

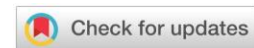
Board Size Moderates the Influence of Research and Development (R&D) Intensity on Financial Performance

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ABSTRACT

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Innovation and R&D activities have been highlighted as important factors influencing corporate growth strategies and corporate financial performance. However, the company's management policy determines the decision to invest in R&D activities, and the board of directors is the leading company's manager. This research examines the effect of R&D intensity on company financial performance, with board size as a moderating variable. This research uses multiple linear regression methods, ordinary least squares (OLS) and moderated regression analysis (MRA) with the application program IBM SPSS Statistics 22 for Windows to explore the hypothesis. The results of this paper show that R&D intensity has a positive and insignificant effect on corporate financial performance. Then, after board size was entered into the regression model, the results showed that board size positively and significantly moderated the influence of R&D intensity on the company's financial performance.

INTRODUCTION

The world is experiencing endless changes, and so is human behaviour. The never-ending development of technology forces people to adapt and change their habits. For example, in the past, most mothers were housewives who only cared for the house, so they had enough time to cook breakfast. However, as time passes, many mothers also work outside the home, so they need more time to cook in the morning. Because of these conditions, many food companies produce and market instant or ready-to-eat food to make it easier for working mothers to prepare breakfast. Thus, companies must adapt and innovate to meet society's changing demands. Companies need to invest in research and development (R&D) activities to produce innovations that can meet society's needs and have superior competitiveness compared to their competitors. According to Ghazi and Rim (2014), investment in R&D is essential to value creation and performance. However, on the other hand, innovation requires quite a lot of costs and is also very risky because only some R&D can produce practical innovations (Quirnbach, 1993). The possibility of failure in creating innovation is never closed for R&D activities.

R&D intensity, or the costs a company incurs to carry out R&D, is a leading indicator in measuring innovation (Busch & Schnippering, 2022). According to several previous researchers, R&D intensity significantly influences a company's financial performance (Artz et al., 2010; Demirel & Mazzucato, 2010; Griliches, 1979). From a macroeconomic perspective, it is found that there is a positive relationship between innovation and economic growth. Meanwhile, from a microeconomic perspective, it was found that there was a positive relationship between innovation and company performance (Coad, 2019). More recent research on innovation emphasizes that the relationship between R&D intensity and company financial performance tends to be more complicated and forms a curved line like an inverted U (Busch & Schnippering, 2022; Bracker & Ramaya, 2011; Coad, 2019).

R&D intensity takes time to improve the company's financial performance. Spending company money on R&D is not without risk because R&D activities require many sunk costs. This makes R&D activities at the beginning of the period appear to have less of a positive impact on financial performance. However, the creation of innovation from R&D activities is believed to provide benefits for companies in the form of competitive advantages, which positively influence the company's financial performance (Chen & Wu, 2020).

The decision to invest in R&D activities is determined by company management policy. Traditionally, shareholders control a company's direction, policies, and activities. Shareholders elect members of the board of directors (BOD), and then the BOD elects the Chief Executive Officer (CEO). The CEO's function is as a company official to manage company operations in the best interests of shareholders (Ross et al., 2019). Thus, BOD is an extension of shareholders who determine company strategy, including making decisions to invest in R&D activities.

The relationship between shareholders and management is called an agency relationship. This relationship always occurs whenever the business owner (principal) employs another person (agent) to represent the principal's interests. The theory that refers to the relationship between business owners (principals) and other people (agents) is called agency theory (Kyere & Ausloos, 2020). In an agency relationship, there is always the possibility of a conflict of interest between the principal and the agent. Such conflicts are called agency problems (Ross et al., 2019). Agency problems occur in companies when one or several board members act solely in their interests and not in the interests of shareholders (Yoon et al., 2022). Agency problems can become more severe because they are related to risky investments in R&D activities that require long payback periods and are very company-specific (Ghazi & Rim, 2014). To control management opportunism and ensure that R&D investment is carried out in the interests of shareholders, it is necessary to establish a solid corporate governance mechanism, where most of this mechanism will be represented by the board of directors. Previous research states that

robust corporate governance mechanisms can reduce agency costs and prevent agency problems (Yoon et al., 2022).

