

## Confirming Research and Development Intensity as the Expected Growth Driver in Manufacturing Firms

Novie Susanti Suseno  
Universitas Garut

Hilmi Aulawi  
Sekolah Tinggi Teknologi Garut, Indonesia

— *Review of* —  
**Integrative  
Business &  
Economics**  
— *Research* —

### ABSTRACT

This research is conducted to test the effect of Research and Development Intensity (R&D Intensity) on the firm value with firm characteristic as moderation of manufacture companies. The research applied causalitas method. The data collected were financial reports of manufacturer companies listed on the Indonesia Stock Exchange (IDX) in the period of 2011 to 2017. The population of this study is manufacturing companies ranging from industrial sectors, various industries, to consumer goods. The sample size of this study is 90. The collected data were analyzed by using double linear regression. The results of the analysis revealed that Firm Characteristics, which include firm age and firm size could not moderate to impact of R & D intensity on firm value. It was shown the intensity of R & D has a significant impact on firm value. Based on such findings, this research provides interesting ideas to consider related to managing activities of R & D in the company to be more effective, because of the intensity of R & D does not only depend on the firm characteristics. For this reason, further research can test government support, company support, culture on R & D

Keywords : Research and Development Intensity, Firm Characteristic, Firm Age, Firm Size, Firm Value

### 1. INTRODUCTION

Companies often invest a lot of its resources to research and development (R&D) (Tang, 2015). According to Wade and Recardo (2012), as an effort to develop business management, organizations will pay more attention to research and development investments intangible asset investment which contributes to long term growth of a company (Basgoze and Sayin, 2013).

Developed countries are always supported by R&D intensity produced by industries, universities and their own governments. A highly competitive country is the one that has R&D intensity more than 2% of its Gross National Income (GNI) (Handojo, 2013). Based on the data of Bloomberg 2018, South Korea that has the highest innovation rate allocated R&D intensity as much as 2% of its GNI. Singapore allocated 15% of its GNI, Japan 3% of its GNI and China 16% of its GNI. This fact is quite far compared to Indonesia which was stated by the Minister of Technological and University Research Indonesia, Nasir (2017) state that the number of researches in Indonesia is much lower than some

countries in Asia. This is shown by the ratio of R&D budget every year. In 2014 it was 0.08% and in 2016 it was increased into 0.2% of its GNI. The role of industry in R&D in Indonesia is still low. Nasir (2017) explains that research problem in Indonesia is about the composition of research funding. He said that 75% of researches now is funded by the government and the rest of 25% is funded by industries. In other countries, industries fund 80% of their researches. According to Chen et al. (2011), most countries have gradually devoted more efforts for R&D, and have tried to create profitable innovative environment by enforcing intellectual property rights to promote innovation.

This research will test the impacts of Research and Development Intensity toward firm value with firm characteristics as its variable control.

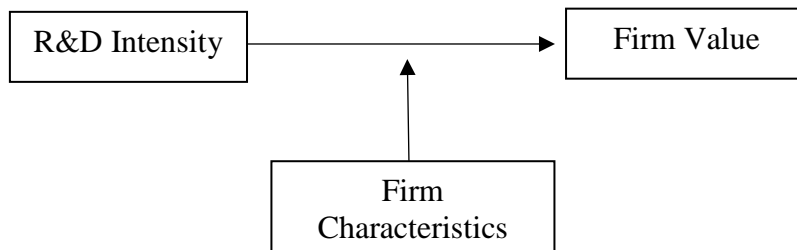
This is important because of the decisions to invest, including whether to invest in R&D, should ultimately be based on their impacts on firm value. Similar research has been conducted by Gupta et al. (2017), Gantowati and Agustine (2017), Dzhukha et al. (2017), Min and Smyth (2016), Putra (2015) Goschin (2014), Gui and Ying (2013) Dundas (2012), Ehie and Olibe (2010), and Gleason and Klock (2006) who state that an important and statistically proven intangible capital which plays a role in increasing firm value is a research and development (R&D).

