

Role of R&D Investment on Future Performance: Evidence From Malaysian Companies

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ABSTRACT

R&D Investment is an issue that is still interesting in business research today because it constantly explores company development in terms of technology and innovation. Our study intends to investigate the impact of R&D investment on Malaysian company performance in the future. This empirical study uses company financial statement data accessed via the OSIRIS database. The sample is a non-financial company in Malaysia from 2003 to 2019. This study evaluates The hypothesis using unbalanced panel data regression on 460 company years of observation. Our findings indicate that R&D investments have a degrading impact on the performance of Malaysian companies in the future. These findings indicate that companies in developing countries such as Malaysia have yet to give special attention to investing in R&D as the main business strategy.

Keywords: R&D investment; future performance; innovation; emerging country.

INTRODUCTION

R&D investment is a company's effort to increase competitive advantage through research and development to create innovations [16] that support improving the company's long-term performance [23]. Investment in R&D plays a role in influencing future company productivity, sales growth, and competitiveness. R&D investment plays a key role in the advancement of enterprise innovation. This is because the rapid rise of technology in the global business environment encourages businesses to innovate to increase or retain their competitiveness in the market [2], [11], [15], [17], and [21].

There are several differences in the research results on the role of investment in R&D in future performance. For example, [3], [5], and [19] illustrate the positive relationship that exists between R&D and the growth of financial performance and future productivity of the company. [24] found that R&D expenditures positively affect a company's future performance. [13] discovered that investment in R&D can lessen variations in future performance, including financial and sales results. [3], [5], [19], and [22], in their research, concluded that companies that spend on R&D will gain positive results for the company in terms of increased company performance.

In other studies, there are differences in results regarding the relationship between R&D investment and performance. [18] Moreover, [24] found that companies that spend on R&D fare worse than others through reduced profitability. Therefore, the

different results of the study raise questions about the influential role of R&D investment on performance. Investment in R&D may only yield profits for the company after a period of time.

There is debate about whether R&D spending affects a company's success. This study argues that R&D may not affect performance in the current period because it takes time to demonstrate new product development, production techniques, and information technologies [16]. Additionally, the R&D process might only sometimes satisfy the market's demands because it is uncertain, risky, and expensive [6]. Investment in R&D is risky, but the results that can be felt in the long term can have an impact on productivity and effectiveness, lessen income variation, and produce more significant future profit margins [3], [18], [24] It is regarded as the true value of R&D investment.

The increasing competition in the business environment means that business will increase their R&D spending to support innovation and R&D capabilities [15], [17]. However, a precise evaluation of the effectiveness of R&D spending is also necessary because investment in R&D can increase spending on science, technology, and innovation. Therefore, because R&D raises business expenses, there is a risk element for the company without guaranteed profits [8].

Most studies on the impact of R&D on business performance are generally carried out in developed countries or industrialized countries [1], [2], [3], [4], [5], [6], [11], [12], [16]. However, fewer studies have conducted analyses on companies in developing

countries. One of the ASEAN emerging nations with a high innovation index is Malaysia, which is just below Singapore as a developed country [20]. In detail, the innovation index obtained by Malaysia over the last ten years is at 43.61, which is the highest innovation index compared to nine other ASEAN countries. The average rate of continuous economic growth has reached more than 6% per year for the last ten years, demonstrating that despite challenges to the global economy, Malaysia's economic growth momentum is still strong. However, apart from that, when viewed from the research and development expenditure index, Malaysia only has 0.86% of the national GDP [20]. Malaysia spends only 0.86% of its annual income on research and development every year. This shows that Malaysia must considerably expand its local innovation potential. Based on these conditions, the research questions about R&D investment influencing the company's performance in the Malaysian context have greatly interested researchers and policy-makers. To fill this gap, our study needs to investigate companies listed in Malaysia.

Although specific studies have indicated a favourable role for R&D investment [1], [14], [18], [19], [22], [23], there has been little research, especially in Malaysia, that explores the role of R&D investment in a company's future performance. As a result, it is anticipated that this research will add to the theoretical framework in two ways: (1) by being the first to demonstrate the impact of R&D investment on a company's future performance in developing nations and (2) by using a study involving a sample of Malaysian companies to persuade investors to think twice about their investment activities. Our results showed that perspective and knowledge about the role of R&D investment negatively affect the company's future performance. This negative effect of R&D on future performance indicates that R&D investment is a sizeable investment that companies must take to achieve long-term benefits. Still, companies in Malaysia have yet to be able to utilize R&D investment optimally.

