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Research and Development Investment: The Role of Corporate Governance and Financial Slack

Erlin Ketna Purnamasari[1], Marfuah[2*], Priyono Puji Prasetyo[3]
[1,2*]Faculty of Business and Economics, Universitas Islam Indonesia, Yogyakarta
[3]Faculty of Islamic Studies, Universitas Ahmad Dahlan, Yogyakarta
*Corresponding email: marfuah@uii.ac.id

Abstract

This study aims to examine and develop an understanding of the effect of corporate governance and financial slack on R&D investment by exploring the influence of ownership structure and board characteristics which consequently can influence the expansion or reduction of a company's R&D budget. Using the purposive sampling method, 41 samples of pharmaceutical companies were selected which were listed on the IDX in 2013-2019. The results of hypothesis testing concluded that managerial ownership, tenure of independent commissioners, and financial slack proved to have a significant positive effect on R&D investment decisions. Meanwhile, institutional ownership, the proportion of independent commissioners, educational level of directors, and education of directors do not have a significant influence on R&D investment decisions in pharmaceutical companies in Indonesia. The results of this study indicate that the management ownership structure and the characteristics of independent commissioners are elements of corporate governance that are able to play a role in aligning the interests of management and shareholders in making R&D investment decisions in pharmaceutical companies in Indonesia. In addition, this study also found that R & D investment tends to increase when companies have large financial slack. The results of this study contribute to management in making better R&D investment decisions.

Keywords: Corporate Governance; Financial Slack; Managerial Ownership; R & D investment

Abstrak

Penelitian ini bertujuan untuk mengkaji dan mengembangkan pemahaman tentang pengaruh antara corporate governance dan financial slack terhadap investasi R&D dengan mengeksplorasi pengaruh struktur kepemilikan dan karakteristik dewan yang konsekuensinya dapat mempengaruhi perluasan atau pengurangan anggaran R&D perusahaan. Dengan menggunakan metode purposive sampling, terpilih 41 sampel perusahaan Farmasi yang terdaftar di BEI tahun 2013-2019. Hasil pengujian hipotesis menyimpulkan bahwa kepemilikan manajerial, masa jabatan komisaris independen, dan financial slack terbukti berpengaruh positip signifikan terhadap keputusan investasi R&D. Sementara kepemilikan institusional, proporsi komisaris independen, tingkat pendidikan direksi, dan bidang pendidikan direksi tidak memiliki pengaruh signifikan terhadap keputusan investasi R&D pada perusahaan farmasi di Indonesia. Hasil penelitian mengindikasikan bahwa struktur kepemilikan manajemen, dan karakteristik komisaris independen merupakan unsur corporate governance yang mampu berperan dalam mensejajarkan kepentingan antara manajemen dan pemegang saham dalam pembuatan keputusan investasi R &D pada perusahaan Farmasi di Indonesia. Selain itu penelitian ini juga menemukan bahwa investasi R & D cenderung meningkat ketika perusahaan mempunyai slck financial yang besar. Hasil penelitian ini memberi kontribusi bagi manajemen dalam membuat keputusan investasi R &D yang lebih baik.

Kata Kunci: *Corporate Governance; Financial Slack; Kepemilikan Manajerial; Investasi R & D*

I. INTRODUCTION

Research and Development (R&D) is an activity or process carried out by a company in order to produce a product that is better than the previous product and can also improve the quality of the old product to be even better. The resulting product does not have to be in the form of hardware, but can also be in the form of software (Sujadi, 2003). Most of the R&D investment consists of purchasing materials, purchasing

equipment, hiring technical people, and so on. The fact that these investments are irreversible adds to the amount of risk (Jiang &; Liu, 2020).

According to Chandra and Marsaulina (2019), R&D intensity is one of the factors that can advance the growth of the national industry, but in reality only a small number of companies in Indonesia consider R&D important, and even a few companies attach R&D accounts to their financial reports. As stated by Nugraheni (2021) that in the global research scheme, the country of Indonesia reached its peak of performance in the field of R&D in 2018. In 2018, Indonesia achieved the highest Global Innovation Index score during 2015-2020, which was 37.12. However, the Global Innovation index score decreased in 2019 at 29.72. In 2020, Indonesia's Global Innovation Index score fell again to 26.49, which placed Indonesia in 85th place out of 131 countries. Nugraheni (2021) also stated that currently, 80 percent of the research budget still comes from the government budget, even though the role of the private sector in research and innovation will also have an impact on increasing the competitiveness of the private sector in global technology competition.