## **II. RESEARCH FRAMEWORK**

The conceptual framework is developed based on extensive literature review of studies on R&D intensity, firm characteristics to firm value. Investment in R&D activity can increase the value of an intangible asset market book value of a company represents a market value from future-expected profit resulted from R&D investment. (Min and Smyth, 2016). On average, each and every investment in an intangible asset of a company must be expected to increase market value of its company (Bosworth & Rogers, 2001). Successful R & D investment can produce a new product or service that enables a company to stand out among others (Basgoze and Sayin, 2013). Noerirawan (2012) states that firm value is a condition achieved by a company as a picture of how people trust in the company after a process of activities for several years, since the company was established until present time.

In some literature it is mentioned that, there is an influence of R & D intensity on firm value (Gupta et al., 2017, Min and Smyth , 2016, Ehie and Olibe, 2010.). Another study that states the relationship of firm characteristic as a variable that moderates R & D intensity of firm value is Pindado et al (2010) which states that size positively affects the relationship between firm value and R & D spending.

Similar delivered by Shefer and Frenkel (2005) which states that the expenditure on R & D is influenced by the characteristics of the company - especially its size. Large companies tend to invest more in R & D than small ones. Further Cannolly and Hirschey (2005) find support for size effects in R & D investments. Furthermore Shefer and Frenkel (2005) state investment in R & D can be influenced by company size in various ways. Large companies are more likely to secure the funding needed for large-scale R & D. Research model is as shown in figure 2.1 below



**Picture 2.1**  
**Research Model**

**III. METHODOLOGY**

This section presents research methodology adopted in this study. It explains sample selection criteria, variables of the study and research model, hypotheses. This research applied causalitas method. The data collected were financial reports of manufacturing companies listed in Indonesia Stock Exchange (IDX) in the period of 2011 to 2017. The population were manufacturer companies ranging from industry sectors, miscellaneous industry, to consumer goods, with 90 company as the sample. The data were analyzed by using double linear regression with moderating variable.

**IV. RESULT AND DISCUSSION**

R&D activity as creative and systematic work done to enrich knowledge stock including knowledge about humans, culture and the society and to plan new applications out of available knowledge (OECD,2015). Firm value is an indication of quality for a company (Orens et al., 2009), a perception of investors’ role toward the company (Prapaska el al., 2012). To measure it, the writer uses Tobin's Q Ratio is calculated the total market value plus the total book value of liabilities in the total book value of assets.

This study used the firm characteristics from Tsai, Lu, & Yen, (2012) including firm size which is the log of total assets and profitability that calculates the ratio of net income to total assets. Research conducted by Hidayah (2014) discovers that firm size and return on asset have significant effects on the firm value. Besides, Setiono (2013) claims that firm size, market share, and capital intensity weakens can moderate the relation of R&D on firm value. Several firm characteristics (size, firm growth, and market share) have positively affected the relations between firm value and R&D spending, while others (free cash flow, dependence on external finance, labor intensity and capital intensity) exert a negative effect. Therefore, the effectiveness of R&D spending depends on firm characteristics (Pindado et al., 2010).

**Tabel 4.1**  
**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,560 <sup>a</sup>	,314	,304	91,21217

a. Predictors: (Constant), R&D

Based on equation of coefficient of determination on table 4.1, it can be seen that the value coefficient determination (R<sup>2</sup>) is 0.314. It means that Research and Development Intensity have influence to firm value calculated by Tobin’s Q as much as 31.4 %.

**Tabel 4.2**  
**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11,039	,923		11,956	,000
	Firm value	,004	,008	,053	,438	,662

a. Dependent Variable: ABRES

Based on the table 4.2 with the significance level of 5% = 0,05 , then the coefficient is 0,004 The result for the first independent variable is that since the significance level 0,662 is higher than 0,05, it means that Firm age can not be a moderating variable to find influence R&D intensity to Firm Value. Firm Characteristic using by firm age apparently has not supported the improvement R&D intensity to firm value.

Based on these findings, it can be seen that the firm age has no significant effect on the relationship of R & D intensity and firm value. This shows that although the intensity of research and development is generally regarded as a driver in technological progress and company growth, the length of the company standing is not a guarantee for R & D activities. Such a result is in line with the Nasir's statement (2017) that there is a lack of motivation to do R&D activities in companies in Indonesia. Companies tend to prefer committing franchise, buying a license and trademark for their business. It is shown by the fact that a lot of companies in Indonesia did not report their R&D activities. It also indicates that a lot of companies in Indonesia have not prioritized R&D.