The board of directors plays a vital role in the corporate governance structure (Fama & Jensen, 1983) because the BOD is responsible for the company's development and must act in the company's interests, especially shareholders. According to Vu et al. (2018), the size of the board of directors (board size) is considered a determining factor in the proper functioning of the BOD. Generally, shareholders think that a large board size will tend to produce effective monitoring and then have an impact on improving company performance (Kyere & Ausloos, 2020). However, a large board size also needs to improve, increasing the possibility of conflict between members of the board of directors. In addition, increasing the board of directors members results in increased BOD capabilities and agency costs related to information search and decision-making (Vu et al., 2018).

This research will examine the moderating effect of board size and relate it to agency theory to test how significant the impact of R&D is on the financial performance of companies in Indonesia. This research selected companies listed on the Indonesia Stock Exchange (BEI) and classified in the category of Sub Sector D2 Food and Beverage (Primary et al.), as well as Sub Sector F211 Pharmacy (Health Sector) in 2017-2021, as research samples.

LITERATURE REVIEW

Agency Theory

Agency theory refers to the relationship between shareholders (principals) and other people (agents). Shareholders delegate some of their decision-making authority to agents so that agents can make decisions on behalf of shareholders. This theory attempts to resolve problems arising from differences in interests between company management and owners (Kyere & Ausloos, 2020).

The board of directors and shareholders must have aligned interests to achieve better financial performance. One of the factors for better financial performance is to reduce agency costs. Agency costs arise due to competing interests (conflict interests) between the principal and the agent, including all expenses related to resolving differences of opinion and managing the relationship between the two parties (Florackis & Ozkan, 2008). There are two types of agency costs, namely:

1. Direct agency costs are costs that the company directly incurs. These expenses include things that benefit the agent while ignoring the principal's interests and costs incurred due to monitoring the agent's behaviour so that the relationship between the principal and agent remains harmonious, for example, external audit fees.

2. Indirect agency costs are costs that refer to lost business opportunities. For example, shareholders want to invest in an R&D activity that will increase company profits if successful. However, agents are concerned about the risks as future events could worsen the company's finances. When agents do not carry out investments with high risk and return, shareholders lose the opportunity to gain these profits. This is an indirect agency cost because it creates a difference in income between the principal and the agent, but the value of the cost cannot be measured directly.

By reducing agency costs, it will have an impact on the company's better financial performance.

Financial Performance

Financial performance is described as a way that aims to analyze a company's efficiency and effectiveness in obtaining sure profits and cash flows. The company's financial performance can also be used to see growth and financial development potential. The company's success is determined by achieving predetermined performance levels (Vu et al., 2018). Financial performance is presented using financial ratios, and in this research, return on assets (ROA) is used as a proxy for financial performance. This ratio was chosen because it assesses how management performance can generate profits by optimally utilizing company assets.

Research and Development (R&D) Intensity

Innovation within a company is defined as a significant improvement in product quality or improvement in the production process (Busch & Schnippering, 2022). To obtain this innovation, research and development activities are needed. Research and development (R&D) activities are efforts to create and improve a product to get better results to increase the value of the product (Basgoze & Sayin, 2013). Successful R&D will produce new products or services, enabling the company to differentiate itself from its competitors. In addition, successful R&D investments can increase sales and profits for the company. The leading indicator in measuring innovation is R&D intensity, or the costs a company incurs to carry out R&D. R&D intensity in this research is measured by dividing total R&D costs by total sales. This formula reflects the amount of R&D costs incurred by the company (Busch & Schnippering, 2022).

Therefore, by spending R&D costs on the company, it is hoped that it can produce valuable innovations to maintain its competitive advantage. A company's competitive advantage will attract buyers, thereby allowing for increased sales and profits. This profit increase will be reflected in financial performance, which will also increase.