The pharmaceutical and medical device industry is an industry with higher technological requirements, large market potential, high output added value, low pollution, emphasis on science-tech integration, and wide applications. In addition, the pharmaceutical industry has a higher risk, provides higher profits, and is a knowledge-intensive industry. The medical biotechnology sector demands continuous innovation, and has long invested a large amount of money in R&D to obtain various patents and R&D results to enhance its competitiveness. R&D costs and patent rights are very important for medical biotechnology companies to maintain a competitive advantage (Johennessee & Budidarma, 2022). The study conducted by Lou et al. (2018) using medical device business executives and staff in Shanghai as research subjects found that R&D expenditure and patents, patents and operational performance, and R&D expenditure and operational performance all had a favorable correlation. The findings and recommendations made assist medical device businesses in obtaining various patents for R&D contributions and maintaining competitive advantage (Luo et al., 2018).

This research was conducted primarily based on agency theory, because a company's investment in R&D is a decision that can cause disputes between managers and shareholders. Shareholders are modeled as risk-neutral in agency theory because they can diversify their overall investment across several firms, but managers are modeled as risk-averse because they can focus on only one job. As a result, managers are perceived to favor short-term benefits from efficiency-seeking techniques, which may hinder long-term innovation and returns (Johennessee & Budidarma, 2022). Effective corporate governance practices must try to align the interests of shareholders with managers' decisions. Good governance must be able to subordinate management to the interests of shareholders so as to generate a beneficial influence on R&D decisions.

R&D investment decisions are long-term strategic decisions that cannot be separated from the role of the corporate governance structure as the party that makes decisions and oversees decisions. The corporate governance structure consists of main organs, namely shareholders, board of commissioners and directors as well as other supporting organs such as committees, corporate secretary and internal control unit. In practice, the board of commissioners and directors need to jointly agree on several things, including long-term plans, strategies, as well as work plans and annual budgets (KNKG, 2006). The board of commissioners as supervisors and directors as company managers will be accountable for their performance to shareholders at the General Meeting of Shareholders (GMS).

Institutional ownership is seen as a corporate governance mechanism that is able to handle agency conflicts through intensive supervision because of the resources, networks, and experience in business and finance. Research by Cebula & Rossi (2015), Dewi (2018), and Septiandendi (2019) proves that institutional ownership has a significant positive influence on R&D investment. However, research by Chen (2010), Lee (2012), Lee (2015) and Soffitri (2017) found that institutional ownership does not have a significant impact on R&D investment.

Managerial ownership as a party that is actively involved in the decision-making process is predicted to have an influence on R&D investment decisions. Chen (2010) found that managerial ownership proxied by the percentage of share ownership by people who have control over the company, family members, or other relatives has a positive effect on R&D investment. On the other hand, Zeng & Lin (2011) found that

managerial ownership has a negative effect on R&D spending, which means that managers use this incentive to use company resources for personal gain. Research by Soffitri (2017), Chandra & Marsaulina (2019), and Dewi (2018) states that managerial ownership has no effect on R&D intensity.

The existence of a board of commissioners, especially an independent commissioner as a representative of shareholders and stakeholders, will help control risks, protect optimal returns, and other interests. Like the board of directors, the board of commissioners also has the responsibility to maintain the long-term sustainability of the company's business (KNKG, 2006). This responsibility is realized through the oversight and advisory functions in terms of planning, implementing, and evaluating the results of R&D projects. Grade (2018) found that independent commissioners have a significant positive effect on innovation proxied by R&D spending. However, the research results of Utomo & Septiani (2017) and Rodrigues et al. (2019) found that independent commissioners have a non-significant positive effect on R&D investment. Meanwhile, Septiandendi (2019) found that independent commissioners had a negative but not significant effect on R&D investment.

The long tenure of an independent commissioner in a company contributes to the quality of the company's strategy assessment because of the large amount of experience and knowledge about the company that has been obtained. Guldiken & Darendeli (2016) found that on average outsiders' board tenure has a significant positive effect on R&D investment. Conversely, long tenure can reduce independence. Rodrigues et al. (2019) concluded that the average board tenure has a negative but not significant effect on R&D investment.

The board of directors as top management are the people who will develop strategies and determine investment decisions in R&D. Making a decision can be influenced by the background of the board of directors. One of the directors' influential background is education which represents the knowledge of each director. Based on the level of education, research by Chen (2012), Zhou et al. (2012), Kuo et al. (2018), and Wang et al. (2019) found that the educational level of directors has a positive effect on R&D investment. However, research by Yuan et al. (2012) found that the educational level of executives under some conditions had no effect on company R&D spending. Apart from educational level, research by Scherer & Huh (1992), Zhou et al. (2012), and Dalziel et al. (2011) found that certain educational fields owned by directors will also influence R&D investment decisions.

