, thus increase investor's trust. That means increase firm value. Based on the brief explanation above, the following hypothesis is formulated :

H₂: Managerial Efficiency have a positive influence on firm value.

1.5. Innovation and Firm Value

Innovation greatly determines a company's competitiveness. Some studies have found a positive relationship between innovation and performance, which focuses on export values (Azar & Ciabuschi, 2017), focusing on organizational efficiency (Shanker, Bhanugopan, van der Heijden, & Farrell, 2017) and on corporate financial performance (Shanker et al., 2017). By innovating, companies have a greater possibility of creating value, creating intellectual property (Verwaal, 2017). Innovation is a company breakthrough for increasing normal profits and company value which can have an impact on market reaction (Pérez-Rodríguez & Valcarcel, 2012). Therefore, the following hypothesis can be formulated:

H₃: There is significant influence between innovation and firm value

2. Objectives

The purpose of this study is to examine the effect of managerial efficiency, innovation and firm value. Managerial efficiency is reflected in the input and output used for the company's operations by separating R&D expenditure as an indicator of the innovation variable.

3. Materials and Methods

3.1. Population and Samples

In accordance with its objectives, this research is explanatory, to explain the relationship (causality) between managerial efficiency, innovation, and company value variables through hypothesis testing. The research population is all pharmaceutical companies listed on the Indonesia Stock Exchange in the period 2008 - 2017. There are 9 out of 10 pharmaceutical companies that meet the reporting criteria (purposive sampling) which in that period published complete financial report data which became the research variable, 1 company does not report complete financial data. Data collection is done by the method of documentation through the Indonesia Capital Market Directory (ICMD).

3.2. Variable definition

A. Managerial Efficiency

Managerial efficiency is the ability to manage company spending to produce optimal output. The greater the estimated value obtained from managerial efficiency will give an idea of achieving better company



efficiency. Observation values greater than 1 indicate that companies use inputs efficiently and values less than 1 indicate that companies need to reduce costs or increase their income to achieve efficiency (Demerjian et al., 2008) calculated by the formula as follows:

$$MaxV\theta = \frac{Sales}{CoGS + SG\&A + PPE + OpsLease + Goodwill + other Intan} \dots\dots\dots (1)$$

This study uses a DEA (Data Envelopment Analysis) that calculates efficiency by means of weighted outputs on weighted inputs. DEA is an optimization program to determine the company's optimal weight at input and output. The optimal weight of this company will describe the efficiency of the company based on its input and output (Demerjian et al., 2008)

The company's total efficiency is estimated using sales and six inputs : Costs of Goods Sold (CoGS), Sales General and Administration expenses (SG& A), Property plant and Equipment (PPE), OpsLease, Goodwill and Other Intangible assets). By separating R&D in the intangible of assets, there is an indicator of innovation.

The most successful companies are those that produce maximum sales at the lowest cost. The greater the value of *MaxVθ*, the better the manager's ability to manage inputs to produce output. Use of these six inputs with the consideration that each company operational activity is a strategy and policy taken by the manager. Every policy taken by a manager is expected to influence sales. To achieve maximum value from sales managers must be able to control and use resources optimally.

B. Innovation

Innovation is the company's activities in developing products and markets, which in this study are calculated from Expenditures for R&D as a percentage of the company's total sales (Irina Berzkalne & Zelgalve, 2013)

C. Firm Value

Firm value is defined as the ratio of market value to the value of the replacement of a company's assets. A value higher than one indicates that the company has good value. Firm value is measured using Tobin's Q Tobin-Q value as a ratio of the market value of equity of a firm to the book value of its assets in accordance with the research of Leung & Cheng, (2013), Y. Li, Gong, Zhang, & Koh, (2018)

3.3. Analysis Techniques

This research was analyzed using path analysis, by forming the following equations:

$$I = f(ME) \dots\dots\dots(3)$$

$$FV = f(ME,I) \dots\dots\dots(4)$$

$$I = \alpha_0 + \alpha_1 ME + \mu_1 \dots\dots\dots(3.1)$$

$$FV = \beta_0 + \beta_1 ME + \beta_2 I + \mu_2 \dots\dots\dots(4.1)$$

Notes:

- ME = Managerial Efficiency
- I = Innovation
- FV = Firm Value
- α0 , β0 = Konstanta
- μ1 , μ2 = Error Term



4. Results and Discussion

The population used in this research are all pharmaceutical companies listed on the Indonesia Stock Exchange (IDX) from 2008 to 2017 consisting of 10 companies. The company was selected by purposive sampling method to produce as many as 9 companies with 90 observation samples and had passed the testing process of various model assumptions (Goodness-of-Fit Model) to produce 90 observation samples tested using simple regression analysis.