Board Size

The board of directors plays a vital role in the corporate governance structure. The BOD has the authority to hire, fire, and compensate top managers and to ratify and monitor important decisions (Fama & Jensen, 1983). The board of directors (board size)

is considered a determining factor in the proper functioning of the BOD (Vu et al., 2018). Board size is the number of board members in a company (Kyere & Ausloos, 2020).

In this research, board size is the number of board members on a company's board of directors. According to Kyere and Ausloos (2020), increasing board size also improves a company's financial performance because a large board size can help properly allocate managerial work to increase growth and financial performance. Apart from that, a large board size can reduce the company's business risks because the knowledge and experience possessed by the members of the board of directors are also more diverse. However, too many board members can cause conflicts of interest within the company due to coordination and communication problems between board members, excessive control over top managers, and higher salary costs incurred by the company. On the other hand, a small board size can still facilitate control over managers, and the salary costs incurred by the company are also less. However, they may need to be more efficient in managing manager power (Vu et al., 2018).

Large or small board sizes can impact the company's financial performance. This is because both large and small board sizes have advantages and disadvantages. Therefore, companies need to determine the optimal board size so that the company can improve its financial performance.

R&D and Financial Performance

Investment in intangible assets in terms of R&D is expected to have a positive impact on the company, whether in the form of innovation in its products or innovation in its production processes. On the other hand, innovation can be costly and risky because only some of the effort exerted by R&D activities can produce valuable innovations. The benefits and side effects of R&D activities make the relationship between R&D and a company's financial performance like a double-edged sword. Previous studies have analyzed the influence and relationship between R&D expenditure and company financial performance. Based on previous research, it can be concluded that the argument is divided into two thoughts, namely:

1. The first point of view is that R&D reduces financial performance. This shows that R&D intensity hurts the company's financial performance (Busch & Schnippering, 2022). This thinking is based on the expensive sunk costs of R&D and the relatively high risk of failure, reducing the company's financial performance. Moreover, if R&D is considered successful, achieving the desired benefits will take a long time.
2. The second point of view is that R&D improves financial performance. This means that R&D intensity positively influences the company's financial performance (Nemlioglu & Mallick, 2021; Chen & Wu, 2020; Vishwanathan et al., 2020). Innovation is one way to solve sales problems and get creative solutions that positively impact the company's financial performance (Vairavan & Zhang,

2020). Even though there are risks in R&D activities, it is believed that R&D can benefit companies, for example, by the emergence of new technology, increased productivity, and innovation in production processes that reduce production costs. This can improve the company's financial performance.

The company's purpose in conducting R&D is in the interests of shareholders. Allocating expenditure for research and development is believed to produce valuable innovations, such as developing technology that can save production costs, improve the quality of products and services, or discover new products. Then, this innovation will increase the company's competitive advantage. By increasing competitive advantage, it can encourage increased sales. An increase in sales will increase the company's profitability. Empirical evidence from previous research finds that all innovation activities will increase company profitability (Nemlioglu & Mallick, 2021). With increasing profitability, the potential for increasing financial performance is also more significant so that, in the end, the company can provide maximum profits for shareholders.

Every product sold by the company has a life cycle (product life cycle), which consists of four phases, starting from the introduction phase, growth phase, maturity phase and finally, the decline phase. When a product enters the maturity phase, marked by product sales starting to have difficulty increasing, the company needs innovation to attract market attention so that it is equal to its competitors. The "innovate or die" view suggests that companies need to prioritize innovation (Eisenhardt & Martin, 2000; Teece et al., 1997). Suppose the company ignores the role of innovation or does not have innovation. In that case, the products released by the company will be trapped in a decline phase and lose their competitive advantage (Ahuja & Lampert, 2001). Products in a decline phase will experience a reduced value and then become outdated, obsolete, and ultimately challenging to sell, resulting in reduced company profits or losses. This situation can have an impact on worsening financial performance. So, innovation plays a vital role in achieving superior financial performance.