This research is different from previous research, because apart from examining the role of corporate governance in making R&D decisions, it also attempts to examine financial slack which describes the company's financial condition. In accordance with the pecking order theory, in which companies will tend to choose funding sources with minimal risk first. Companies that have flexible resources can create and increase their involvement in various company innovation and development activities (Hartono, 2019). This is evidenced by research by Ashwin et al. (2016) who found that financial slack had a significant positive effect on R&D investment.

Therefore the purpose of this research is to examine and develop an understanding of the influence between corporate governance and financial slack on R&D investment by exploring the influence of ownership structure and board characteristics which consequently can affect the expansion or reduction of a company's R&D budget. The results of this study contribute to company management in making better R&D investment decisions. This article begins with an introductory presentation explaining the background of this research and its contribution. Then it is continued with a discussion of literature reviews which explain theories and previous research studies that are useful in formulating research hypotheses. The next discussion is the research method, followed by a description of the results and discussion of the research. The last section discusses the conclusions outlining the conclusions, implications and limitations as well as research suggestions.

Agency Theory

Agency theory is an important basic concept in understanding agency relationships that occur in a company. Jensen & Meckling (1979) define an agency relationship as a contract in which one or more owners engage others as agents to perform work on behalf of the principal, including giving management some decision-making authority regarding the work. Principals and agents in a company are played by shareholders and management, respectively. Nevertheless, agents do not always act in favor of the principal's interests due to human nature that tends to maximize utility. In overcoming agency problems arising from the separation of ownership and control, agency costs are needed. The agent's fee is the total amount that the principal must spend to supervise the agent (monitoring expenditures), the amount incurred by the agent to ensure that he does not take actions that harm the principal (*bonding expenditures),* and the cost of losses due to the agent's actions that are not in accordance with the principal (residual loss). This theory helps explain the influence of corporate governance structures (shareholders, board of commissioners, and board of directors) as a mechanism that functions to minimize agency problems, including research & development investment decision making.

Companies with additional investment in R&D are more feasible to drive firm uniqueness, and hence, competitive advantage and sustainable market value in the long run (Hsieh et al., 2003). Nevertheless, risk-averse managers will constantly underinvest in R&D and use less risky mechanisms to pursue company growth. Shaikh &; Peters (2018) found that companies that are required to maintain high R&D intensity, structure their boards with more top managers to help reduce agency costs that are more pressing than underinvestment. The company's R&D investment remains affected by agency fees underlying agency issues. Lin et al. (2017) view that financing constraints lead to lack of R&D investment and agency costs lead to R&D overinvestment.

Research and Development Investment

Most of the R&D investment consists of purchasing materials, purchasing equipment, hiring technical people, and so on. The fact that these investments are irreversible adds to the amount of risk (Jiang &; Liu, 2020). Higher levels of market uncertainty, can reduce business R&D spending and increase the value of waiting for new information (Bloom, 2007; Czarnitzki & Toole, 2007).

Return and risk of an investment generally cannot be estimated with certainty, including investments in R&D. Ben-Zion (1984) explains the difference between R&D investments and other investments. First, R&D investments relate to cost streams and the future net income potential is more uncertain. Second, uncertainty of results and business confidentiality in R&D projects require internal funding rather than external funding. Third, the success of the company and changes in R&D spending have a positive relationship so that R&D expenditure that is seen as *extraordinary expense* is more easily justified in periods of comparable prosperity.

Hypothesis Development

The Effect of Institutional Ownership on R&D Investment

Share ownership by institutional investors, which is generally of great value, is expected to be a *corporate governance* mechanism that strengthens the supervisory function of management performance. Previous research has proven that institutional ownership has a significant positive influence on R&D investment (Cebula & Rossi, 2015; and Septiandendi, 2019). This is because institutional ownership can increase control over management because it has more incentives for knowledge, experience, and networks. Based on this explanation, the first hypothesis in this study is as follows:

H_1: *Institutional ownership positively influences R&D investment decisions*

The Effect of Managerial Ownership on R&D Investment Decisions

Management who is also a shareholder is expected to reduce agency conflicts and align managerial interests with the interests of shareholders. On the other hand, managerial ownership will give management more power over the company's control, including in rejecting or supporting R&D investment. Chen's research