This study provides several contributions. First, theoretically, many studies of R&D investment and future performance are carried out in developed countries [1], [2], [3], [4], [5], [6], [11], [12], [16], while research in a developing country is still limited. Second, previous studies have generally used R&D expenditure as a proxy for R&D investment [1], [2], [5], [11], [14], [18], while this study uses R&D expense and R&D assets to measure R&D investment. [9] argue that R&D expense and R&D asset are important components that comprehensively measure R&D because both have the same contribution to R&D implementation.

There are five sections to this article. A review of the literature and hypothesis development is

included in Section 2. Data and the research method are described in Section 3. The results are explained in Section 4. Conclusions are presented in Section 5, along with research implications.

Literature Review and Hypotheses Development

The theoretical foundation of the knowledge-based view (KBV) states that knowledge is a unique, heterogeneous resource between companies, thus making knowledge difficult for other companies to imitate [10]. This research integrates the basic premise of KBV with R&D as a knowledge resource that becomes the company's foundation to continue to innovate in the face of competition. R&D is one of the most commonly used measures of innovation, and this research considers R&D activity as the primary mechanism for building a firm's knowledge base and innovation to support future performance.

Investment in R&D is utilized to gain a competitive edge and sustain long-term growth and advanced technology [15], which can enhance performance [7], [18], [24]. Numerous studies have discovered a positive relationship between R&D and company performance. [3], [5] and [19] illustrate the positive relationship between R&D and the growth of financial performance and future productivity of the company. [24] found that R&D expenditures positively affect a company's future performance. [13] discovered that investment in R&D can lessen variations in future performance, including financial and sales results. [3], [5], [19], and [22], in their research, concluded that companies that spend on R&D will gain positive results for the company in terms of increased company performance. In light of the study as mentioned above, the hypotheses built in this study are:

H₁: R&D investment positively influences the company's future performance.

The hypothesis testing model developed in this research is described using the following equation:

$$Perf_{it+1} = \alpha_1 + \beta_1 R\&D_{it} + \beta_2 Size_{it} + \beta_3 CFO_{it} + \beta_4 Lev_{it} + \beta_5 Sale_{it} + \varepsilon_{1it} \dots (1)$$

RESEARCH METHOD

Sample

The sample for this study was non-financial companies in Malaysia for 2003-2019, obtained from the OSIRIS database. Companies in the financial industry were excluded from the sample because they have different accounting treatments and interpretations of financial reporting. The research sample shown in Table 1 is a company with specific

criteria according to what the test needed. Data from 102 companies is available in OSIRIS. However, 45 companies do not fit the criteria. Specifically, some companies do not have complete annual financial reports, so the final sample that meets the criteria for testing is 57 companies.

Because the research data used is unbalanced panel data, not all companies have the same years from 2003 to 2019, so the number of observations is 460 firm years. The description of this research sample is shown in Table 1.

Table 1. Description of The Research Sample

Sample Criteria	Total
Malaysian non-financial company with R&D data	102
Companies that do not display a full annual report	45
Companies that can be analyzed	57
The number of observations of the research sample (unbalanced panel data) 2003-2019	460 firm years

Source: OSIRIS Database

Variables Measurement

The research consists of dependent, independent, and control variables, and Table 2 explains the operational definition of each variable.

Table 2. Variables Measurement

Variables	Measurement	Source
Dependent:		
Future Performance ($Perf_{it+1}$)	Return On Asset (ROA): $\frac{EBIT_{it+1}}{\text{Total Assets}_{it+1}}$	Osiris
Independent:		
R&D Investment ($R\&D_{it}$)	$\frac{\text{R\&D Expense}_{it} + \text{R\&D Asset}_{it}}{\text{Total Assets}_{it}}$	Osiris
Control Variables:		
Size ($SIZE_{it}$)	$\text{Ln of Total Assets}_{it}$	Osiris
CFO (CFO_{it})	$\frac{\text{Operating Cashflow}_{it}}{\text{Total Assets}_t}$	Osiris
Leverage (LEV_{it})	$\frac{\text{Total Debt}_{it}}{\text{Total Assets}_{it}}$	Osiris
Sales ($SALE_{it}$)	$\frac{\text{Total Sales}_{it}}{\text{Total Assets}_t}$	Osiris

Dependent Variable

Future performance was used as the dependent variable. [24] explain that the company's future performance can be seen in its financial performance in the following year. Future performance ($Perf_{it+1}$) used refers to [24], which was measured using Return on Assets (ROA_{it}) firm i in the year of $t+1$.