This research examines the impact of R&D activities on financial performance in companies. By utilizing the results of R&D, which are unique and not easily imitated, companies can offer products that are different from their competitors so that the company has a competitive advantage to compete. This explains that spending on higher R&D costs can increase company income in the future, and the company's financial performance will also increase. For these reasons, the hypothesis is formulated as follows.

H1: R&D intensity has a positive effect on Financial Performance.

The Moderating Effect of Board Size on the Impact of R&D on Financial Performance

Board size, the number of board members on a company's board of directors, is an essential component of corporate governance. The board size in a company is considered a determining factor in the proper functioning of the BOD (Vu et al., 2018). The BOD is responsible for supervising, managing and directing the company towards its goals and protecting the interests of shareholders, including the company's financial performance (Sari et al., 2022). The board of directors' achievements in managing the company in the interests of shareholders can be seen through financial performance.

A large board size is often associated with more profound intellectual knowledge, thus helping decision-making and improving performance (Arora & Sharma, 2016). The BOD's role in improving financial performance lies in its policy (Khatib & Nour, 2021). Therefore, whether the board size is large or small may influence the company's financial policies and decisions, including the decision to carry out R&D activities.

Moderating variables provide information about how, why, or when a phenomenon occurs and are the third variable that influences the relationship between the independent and dependent variables; that is, they can increase or decrease the strength of the relationship or even change the direction of the relationship (Bennet, 2000). In this research, board size acts as a moderating variable because the diverse expertise of each member of the board of directors will allow the company to use the right strategies and make the right decisions towards company goals, resulting in superior financial performance. Thus, this research formulates the following hypothesis.

H2: Board size moderates the influence of R&D intensity on financial performance.

Conceptual Framework

A conceptual framework containing a research perspective will help describe what the researcher focuses on. Apart from that, it also serves as a reference in forming hypotheses and solving problems being researched. The conceptual framework of this research is shown in Figure 1 as follows:

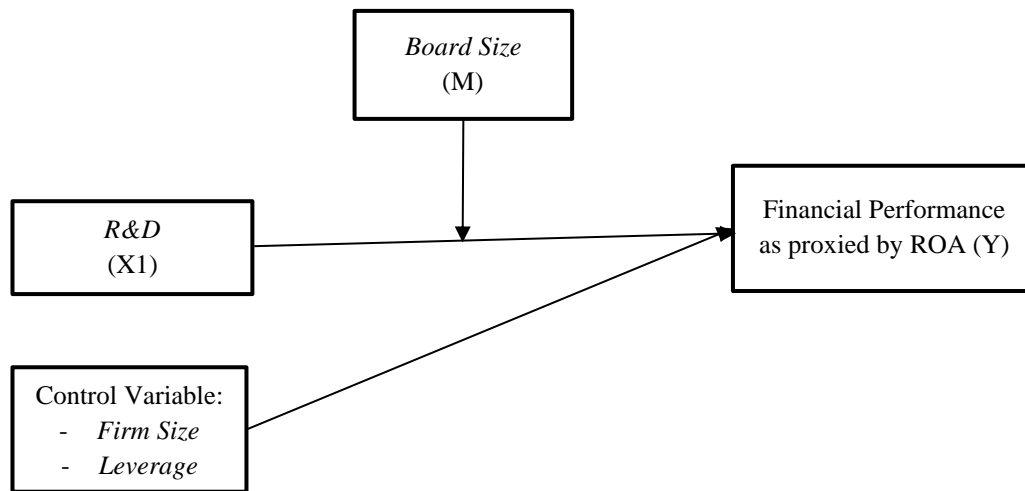


Figure 1. Research Conceptual Framework

METHOD

This research examines the impact of innovation on financial performance and the moderating effect of board size, with the selected population being secondary data from companies listed on the Indonesia Stock Exchange (BEI) from 2017 - 2021. The approach used is quantitative, using time series data. The statistical analysis method used in this research is multiple linear regression OLS (Ordinary Least Square) and MRA (Moderated Regression Analysis), assisted by applying the IBM SPSS Statistics 22 for the Windows program.