(2010) shows that managerial ownership has a positive effect on R&D investment. The results of this study are in accordance with agency theory that managerial ownership is able to overcome the problem of managerial myopia (managerial myopic) and information asymmetry. Based on this explanation, the second hypothesis of this study is as follows:
H2: Managerial ownership has a positive effect on R&D investment decisions

The Effect of Independent Commissioners on R&D Investment Decisions

Agency theory emphasizes the importance of monitoring (monitoring) as the main function of the board of commissioners. This means that the board of commissioners needs to check first before finally approving the long-term plans, strategies, as well as work plans and annual budgets submitted by management. This is intended to prevent opportunistic management behavior that is contrary to the interests of shareholders and harms the company as a whole. A sufficient proportion of the board of commissioners is needed to ensure the effectiveness of the supervisory function and the creation of compliance with laws and regulations (KNKG, 2006). Grade (2018) found that independent commissioners have a significant positive effect on innovation proxied by R&D spending. According to Jiraporn et al. (2018), board independence results in much greater investment in innovation as well as higher innovation productivity. This suggests that board governance has a real effect on important organizational outcomes, such as creativity and productivity. Based on this explanation, the third hypothesis in this study is as follows:
H3: Independent commissioners have a positive effect on R&D investment decisions

The Effect of Tenure of Independent Commissioner on R&D Investment Decisions

The Asian Development Bank (2014) recommends that tenure of independent commissioners be no more than 9 years, while the Financial Services Authority (OJK) allows independent commissioners to serve more than two terms. Research by Guldiken & Darendeli (2016) found that on average outsiders' board tenure has a significant positive effect on R&D investment. This is in line with the theory of the upper echelons that the experience of independent commissioners during their tenure is able to increase their understanding of the company's business and management's strategic challenges and opportunities, thereby increasing their contribution in formulating strategies and overseeing the company's risk management. Based on this explanation, the fourth hypothesis is as follows:
H4: Tenure of independent commissioner has a positive effect on R&D investment decisions

The Effect of the Education Level of Directors on R&D Investment Decisions

Based on the upper echelon theory, education is one of the components that shape the characteristics of the top management team (TMT) and ultimately affects preferences in strategic decision making. The results of Jiang & Liu's (2020) research found that some attributes for example, education, study or work experience abroad, product R&D experience, and process engineering experience lead to a positive relationship with R&D investment. Research Chen (2012), Zhou et al. (2012), and Kuo et al. (2018) proves that the education level of directors has a positive effect on R&D investment. These studies state that the higher the level of education, management will be better in cognitive abilities, tolerance for ambiguity and novelty, understanding of new ideas, and solutions in dealing with complex situations so that they have a tendency to invest more in activities. R&D. Based on this explanation, the fifth hypothesis in this study is as follows:
H5: The education level of directors has a positive effect on R&D investment decisions

The Effect of The Education Sector of Directors on R&D Investment Decisions

Diverse educational fields will expand the knowledge of directors. This will have an impact on the formulation and implementation of the company's strategy. Scherer & Huh (1992) shows that the education of top executives in the fields of science or engineering who may be complemented by legal and business skills will increase the intensity of R&D spending which means that directors who have a variety of disciplines will encourage and maximize investment in R&D projects. Directors with technical knowledge (science &

engineering) especially in high-tech companies are seen to be more capable of providing advice and assessment of the success of R&D projects. Directors with knowledge of economics/business management have skills in budgeting and investment risk management so that they can understand the process of funding R&D investments and the timeframe needed to recover R&D investments. Based on this explanation, the sixth hypothesis in this study is as follows:
H6: The education sector of the board of directors has a positive effect on R&D investment decisions

The Effect of Financial Slack on R&D Investment Decisions

Pecking order theory emphasizes the importance of sufficient financial slack for companies to fund large projects without having to harm the interests of shareholders and other stakeholders. This shows that companies will be more motivated to invest if they have financial slack. Research by Ashwin et al. (2016) and Hartono (2019) found that financial slack has a significant positive effect on R&D investment. Based on this explanation, the seventh hypothesis in this study is as follows:
H7: Financial slack has a positive effect on R&D investment decisions

II. METHOD

Research Design

This study is an empirical study that tests the hypothesis about the effect of 7 (seven) independent variables on R & D decisions in pharmaceutical companies in Indonesia. The seven independent variables include institutional ownership, managerial ownership, independent commissioner, term of office of independent commissioner, level of education of directors, education of directors, and financial slack. The seven independent variables are thought to have a positive influence on R & D decisions in pharmaceutical companies in Indonesia.