Independent and Control Variables

This study uses R&D investment ($R\&D_{it}$) as an independent variable measured from R&D expenses plus R&D assets by total assets. This measurement refers to [2], which explains that R&D investment can use R&D expense and asset items to capture complete R&D information [2]. The control variable consists of company size ($SIZE_{it}$), operating cash flow (CFO_{it}), Leverage (LEV_{it}), and sales ($SALE_{it}$).

RESULTS AND DISCUSSION

Descriptive Statistics

Table 3 shows the distribution data of each variable in this study. The average of future performance ($Perf_{it+1}$) is 0,056% by total assets with a minimum value of -1,51 and a maximum of 1,28 (standard deviation 0,13), which indicates that the company has a relatively small company performance. The average R&D investment ($R\&D_{it}$) is 0,17% with a maximum value of 0,42% and a standard deviation of 0,04. This shows that the average company has a reasonably low R&D value. The average value of company size ($Size_{it}$) is 11,35 with a minimum value of 7,65 and a maximum of 17,39 (standard deviation of 1,86), which indicates that, on average, the company has a relatively small company size because the resulting average value tends to close to the minimum value.

Table 3. Descriptive Statistics

Variable	Obs	Min	Mean	Max	Std. Dev
Perf	460	-1.51	.056	1.28	.128
R&D	460	.00	.017	.42	.04
Size	460	7.65	11.35	17.39	1.86
CFO	460	-.14	.08	.49	.083
Lev	460	.02	.39	3.14	.28
Sale	460	.11	.80	3.37	.41

The cash flow from the operation has an average value of 0.08 with a minimum of -0.14 and a maximum of 0.49 (standard deviation of 0.083). The leverage has an average value of 0.39 with a minimum of 0.02 and a maximum of 3.14 (standard deviation of 0.28), which means that, on average, companies have high leverage. The average sales value ($Sale_{it}$) is 0.80 with a minimum of 0.11 and a maximum value of 3.37 (standard deviation of 0.41), which means that the company has relatively high sales on average.

Correlation Matrix

The correlation test results in Table 4 show that the correlation coefficient between the main

variables ($Perf_{i+1}$, $R\&D_{it}$, $Size_{it}$, CFO_{it} , Lev_{it} , $Sale_{it}$) is $< 50\%$. To determine whether there is considerable multicollinearity between independent variables, variance inflation factors (VIFs) were calculated. Our results show that no VIF exceeds 5.0, and all the variables tested have an average VIF of 1.1, indicating that the interpretation of the test findings can be done without multicollinearity issues.

Table 4. Correlation matrix

Var.	Perf	R&D	Size	CFO	Lev	Sale
Perf	1					
R&D	-.184**	1				
	.000					
Size	.092*	-.355**	1			
	.049	.000				
CFO	.208**	-.055	-.021	1		
	.000	.242	.655			
Lev	-.059	-.068	.232**	-.149**	1	
	.206	.147	.000	.001		
Sale	-.018	-.114*	-.050	-.009	.142**	1
	.707	.014	.281	.844	.002	

This results calculated by using equation number 1;
Number of observation : 460; Variables was refers to
Table 2; ***sig 1%; **sig 5%; *sig 10%

The Effect of R&D Investment on Future Performance

Table 5 is the regression result to test the effect of R&D investment on future performance. The test results show that the R&D investment significantly influences future performance ($p < 0,01$). Still, this effect has a negative coefficient (-0.525), which means that the R&D investment has a negative impact on *future performance*. This shows that investment in R&D still needs to pay off on the future performance of companies in Malaysia.

Table 5. Regression Results of R&D on Future Performance

Variables	Future Performance
Const	.017
R&D	-.525***
Size	.003
CFO	.299***
Lev	-.023
Sale	-.008
R^2	0,279
Adjusted R^2	0,068
F -statistic	7,674
p -value (F)	0,000

This results calculated by using equation number 1;
Number of observation : 460; Variables was refers to
Table 2; ***sig 1%; **sig 5%; *sig 10%

These findings illustrate that, in this case, especially for companies in developing countries, increasing investments in R&D will decrease financial performance, even in the future. This also indicates

that companies in Malaysia have not paid special attention to R&D investment.