Data and sample

Based on the categorization from IDX-IC, two sectors are selected as research samples, namely the first from Sector D Primary Consumer Goods, Sub Sector D2 Food and Beverages, then the second from Sector F Health, Sub Sector F211 Pharmacy. Sampling was determined using a purposive sampling technique. After applying several specific criteria, 65 observation data were obtained consisting of 8 companies in the D2 Food and Beverage Sub-Sector category and five companies in the F211 Pharmacy Sub-Sector category. The reason for choosing to sample is because it starts with increasing public awareness of health, which makes people more selective in consuming food, drinks, vitamins and medicines, so companies need to carry out R&D to fulfil consumers' desires and show a good image in the eyes of the public. Sampling data was obtained from the site www.idx.co.id, and some information may be obtained from yahoofinance.com.

Operational Definition and Variable Measurement

All variables are measured using a ratio scale. The measurements of this research variable are presented in Table 1 as follows:

Table 1. Measurement and Operational Definition of Research Variables

| Variable | Operational Definition | Measurement | Scale |
|-------------------------------|--|---|-------|
| Dependent variables: | | | |
| Financial Performance (Y) | Return on Assets (ROA). ROA shows the company's potential to generate profits by optimally utilizing all company assets. | Net profit divided by total assets. | Ratio |
| Independent Variables: | | | |
| R&D Intensity (X) | The amount of R&D costs incurred by the company for five consecutive years. | Total R&D costs are divided by total sales. | Ratio |
| Moderation Variable: | | | |
| Board Size (M) | The number of members of the board of directors in the company | Total members of the board of directors at company i in year t. | Ratio |
| Control variable: | | | |
| <i>Leverage</i> | The Debt to Assets Ratio (DAR) measures the amount of company funding using debt. | Total debt divided by total assets | Ratio |
| <i>Firm Size</i> | The size of the company | Log (asset total _{i,t}) | Ratio |

Analysis Model

The analysis model in this research is written in the following equation:

Analysis model for H1:

$$ROA_{i,t} = \beta_0 + \beta_1 R\&D_{i,t} + \beta_3 LEV_{i,t} + \beta_4 FSIZ_{i,t} + e_{i,t}$$

Analysis model for H2:

$$ROA_{i,t} = \beta_0 + \beta_1 R\&D_{i,t} + \beta_2 BSIZ_{i,t} + \beta_1 R\&D_{i,t} * \beta_2 BSIZ_{i,t} + \beta_3 LEV_{i,t} + \beta_4 FSIZ_{i,t} + e_{i,t}$$

Informations:

- $ROA_{i,t}$: The financial performance of company i in year t is proxied by ROA
- β_0 : Constanta
- $\beta_1 - \beta_4$: Regression coefficient
- $\beta_1 R\&D_{i,t}$: Company i's research and development intensity in year t
- $\beta_2 BSIZ_{i,t}$: Number of members of the board of commissioners of company i in year t
- $\beta_3 LEV_{i,t}$: The control variable is the leverage level of company i in year t
- $\beta_4 FSIZ_{i,t}$: Control variable firm size company i in year t
- $\beta_1 R\&D_{i,t} * \beta_2 BSIZ_{i,t}$: Interaction between R&D intensity and board size in company i in year t
- $e_{i,t}$: Error or residual value of company i in year t

RESULT AND DISCUSSION

RESULT

The objects of this research are companies registered on the IDX from 2017 to 2021, then categorized into Sub-Sector D2 Food and Beverages and Sub-Sector F211 Pharmaceuticals, and disclose R&D costs in their financial reports. The analysis will not include companies that are included in the research period and have favourable R&D costs but are not disclosed in the annual financial report. So, the sample obtained by this research was 13 companies with 65 observation data.