Populations and Sample

This study uses secondary data in the form of annual reports for the 2017-2023 period obtained from the Indonesia Stock Exchange (IDX) website or related company websites. The research population is 10 companies. By using purposive sampling technique, 41 financial statements were selected for 7 years of observation from 6 pharmaceutical companies that met the criteria as research samples. The following table 1 presents the sample selection process:

Table 1. Sample Selection Process

Criteria	Amount
Pharmaceutical companies in Indonesia listed on the Indonesia Stock Exchange in 2017 -2023	10
Companies that do not report research and development (R&D) accounts	(4)
Number of companies being sampled	6
Total observation for 7 years	42
Companies that have negative data	(1)
Final sample total	41

Source: secondary data

Measurement of Research Variables

Research variables consist of dependent and independent variables. The dependent variable in this study is the R&D investment decision, while the independent variables include institutional ownership, managerial ownership, independent commissioner, term of office of independent commissioner, education level of the board of directors, board of directors education and financial slack. The measurement of each variable is presented in table 2 below:

Table 1. Measurement of Variable

Variable	Symbol	Measurement
R&D Investment	RND	Total R&D expenditure divided by total sales
Institutional Ownership	INST	The number of shares held by institutional shareholders divided by the number of shares outstanding
Managerial ownership	MOWN	The number of shares owned by the board of directors and the board of commissioners divided by the number of shares outstanding
Independent Commissioner	INCOM	The number of independent commissioners divided by the number of members of the board of commissioners
Tenure of Independent Commissioner	TENURE	The number of independent commissioners who have served more than 9 years divided by the number of boards of commissioners
Education Level of Directors	EDLEV	The highest education degree of a member of the board of directors (Notation: 4 = doctorate, 3 = master, 2 = bachelor, and 1 = other.
Education Sector of Directors	EDSEC	The number of members of the board of directors with technical and economic/management education divided by the number of the board of directors
Financial Slack	FINSA	Current assets minus current liabilities divided by current liabilities.

Source: Various Literature

Data Analysis Method

The data analysis method to test the research hypothesis is multiple linear regression with the equation:

$$RND = a + \beta 1\ INST + \beta 2\ MOWN + \beta 3\ INCOM + \beta 4\ TENURE + \beta 5\ EDLEV + \beta 6\ EDSEC + \beta 7\ FINSA + e \quad \text{.....(1)}$$

III. RESULT AND DISCUSSION

Descriptive Statistics

Descriptive statistics of all research variables which include minimum, maximum, mean and standard deviation values are presented in table 3 below:

Table 3. Descriptive Statistic

Variable	Minimum	Maximum	Mean	St. Dev
INST	0.53846	0.99454	0.84807	0.15757
MOWN	0.00000	0.23077	0.03398	0.07835
INCOM	0.28571	0.75000	0.41910	0.10062
TENURE	0.00000	0.33333	0.06818	0.11268
EDLEV	200.000	300.000	251.050	0.23140
EDSEC	0.00000	0.80000	0.28930	0.27234
FINSA	0.04220	365.770	162.133	109.247
RND	0.00015	0.02284	0.00490	0.00532

Source: secondary data processed

"

The R&D investment decisions (RND) has the lowest value of 0.00015 and the highest value of 0.02284 with an average value of 0.00490 which is smaller than the standard deviation value of 0.00532, which means that the data is heterogeneous. The company that has the lowest R&D investment value is PT Merck Tbk (MERK) in 2019, while the one with the highest R&D is PT Pyridam Farma Tbk (PYFA) in 2019. The average R&D value of 4.9% is far from the average value The average R&D ratio in the global pharmaceutical industry is 17% (Investopedia, 2019).

The institutional ownership (INST) has the lowest value of 0.53846 and the highest value of 0.99454 with an average value of 0.8480717. The company that has the lowest institutional ownership is PT Pyridam Farma Tbk (PYFA) for 5 years, namely 2013-2019. The company that has the highest institutional ownership value is PT Indofarma Tbk (INAF) for 2018.

The managerial ownership (MOWN) has the lowest value of 0 and the highest value of 0.23077 with an average value of 0.03398. Companies that have the lowest managerial ownership, which is 0 (zero), meaning that there are no company shares owned by managers, are PT Indofarma (Persero) Tbk (INAF) and PT Kimia Farma (Persero) Tbk (KAEF) in several years and PT Merck Tbk (BRAND) for 2014-2019. The company that has the highest managerial ownership is PT Pyridam Farma Tbk (PYFA) for 2016-2019.