R&D investment is indeed an investment with a high risk. If it is not managed properly, it will reduce the expected benefits. Excessive investment in R&D can decrease financial performance because the company invests too much in R&D, which may not necessarily generate direct economic benefits.

Additional Analysis

Additional analysis was carried out to explore the main test results further. This test is carried out by grouping companies based on their level of R&D investment. The sample was divided into two groups of companies with low and high R&D investment. This test aims to determine differences in future performance based on each company's level of R&D investment.

Our test results show differences in future performance between companies with low and high R&D investment. Companies with increased R&D investment tend to have a negative effect on future performance compared to low R&D investment, which has no impact on the company's future performance. This test aligns with our main finding, which shows that high R&D investment can reduce a company's future performance.

These findings confirm research from [8] and [23], which found that R&D investment has a negative effect on the company's financial performance and can increase uncertainty. This can happen because of the possibility that the company invests in R&D excessively or that the R&D investment is outside the expected economic benefits. Besides that, companies that do not make maximum R&D investment (low R&D) also tend not to provide benefits to future performance, so they are at risk of wasted expenditure.

Table 6. Regression results of two groups at the R&D level

Variables	Low R&D	High R&D
Const	-0,064	0,084
R&D	4,482	-0,649***
Size	0,009**	0,000
CFO	0,302***	0,259**
Lev	-0,093**	-0,004
Sale	0,022	-0,045*
R^2	0,095	0,095
Adjusted R^2	0,075	0,075
F -statistic	0,000***	0,000***
p -value (F)	4,696	4,722

This results calculated by using two group samples;
Number of observation of each group : 230; Variables
was refers to Table 2; ***sig 1%; **sig 5%; *sig 10%

The results of this study also confirm the findings of other studies, for example [22] showing that

excessive investment in R&D will undoubtedly pose a risk of disruption to the company's finances. [18] Moreover, [19] also explained the issues that may result from R&D might also be caused by increasing R&D initiatives that do not necessarily satisfy the market demands. These results lead to the conclusion that the hypothesis is not supported.

Investment in R&D may only yield profits for the company after a period of time. According to Jensen and Meckling [1], age conflict may reduce the advantage associated with R&D investment. Managers could waste their free cash flow on initiatives like R&D [14], [18]. This overspending can disrupt financial condition failures, so it is necessary to carry out internal controls. Due to the risky nature of R&D, issues with R&D investment might also result from the higher financing cost associated with these initiatives. However, if the investment is managed properly, it will provide benefits in the future [24].

This research has implications in several ways. First, companies, especially in developing countries, need to consider before investing in R&D not to burden the company's activities. Second, suppose the company has invested in R&D. In that case, it is necessary to look at the effectiveness of the long-term implementation of R&D on an ongoing basis, but this requires a significant investment value, so there is also considerable risk.

The results of this study have limitations. First, the sample size is small because the researcher only chose one country to represent developing countries in ASEAN. Second, the data used to measure future performance uses t+1 financial performance. This is because the data is limited, so researchers have been unable to capture information on more extended performance.

CONCLUSION

The results of this study prove that R&D investment has a negative impact on a company's future performance in Malaysia. The greater the investment made in R&D, the greater the company's risk of experiencing a decline in financial performance. Investing in R&D has a relatively high cost and risk, and the resulting benefits cannot be felt instantly. Our results indicate that companies in developing countries like Malaysia may have yet to invest in R&D as the central part of their business strategy. Considering that R&D investment is generally made by many companies in developed countries, it becomes very realistic for companies in developing countries. Otherwise, several studies confirm this fact that, in general, investment in R&D is carried out by most companies in developed countries, for example [1], [2], [3], [4], [5], [6], [10], [11], [13] which

generally gives the view that companies in developed countries dare to take risks to invest in R&D because they have the ability of knowledge and have a variety of resources and technology that is sufficient to support the success of the R&D investment.

This research has limitations. The first limitation is data limitations. Namely, this study has a relatively small sample of 57 companies with 460 firm years of observations. Therefore, further research can be carried out by adding samples to make the findings more representative. Second, this study uses a sample of Malaysian companies, a developing country in Southeast Asia, so it can only represent some developing countries, especially in Southeast Asia, that are representative of developing countries in general. Third, this study only uses next year's financial performance (t+1) to measure company performance in the future. This is because the number of samples in this study is relatively small, so if the research uses a longer time of future performance, the number of samples will be smaller. Therefore, as explained by [18], researchers can measure future performance by using financial performance in year 3 (t+3) or year 5 (t+5) if they have a large sample size.

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