4.1. Testing for Normality

Multivariate testing in this study requires the fulfillment of the assumption of normality. This test was carried out when the AMOS operation was running. There are two tests of normality, namely univariate normality, and multivariate normality. Data distribution can be said to be normal if the value of C.R skewness and the value of C.R kurtosis is smaller than the critical value of the table + 1.96 with a significance level of 0.05 (p-value of 5%). The following table is the result of testing univariate and multivariate normality with the AMOS version 24 program.

Table 1. Normality Test Results

Variable	min	max	skew	c.r.	kurtosis	c.r.
Managerial efficiency	0.691	1.062	-0.098	-1.016	0.628	3.269
Innovation	0.382	1.341	-0.180	-1.848	1.809	9.395
Firm Value	0.178	4.102	1.238	12.698	1.239	6.398
Multivariate					-0.076	-0.097

Table 1 shows a univariate analysis which states that there are still variables that have a C.R value. skewness and kurtosis are greater than the critical value of the table + 1.96. Thus it can be concluded that univariate data distribution is abnormal at the 0.05 level of significance (p-value 5%). But if the test is analyzed multivariate, it is known that C.R. kurtosis of -0.098 is smaller than the critical value of table + 1.96. So it can be concluded that multivariate data distribution is normal. While multivariate testing is normal then univariate is also normal. While testing all abnormal univariate variables does not guarantee that multivariate testing is also abnormal (Hinson & Utke, 2016) Thus, it can be concluded that the data in this study are normally distributed, because although abnormal distributed univariate but normally distributed multivariate, therefore the assumption of normality in this study has been fulfilled.

4.2. Descriptive statistics

Descriptive statistical analysis is used to determine the description of research variables, that the magnitude of Managerial Effectiveness, Innovation and Firm Value (FV). The values seen from descriptive statistics are the maximum, minimum, average (mean) and standard deviation values.

Table 2. Descriptive Statistics

Variable	min	max	mean	Std deviation
Managerial efficiency	0.691	1.062	0.849	0.057
Innovation	0.382	1.341	0.578	0.697
Firm Value	0.178	4.102	1.362	0.692

Managerial efficiency shows a minimum value of 0.691 and a maximum value of 1.062 with an average of 0.849 and a standard deviation of 0.057. This illustrates that managers are able to manage inputs or resources efficiently and effectively in producing output for the company. The standard deviation value of 0.057 < mean 0.849 illustrates that the spread of data for managerial efficiency variables is quite normal.

Innovation shows a minimum value of 0.382 and a maximum value of 1.341 with an average of 0.578 and a standard deviation of 0.697. Indicates that the composition of research and development spending is smaller than other expenses. A small ratio means more efficient spending on innovation in generating profits. to produce sustainable profits in the future (Namazi & Rezaei, 2016). The average value of 0.578 indicates that research and development expenditures tend to have a small portion and cash outflow from operations. This means that the company does not consider the importance of research and



development, especially in pharmaceutical companies. The standard deviation value of 0.697 > mean value 0.578 gives an indication that the spread of data for innovation variables tends to be abnormal.

The company value shows a minimum value of 0.178 and a maximum value of 4.102 with an average of 1.362 and a standard deviation of 0.692. Faller & Zu Knyphausen-Aufseß (2018), (Ghosh, 2018), Xia (2008) Li, Yang, & Xiao (2014) provide empirical results that if the value of a company is greater than 1, it has been able to increase value in its operations for years. The average value of 1.362 indicates that the average pharmaceutical company found on the Indonesia Stock Exchange has been well managed so that value is created for the company's stakeholders. The standard deviation value of 0.692 < mean value 1.362 gives an indication that the spread of data for firm value variables tends to be normally distributed.

4.3. Path Analysis

After the Goodness-of-Fit Model is conducted, testing hypotheses can be done by using a regression model in path analysis to predict the relationship between exogenous variables and endogenous variables.

Table 3. Standardized Value Path Coefficient

<i>Variable</i>	Coef. Est	S.E	p
Managerial Efficiency to Innovation	0.078	0.205	0.015*
Managerial Efficiency to Firm Value	0.149	0.698	0.000*
Innovation to Firm Value	0.088	0.335	0.020*