The independent commissioner variable (INCOM) has the lowest value of 0.28571 and the highest value of 0.75 with an average value of 0.41910. The company that has the lowest proportion of independent commissioners is PT Kalbe Farma Tbk (KLBF) for 2018. The company that has the highest proportion of independent commissioners is PT Tempo Scan Pacific Tbk (TSPC) for 2014.

The Tenure of independent commissioner (TENURE) has the lowest value of 0 and the highest value of 0.33333 with an average value of 0.06818. Companies that have a proportion of independent commissioners serving more than 9 years are PT Merck Tbk (MERK) for 2019. Companies that have a proportion of independent commissioners serving more than 9 years are PT Tempo Scan Pacific Tbk (TSPC) for 2017 and 2018.

The education level of directors (EDLEV) has the lowest value of 2 and the highest value of 3 with an average value of 2.51050. The mean value of 2.51 indicates that members of the board of directors in Indonesian pharmaceutical companies are dominated by those with undergraduate (S1) and master (S2) education, according to the data shown in table 4 below.

Table 4. Composition of the Board of Directors Based on Education Level

Year	Doctor	Master	Graduate	Other	Dominan
2019	2	15	14	0	Master
2018	1	15	13	1	Master
2017	1	14	15	1	Graduate
2016	1	14	15	1	Graduate
2015	1	14	15	2	Graduate
2014	1	13	15	3	Graduate
2013	1	15	17	2	Graduate

Source: secondary data processed

"

The education level of directors (EDLEV) has the lowest value of 0 and the highest value of 0.8 with an average value of 0.28930. The company that has the lowest variable in the field of directors' education with a value of 0 (zero) is PT Kalbe Farma Tbk (KLBF) for the years 2013-2019. The number 0 (zero) indicates that the KLBF company does not have a member of the board of directors who has both technical and economic/management education. The sample data shows that members of the KLBF board of directors have educational backgrounds that are concentrated in one field, namely focusing on technical or economics/management only. While the company that has the highest variable in the field of directors' education with a value of 0.80000 is PT Kimia Farma (Persero) Tbk (KAEF) for the years 2013-2016. This data shows that 80 percent of KAEF's board of directors have a technical education background as well as economics/management.

The financial slack variable (FINSA) has the lowest value of 0.04220 and the highest value of 3.65770 with an average value of 1.62133. This financial slack variable shows the level of cash availability above current liabilities owned by the company. The company that has the lowest financial slack is PT Indofarma (Persero) Tbk (INAF) 2017, while the company that has the highest financial slack is PT Kalbe Farma Tbk (KLBF) in 2018.

Classical Assumption Test

Classical assumption test is used to ensure that the regression equation has predictive accuracy, is unbiased, and is consistent. The classical assumption test in this study consists of the normality test, multicollinearity test, and heteroscedasticity test. The following table presents the results of multicollinearity and heteroscedasticity test:

Table 5. Multicollinearity and Heteroscedasticity Test

Variable	Multicollinearity Test		Heteroskedasticity Test (Park Test)	
	Tolerance	VIF	t	Sig.
INST	0.122	8.197	0.392	0.697
MOWN	0.137	7.324	0.635	0.530
INCOM	0.661	1.514	-0.063	0.951
TENURE	0.225	4.445	1.834	0.076
EDLEV	0.465	2.125	1.146	0.260
EDSEC	0.511	1.957	0.287	0.776
FINSA	0.630	1.588	1.799	0.081
Dependent Variable: RND				
Asymp.sig 2 tailed (one-sample kolmogorov-smirnov)				0.200

Source: secondary data processed

Testing the normality of the data using the Kolmogorov Smirnov test shows that the Asymp value. Sig 2 tailed is 0.200 > 0.05 significance level, so it can be concluded that the residual data in this regression model

is normally distributed. Multicollinearity test is used to determine whether in the regression model there is a relationship between the independent variables. The results show that each variable has a tolerance value > 0.10 and VIF < 10. It can be concluded that there is no relationship or there is no multicollinearity between the independent variables in this regression model. The heteroscedasticity test is used to test whether there is a diversity of variance and residuals contained in the regression model. Based on the results of heteroscedasticity testing using the park test, the significance value (sig.) of each variable > 0.05 significance level, so it was concluded that there were no symptoms of heteroscedasticity in this regression model. Therefore, the data used in this study passed the classical assumption test.