Such a result is parallel to that of a study carried out by Shefer dan Frenkel (2005) which state that the age of the company in investing in R & D can be influenced by the size of the company in various ways. Large companies are more likely to secure the funding needed for large-scale R & D. In general, large companies are older than small companies. However, it can be observed that in the high-tech industry branch, we can find a large number of young and relatively small start ups.

**Tabel 4.3**  
**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,142	,079		14,535	,000
	Firm value	-,001	,001	-,106	-,878	,383

a. Dependent Variable: ABRES1

Based on the table 4.3 with the significance level of 5% = 0,05 , then the coefficient is -,001 The result for the first independent variable is that since the significance level 0,383 is higher than 0,05, it means that Firm size can not be a moderating variable to find influence R&D intensity to Firm Value. Firm Characteristic using by firm size apparently has not supported the improvement R&D intensity to firm value.

The results of this study indicate that the business agent in Indonesia is not yet fully aware of the importance of research and development activities for the company's future. This shows that there is still a lack of support from industry company for the development of

research in Indonesia. For this reason, firm size and the firm age do not guarantee that companies can compete in the era of global competition. Efforts are needed to always adapt to technology. It should be as suggested by Shefer and Frenkel (2005) that large companies tend to invest in R & D more than small ones, where R & D tends to be concentrated in big cities, and plays a more vital role in creating innovation in the center than in the suburbs.

The results of this study do not support a study carried out by Pinando (2010) which state that the relation of firm value and R&D is moderated by some firm characteristics especially firm size increases market evaluation of R&D spending because firm size shows economic scale, easier access to capital market.

Based on the results, this study reexamined the direct effect of R&D Intensity on firm value, for the result, is as shown in table 4.4

**Tabel 4.4**  
**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	3,782	11,666		,324	,747
	R&D	20.490	3,676	,560	5,574	,000

a. Dependent Variable: Firm value

Based on the table 4.4, it shows that variable coefficients value of R&D intensity is 20.49. This is a positive value which means R&D intensity affects positively to firm value. We also get significance value of 0.000 lower than alpha value (0.05) which mean R&D intensity affects significantly to firm value.

The results show that R&D intensity is one of the ways for a company to gain competitive advantage, because R&D investment closely relate to long term improvements of a company. Besides, through R&D intensity, a company can get fresh ideas to create innovation in the company which can eventually upgrade firm value.

Such a result is parallel to that of a study carried out by Padgett dan Galan (2010) which state that R&D gives opportunities for a company to improve its products and production process and get more effective sales innovation. Therefore R&D intensity can help improve firm value through better company prospect in the future.

Moreover, this finding supports the findings in studies conducted by Gupta (2017), Min and Smyth (2016), which state that one of the reasons why R&D intensity affects positively to firm value is R&D investments can influence market capitalization twice higher than intangible assets.

Besides, total R&D spending is also one of the most frequently used indicators of innovative performance of a company, industry and country (Dzulka et al., 2017); Dmitrishina dan Uskov, 2015; Epifanove et al., 2015; Frank et al., 2016 ).

## V. CONCLUSION

Based on the overall empirical analysis, it substantiates that there is a relationship between R&D intensity on Firm value. This shows that one of the efforts that can be

made by the company in order to increase its competitive advantage is by managing R & D activities. R & D provides opportunities for companies to grow and develop. Through R & D companies can find new ideas, products and processes that make the production of production more efficient which can increase competitive advantage, which in turn can create better corporate value. Further testing relates to firm characteristic as moderation in the effect of R & D intensity on Firm value. When the influence is tested, it shows that the Firm Age and Firm Size cannot moderate the effect of R & D intensity on Firm value. As a result, it clearly indicates that the implementation of R & D in Indonesia still needs to be improved, the results of the study state that the release of R & D intensity does not only depend on firm characteristics. The age of the company and the size of the company do not guarantee high R & D activities. There needs to be other efforts that can motivate companies to participate in improving R & D activities in Indonesia. For this reason, government support is needed in this regard.

### ACKNOWLEDGEMENT

The author would like to thank the University of Garut, Sekolah Tinggi Teknologi Garut, for supporting the publication of this research.