* statistically significant level of $\alpha = 0.05$

1. Managerial efficiency has a positive and significant influence on innovation. managerial efficiency focuses on how to manage inputs optimally to obtain maximum output. When production costs and other expenses can be reduced, it's can increase investment in R&D, so as to encourage the creation of patents or other things that support innovation. The pharmaceutical industry continues to improve drug discovery and development for customer satisfaction
2. Managerial efficiency has a positive and significant influence on firm value. This indicates that efficient management within the company is able to encourage profit increases. Managerial efficiency is measured by the compatibility between actual economic performance and performance that can be achieved with existing conditions. Managerial efficiency considers the calculation of operational costs and the time needed to achieve results. Managerial efficiency is a key factor in improving the financial and economic performance of the company. Return on investment will be higher, so that investor trust will be greater, its reflected in the increase in stock market prices.
3. Innovation has a positive influence on firm value. Innovation is seen from the large amount of R&D spending. R&D costs encourage product quality improvement, new patents, which are the main assets of pharmaceutical companies, are expanding market share, which has led to increased profits. This shows that the level of innovation has an impact on increasing customer satisfaction, achieving new markets and being able to increase sales. So that the company is able to increase profits and investor trust. Innovation and company value are closely related. The pharmaceutical industry basically relies on R&D to achieve production innovations to create value by providing greater customer benefits. In addition, sustainable growth and value creation depend on stable R&D productivity with positive ROI to drive future income that can be reinvested into R&D.

Calculation of the Significance Value of the Effect of Mediation (Sobel Test) Based on the results of the Sobel test, it is explained that the indirect effect of managerial efficiency on firm value has a p-value (two-tailed probability) Sobel test of 0.211 > alpha 0.05. Thus the variable innovation in this study is the type of No Mediation.



4.4. Effect of Managerial Efficiency on Innovation

The standardized beta coefficient value of the direct effect of managerial efficiency on innovation is 0.078 with a p-value of $0.015 < \alpha 0.05$. This shows that managerial efficiency has a positive and significant influence on innovation. Thus Hypothesis 1 (H_1) states that managerial efficiency has a direct influence on accepted innovation. In line with the research of Azar & Ciabuschi (2017), Pérez-Rodríguez & Valcarcel (2012), Ale, Chiotti, & Galli (2005). Managerial efficiency shows the ability of resource management to increase company income in the future by using the lowest input. In addition, every manager needs to evaluate spending in managing product inputs by considering innovations that can provide future cash inflows for the company.

4.5. Effect of Managerial Efficiency on Firm Values

The standardized beta coefficient value of the direct effect of managerial efficiency on firm value is equal to 0.149 with a p-value of $0.000 < \alpha 0.05$. This shows that managerial efficiency has a positive and significant influence on firm value. Thus Hypothesis 2 (H_2) which states that managerial efficiency has a direct influence on accepted firm value. This study shows that managerial efficiency has a positive and significant impact on firm value. The results of this study are in line with (Cho & Lee, 2017), (Aksoylu & Aykan, 2013)

4.6. Effect of Innovation on Firm Values

Investor interest to company's policy in managing funds invested by investors. Fund management can show in the company's innovation activities. Therefore, the more innovative a company is, the investor's response will be higher. The high response will have an impact on increasing firm value. The standardized beta coefficient value of the direct effect of innovation on firm value is 0.088 with a p-value of $0.020 < \alpha 0.05$. This shows that innovation has an influence on company value. Thus Hypothesis 3 (H_3) which states that innovation has an influence on the value of the company received. Innovation has an influence on corporate values in line with Azar & Ciabuschi (2017), Guimarães, Severo, Dorion, Coallier, & Olea (2016), Pérez-Rodríguez & Valcarcel (2012). With research and development pharmaceutical companies are able to survive in business competition and develop new markets that have a positive impact on investor confidence in the company. In some studies measuring firm value with ROE (Cuong & Canh, 2012), combine Tobbin Q and ROA (Prihatiningtias, 2012) may be able to show different results

The study also found that there is no mediating role of innovation variables that connect between exogenous variables of managerial efficiency, and endogenous variables of firm value.

5. Conclusion

Managerial efficiency reflected in the inputs and outputs used for company operations has a positive influence on R&D expenditure as an indicator of innovation. Companies prefer to invest in R&D rather than, marketing or other expenses. Managerial efficiency has a positive and significant influence on firm value. This shows that managerial efficiency reflects the ability of investment and financial decision making will have a positive effect on investor confidence in the company. Innovation has an influence on firm value. This shows that companies with high innovation can maintain investor confidence. Sobel test found that there is no mediating role of innovation variables that connect managerial efficiency with firm value.

The limitation of this study, is the determination of samples taken only from the Indonesia Stock Exchange (from 208 pharmaceutical industries only 10 are listed on the Indonesian stock exchange). Due to research time limitations, it is not possible to obtain data from the company directly. Further research will be added to samples from outside pharmaceutical companies listed on the Indonesian stock exchange by getting data directly from a pharmaceutical company that is on the list of pharmaceutical companies in the health department.



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