Descriptive Statistics

Descriptive statistics for each variable used by this research, from 2017 to 2021, are presented in Table 2 as follows:

Table 2. Descriptive Statistics

| | Mean | Std. Deviation | Minimum | Maksimum | N |
|--------------|---------|----------------|---------|----------|----|
| ROA | 5.4112 | 6.05439 | -6.80 | 18.23 | 65 |
| R&D | .7109 | 1.02129 | 0.02 | 3.64 | 65 |
| Leverage | 38.9269 | 37.44569 | 12.90 | 289.99 | 65 |
| Firm Size | 12.0034 | 3.01381 | 11.93 | 13.56 | 65 |
| Board Size | 4.8769 | 2.19735 | 2 | 10 | 65 |
| RDxBoardSize | 3.4342 | 5.27826 | 0.06 | 19.50 | 65 |

Source: Output IBM SPSS Statistics 22 for Windows, 2023

Classic assumption test

1. Normality Test

One way that can be used to test data normality is the Kolmogorov-Smirnov test. Then, after the Kolmogorov-Smirnov test was carried out on the research sample, a significance value of 0.200 (>0.05) was obtained, meaning this study had a normal data distribution.

2. Multicollinearity Test

The multicollinearity test that was carried out showed a VIF value < 10 for each independent variable and a tolerance value > 0.1 . The results of the multicollinearity test indicate that in the research regression model, there is no multicollinearity between the independent variables.

3. Autocorrelation Test

The autocorrelation test was carried out using Durbin-Watson (DW) statistics. The DW test results showed 2,454 during OLS analysis and 2,435 during MRA analysis. This situation indicates that in this study, there was no autocorrelation..

4. Heteroscedasticity Test

The results of the heteroscedasticity test are shown in Figure 2 and Figure 3. In the scatterplot diagram, it can be seen that the points above and below 0 on the Y axis are

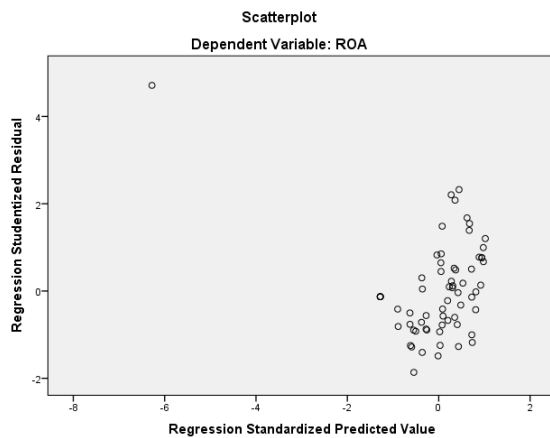


Figure 2
Heteroscedasticity Test With OLS Methode

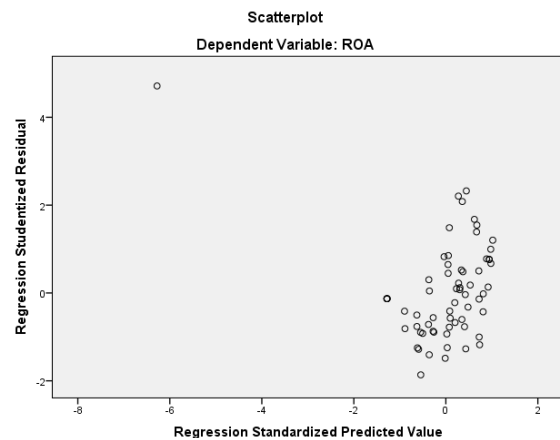


Figure 3
Heteroscedasticity Test With MRA Methode

distributed randomly, and there is also no specific pattern found, meaning that there is no heteroscedasticity in the regression model. Some of the data appears clustered due to the large amount of data studied, but this situation still indicates the feasibility of using a regression model in this research.