The Results of Hypothesis Tests

The results of hypothesis testing with multiple linear regression analysis are presented in table 6 below:

Table 6. Multiple Linear Regression Test Results

Variable	Prediction	B	T-stistic	Sig. t	
				2-tailed	1-tailed
Konstanta		-0.009	-0.701	0.488	0.244
INST	+	0.016	1.461	0.154	0.077
MOWN	+	0.044	2.053	0.048	0.024*
INCOM	+	-0.010	-1.350	0.186	0.093
TENURE	+	0.023	1.954	0.059	0.029*
EDLEV	+	0.000	-0.040	0.969	0.485
EDSEC	+	-0.001	-0.281	0.780	0.390
FINSA	+	0.001	1.810	0.079	0.039*
Dependent Variable: RND					
F statistic = 5.963					
Sig. F = 0.000					
Adjusted R^2 =0.465					

Source: secondary data processed

Based on the table above, there are 3 (three) supported hypotheses and 4 (four) unsupported hypotheses. The value of Adjusted R Square are 0.465 indicates that the R&D investment variable can be explained by 46.5% by the independent variables used in the regression model, while the remaining 53.5% is explained by other factors outside the regression model. The significance value of F 0.000 < 0.05 significance level, then this regression model is feasible to be used as the basis of analysis. The results of hypothesis testing and discussion are described below.

The Effect of Institutional Ownership on R&D Investment Decisions

Institutional ownership variable (INST) has a coefficient value of 0.016 and a sig-t (one-tailed) of 0.077. These results indicate that H1 is not supported so that it is concluded that institutional ownership has no significant effect on R&D investment decisions. These results indicate that the value of R&D investment has not become the main interest of institutional investors in investing. Institutional investors may be more interested in R&D investment returns such as the addition of a type or value of a patent. The results of this study are not in line with the research of Cebula & Rossi (2015), Dewi (2018), and Septiandendi (2019) which state that institutional ownership has a positive and significant effect on R&D investment. However, these results are in line with research by Chen (2010), Lee (2012), Lee, (2015), and Soffitri (2017) which state that institutional ownership has no effect on R&D investment.

The Effect of Managerial Ownership on R&D Investment Decisions

The managerial ownership variable (MOWN) has a coefficient value of 0.055 and a sig-t (one-tailed) of 0.024. These results indicate that H2 so that it is concluded that managerial ownership has a significant positive effect on R&D investment decisions. This indicates that management as well as shareholder uses its power and knowledge regarding the condition of the company that is not owned by other shareholders to support R&D investment which is expected to increase company value and provide long-term benefits for the company and shareholders. The results of this study are in accordance with Chen's (2010) research which states that managerial ownership has a significant positive effect on R&D investment. This is because managerial ownership is able to overcome managerial myopic and information asymmetry problems (Chen, 2010).

The Effect of Independent Commissioners on R&D Investment Decisions

The independent commissioner variable (INCOM) has a coefficient value of -0.010 and a sig-t (one-tailed) of 0.093. These results indicate that H3 is not supported because the significance value is 0.093 > "α" 0.05 so that the regression coefficient is not significant. Therefore, it is concluded that independent commissioners have no effect on R&D investment decisions. This may be due to the limited knowledge and ability of the independent commissioner so that the independent commissioner is weak in maximizing the supervisory function and providing advice, especially regarding budget plans and the effectiveness of R&D projects so that the impact on R&D investment decision making is weak. The results of this study are not in line with the results of the Grade (2018) study which states that independent commissioners have a significant positive influence on R&D investment. However, the results of this study are in accordance with the results of Septiandendi's research (2019) that independent commissioners have an insignificant negative effect on R&D investment.

The Effect of Tenure of Independent Commissioner on R&D Investment Decisions

The variable tenure of independent commissioner (TENURE) has a coefficient value of 0.023 and a sig-t (one-tailed) of 0.029. These results indicate that H4 is supported so that it is concluded that the tenure of the independent commissioner has a significant positive effect on R&D investment decisions. Thus, the proportion of independent commissioners who have served more than 9 years in a company is able to increase R&D investment. This is probably due to the more experience and knowledge of the company's business, the better the independent commissioner in supervising R&D investments which has process complexity, requires large funds, and has a high risk of failure that causes an uncertain rate of return. The results of this study support the results of research by Guldiken & Darendeli (2016) which states that the tenure of an independent commissioner has a positive effect on R&D investment.