Regression Analysis Results

Processing research sample data using the ordinary least squares (OLS) multiple linear regression method aims to find out how strong the correlation is between two or more variables. Meanwhile, data processing using the moderated regression analysis (MRA) method seeks to find out whether the moderating variable has the effect of increasing or decreasing the influence of the independent variable on the dependent variable. Data processing uses the help of the IBM SPSS Statistics 22 for Windows program application, and results are obtained as presented in Table 3:

Table 3. Regression Analysis with OLS and MRA

| Dependent Variable: | Financial Performance (ROA) | | | | | |
|---------------------|-----------------------------|--------|--------|-----------------------|--------|---------|
| Regression Model: | OLS (Without Moderasi) | | | MRA (With Moderation) | | |
| | Coefficient | t | Sig. | Coefficient | t | Sig. |
| (Constant) | 0,541 | 0,224 | 0,823 | 1,695 | 0,695 | 0,490 |
| R&D | 0,354 | 0,574 | 0,568 | -3,662 | -2,121 | 0,038** |
| Board Size | - | - | - | -0,457 | -1,075 | 0,287 |
| R&D * Board Size | - | - | - | 0,812 | 2,496 | 0,015** |
| Leverage | -0,940 | -5,609 | 0,000* | -0,091 | -5,008 | 0,000* |
| Firm Size | 0,688 | 3,374 | 0,001* | 0,795 | 3,160 | 0,002* |
| R ² | 0,385 | | | 0,444 | | |

Source: Output IBM SPSS Statistics 22 for Windows, 2023

*, **, ***, Significant on 1%, 5%, 10%

Based on Table 3, the OLS analysis results show a positive influence of R&D intensity on ROA, but the impact is insignificant because the Sig. is 0.568, where the value is > 0.05 . The R square value is $R^2 = 0.385$, which means that R&D intensity influences ROA of only 38.5%, and other factors affect the rest. Thus, although the impact of R&D intensity on financial performance is less significant because it has a positive coefficient value (0.354), it means that R&D intensity has a positive effect on financial

performance, so the first hypothesis (H1) is accepted. The test results in this study are similar to the results of research by Ghazi and Rim (2014), Vishwanathan et al. (2020), Chen and Wu (2020), and Nemlioglu and Mallick (2021) who also argue that R&D intensity has a positive impact on ROA. Thus, although there are risks in R&D activities, it is believed that R&D can benefit companies by the emergence of new technology, increased productivity, or innovation in production processes, which can reduce production costs.

When the moderating variable board size was included in the regression model, there was an increase in the R² value from 0.385 to 0.444. This means that the board size variable strengthens the positive influence of R&D intensity on financial performance as proxied by ROA. Then, as presented in Table 4.2, the interaction between R&D intensity and board size is at 0.015 (Sig. < 0.05), and the coefficient value is 0.812. This figure means that board size positively and significantly moderates the influence of R&D intensity on financial performance as proxied by ROA, implying that the second hypothesis (H2) is accepted. Thus, when a company has a large board size accompanied by high R & D intensity, the company will likely produce superior financial performance than companies with low R & D intensity and a small board size. Referring to the argument of Arora and Sharma (2016), large board size is often associated with more profound intellectual knowledge, thus helping in decision-making, which improves performance.

DISCUSSION

This research wants to examine the moderating effect of board size and relate it to agency theory to test how significant the impact of R&D is on financial performance, then focuses on companies listed on the Indonesia Stock Exchange (BEI) and classified in the Food and Beverage Sub-Sector D2 category (Consumer Goods Sector Primary), as well as Sub-Sector F211 Pharmacy (Health Sector) 2017-2021. The results of the OLS analysis in this study show that the direct influence of the R&D variable on financial performance is positive but less significant. This is contrary to the research results of Busch and Schnippering (2022), who argue that apart from expensive sunk costs and the relatively high risk of failure in R&D activities, the negative influence of R&D on a company's financial performance can also be caused by each company's strategy. Different. In other words, each company will adjust its R&D strategy according to its focus on achieving competitive advantage through differentiation or cost leadership. According to Porter (1980), lower R&D investment will support the company in achieving a cost leadership position among its competitors, thereby improving its financial performance. Successful R&D also takes a long time to bear fruit, and only investments that meet specific capitalization requirements can be processed as assets.

Some R&D expenditures recorded as expenses can reduce the company's profits for the period in question. So, in the short term, investment in R&D looks less profitable.