The Effect of the Education Level of Directors on R&D Investment Decisions

The variable of education level of directors (EDLEV) has a coefficient value of 0.000 and a sig-t (one-tailed) of 0.485. These results indicate that H5 is not supported so that it can be concluded that the education level of the directors has no effect on R&D investment decisions. This result is probably due to the fact that the board of directors of pharmaceutical companies are dominated by bachelor's and master's degrees so that the education level of directors in the Indonesian pharmaceutical industry is not the main reflection of the quality of competence of the members of the board of directors. This has an impact on the level of education of the Board of Directors, its influence on R&D investment is weak. The results of this study are not in line with the results of the H.-L study. Chen (2012), Zhou et al. (2012), and Kuo et al. (2018) which concludes that the education level of the Board of Directors has a significant positive effect on R&D investment. However, the results of this study are in accordance with the research of Yuan et al. (2012) that the level of executive education in some conditions has no effect on R&D spending.

The Effect of The Education Sector of Directors on R&D Investment Decisions

The variable in the education sector of directors (EDSEC) has a coefficient value of -0.001 and a sig-t (one-tailed) of 0.390. The result indicates that H6 is not supported. Therefore, it is concluded that the education sector of the board of directors has no effect on R&D investment decisions. Thus, the number of boards of directors who have a technical education background as well as economics/management does not have an influence on R&D investment. The data shows that the average value of the board of directors who have technical education as well as economics/management is only 30%. In addition, directors who have undergraduate education in the fields of science and engineering mostly do not continue these fields to the next level but are more interested in studying economics/management. Undergraduates in the fields of science and engineering were dominated by directors who took such education in Indonesia, where in 1980-2000 the quality of research was still very minimal. In fact, the fields of economics and management at the master's level are the most widely taken abroad. Therefore, the directors may be experts in innovation management, especially in terms of budgeting and risk management, but their technical knowledge is still limited so that they are not able to guarantee the accuracy of the innovation concept and the successful implementation of R&D projects. The results of this study are not in line with the research of Scherer & Huh (1992) which states that the education sector of the Board of Directors has a significant positive effect on R&D investment. However, the results of this study can support the research of Dalziel et al. (2011) which states that the education sector of the Board of Directors does not have a significant influence on R&D investment.

The Effect of Financial Slack on R&D Investment Decisions

The financial slack variable (FINSA) has a coefficient value of 0.001 and a sig-t (one-tailed) of 0.039. These results indicate that H7 is supported so that it is concluded that financial slack has a significant positive effect on R&D investment decisions. Thus, an increase in financial slack will increase R&D investment. In line with the pecking order theory, companies seem to have considered the availability of cash on top of short-term debt as a source of minimal risk capital to be allocated in the implementation of R&D projects. Comparing the nominal data on financial slack and R&D spending indicates that the company's average R&D expenditure is only equivalent to 1.94% of the internal funds. The results of this study are expected to be considered by the management to increase the funding of R&D projects independently by using the availability of internal funds.

IV. CONCLUSION

This research was conducted with the aim of studying and developing an understanding of the influence of corporate governance and financial slack on R&D investment by exploring the influence of ownership structure and board characteristics which consequently can affect the expansion or reduction of a company's R&D budget. The results of hypothesis testing concluded that managerial ownership, tenure of independent commissioners, and financial slack proved to have a significant positive effect on R&D investment decisions. Meanwhile, institutional ownership, the proportion of independent commissioners, educational level of directors, and education of directors do not have a significant influence on R&D investment decisions in pharmaceutical companies in Indonesia. The results of this study indicate that the management ownership structure and the characteristics of independent commissioners are elements of corporate governance that are able to play a role in aligning the interests of management and shareholders in making R&D investment decisions in pharmaceutical companies in Indonesia. In addition, this study also found that R & D investment tends to increase when companies have large financial slack.

The results of this study contribute to management in making better R&D investment decisions. For example, a pharmaceutical company with low managerial ownership could try to organize a management stock option program to reward those who succeed in an R&D project.

This research has limitations related to the financial data of pharmaceutical companies for 2019 which are combined with financial data for 2013 - 2018. This is because at the end of 2019 the Covid-19 pandemic

occurred which is likely to have an impact on the operations and performance of pharmaceutical companies in Indonesia. so that the characteristics are different compared to the data in the previous period, there is no official and independent institution that publishes the financial reports of Indonesian foundations periodically. With the Covid-19 pandemic, it is possible that the 2019 pharmaceutical company financial reports will have different characteristics compared to data from previous years so that this might affect the research results. Further researchers are advised to separate data before the Covid-19 pandemic from data after the Covid-19 pandemic and then carry out a comparative analysis related to R&D investment decisions and the factors that influence them in these different conditions. In addition, future research can examine a more varied ownership structure, for example, family ownership structures and foreign ownership structures.

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