On the other hand, the results of this study are in line with research by Nemlioglu and Mallick (2021), Chen and Wu (2020), and Vishwanathan et al. (2020), who argue that all types of innovation can improve a company's financial performance, whether innovation in the products sold by the company, innovation in intangible assets, or innovation in the quality of the company's management itself. Vairavan and Zhang (2020) also argue that innovation can be a way to solve sales problems and get creative solutions that have a positive impact on the company's financial performance. Because this research focuses on manufacturing companies operating in the food, beverage and pharmaceutical industries, investment in R&D should be a strategy that cannot be ruled out. Changes in people's mindsets and lifestyles mean that companies need new developments or modifications that are more competitive in the global market for food, beverage, medicine and vitamin products to achieve better financial performance (Lee and Choi, 2015). Innovation in new things in food, drinks and pharmaceuticals can be one way to secure competitiveness in meeting people's needs. Thus, spending on higher R&D costs can increase company revenue in the future, improving the company's financial performance.

The less significant positive impact of R&D on financial performance becomes more robust after the board size variable is included in the regression model. The results of the MRA analysis show that board size positively and significantly moderates the influence of R&D intensity on financial performance as proxied by ROA. The results of this research are in line with arguments from several previous studies (Khatib & Nour, 2021; Kyere & Ausloos, 2020; Vu et al., 2018) that board size is a corporate governance mechanism that plays a significant role and is responsible for overseeing company management decisions. (Khatib and Nour, 2021). In addition, a larger board size is considered better because the company has more diverse skills, abilities and experience, has better monitoring mechanisms, has more external relationships, and is better able to control oppositional behaviour from company management (Khatib & Nour, 2021; Arora & Sharma, 2016).

This research differs from the opinion of Jensen (1993), that a small board size provides better supervision because agency conflicts between shareholders and the board of directors can be reduced. The larger the board size, the greater the conflict of interest faced (Ghazi & Rim, 2014). However, the principal (shareholders) can limit divergence from the interests of the agent (board of directors) by setting appropriate incentives and by incurring monitoring costs that have been designed to limit the agent's deviant activities (Jensen & Meckling, 1976). Fama and Jensen (1983) believe that the role of the board of directors in monitoring managerial behaviour is more effective with large board sizes. Because companies with a large board size have a broader spectrum of knowledge and capabilities, decisions regarding R&D activities can be made more effortful so that

only a few sunk costs are incurred, and the company obtains valuable innovations, improving financial performance. Companies with smaller boards have a more limited spectrum of knowledge and capabilities. Hence, the intensity of R&D is lower due to more significant concerns about the risk of failure in R&D activities.

CONCLUSION

This research uses board size as a moderating variable and connects it with agency theory to test how significant the impact of R&D intensity is on a company's financial performance; and also uses leverage and firm size, which act as control variables. The samples for this research are companies registered on the IDX and categorized as Sub Sector D2 Food and Beverages (Primary et al.) and Sub Sector F211 Pharmaceuticals (Health Sector) from 2017 to 2021. Next, the results of this research hypothesis test are summarized in the following points:

1. As proxied by ROA, R&D intensity has a positive but less significant impact on financial performance. However, R&D intensity still positively influences financial performance, so the first research hypothesis (H1) is accepted..
2. Board size positively and significantly moderates the influence of R&D intensity on company financial performance as proxied by ROA, so the second hypothesis (H2) is accepted. If linked to agency theory, the strategy and decision of the board of directors to carry out R&D is in the company's interests, where high intensity will be a source of increased company income in the future.

This research is expected to provide information for non-financial companies regarding the impact of R & D intensity and board size on the company's financial performance so that it can be used as additional information in managerial decision-making. This research implies that board size can increase the impact of R&D intensity on a company's financial performance. The limitation of this research is that it cannot precisely determine the optimal number of members of the board of directors. Apart from that, the analysis carried out in this research also did not separate the periods during the pandemic and before the pandemic.

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