### REFERENCES

- [1] Basgoze, P., & Sayin, H. (2013). The Effect of R&D Expenditure (Investments) on Firm Falue : Case of Istambul Stock Exchange. *Journal of Business, Economics & Finance*, 2(3).
- [2] Bosworth, D., & Rogers, M. (2001). Market Value, R&D and Intellectual Property : An Empirical Analysis of Large Australian Firms. *Economic Record*, 77, 323-337.
- [3] Brigham, E. F., & Houston, J. (2015). *Fundamentals of Financial Management*. Cengage Learning.
- [4] Cannolly, R. A., & Hirschey, M. (2005). Firm Size and The Effect of R&D on Tobin's Q. *R&D Management*, 35, 217-223.
- [5] Chen, C., Hu, J., & Yang. (2011). An International Comparion of R&D Efficiency of Multiple Innovative Outputs : The Role of The National Innovation System. *Innovation : Managerial, Policy & Practice*, 13(1), 341-360.
- [6] Dmistrishina, E. V., & Uskov, A. D. (2015). The Issues of Covering Science and Technical Policy of Modern Russia in Strategic Planning Doccuments. *European Research Studies Journal*, 18(4), 57-74.
- [7] Dundas, N. H. (2012). Research Intensity and Knowledge Transfer Activity in UK Universities. *Research Policy*, 41, 262-275.
- [8] Dzhukha, V. M., Kokin, A. N., Li, A. S., & Sinyuk, T. Y. (2017). Research and Development Intensity in Business : Rusia and EU. *European Research Studies*, 20(1), 64-76.
- [9] Echi, I. C., & Olibe, K. (2010). The Effect of R&D Investment on Firm Value : An Examination of US Manufacturing and Service Industries. *International Journal Production Economics*, 128, 127-135.

- [10] Epifanova, T., Romanenko, N., Mosienko, T., & Kupchinskiy, A. (n.d.). Modernization of Institutional Environment of Entrepreneurship in Russia for Development of Innovation Initiative in Small Business Structure. *European Research Studies Journal*, 18(3), 137-148.
- [11] Frank, V. E., Mashevskaya, V. O., & Ermolina, V. L. (2016). Innovational Mechanism of Implementation of Cluster Initiatives in Business. *European Research Studies Journal*, 19(1), 179-188.
- [12] Gantjowati, E., & Agustine, K. V. (2017). Firm's Characteristics and CSR Disclosure Indonesia and Malaysia Cases. *Review of Integrative Business and Economics Research*, 6(3), 131-145
- [13] Gleason, Katherine, I., & Mark, K. (2006). Intangible Capital in The Pharmaceutical and Chemistry Industry. *The Quarterly Review of Economics and Finance*, 4, 300-314.
- [14] Goschin, Z. (2014). Research and Development Intensity in Romania. A Regional Perspective. *Procedia Economics and Finance*, 5, 64-70.
- [15] Gui, S. D., & Ying, L. T. (2013). Perks, Research and Development Intensity and Corporate Performance. *International Conference of Management Science & Engineering*, (pp. 877-882). China.
- [16] Gupta, K., & Onur, R. B. (2017). The Effect of R&D and Competition on Firm Value : International Evidence. *International Review of Economics & Finance*, 51, 391-400.
- [17] Handojo, A. (2013). Kebijakan Iptek untuk Indonesia yang Sejahtera dan Berdaulat. In *Kebijakan Riset Iptek Inovasi Menuju Bangsa yang Berdaya Saing*. Dewan Riset Nasional.
- [18] Hidayah, N. (2014). The Effect of Company Characteristic Toward Firm Value in The Property and Real Estate Company in Indonesia Stock Exchange. *International Journal of Business, Economic and Law*, 5(1).
- [19] Min, B., & Smyth, R. (2016). Determinants of R&D Intensity and Its Impact on Firm Value in an Innovative Economy in Which Family Business Group are Dominant : The Case of South Korea. *Journal Applied Economics*, 48(58), 5667-5675.
- [20] Nasir, M. (2017, Januari Sunday). Dana Riset 2017. Pemerintah Gelontorkan Hampir Rp 1,4 T. Jakarta, Indonesia. Retrieved 2017, from <https://nasional.tempo.co/read/833275/dana-riset-2017-pemerintah-gelontorkan-hampir-rp-14-t/>
- [21] OECD. (2015). *Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement Scientific, Technological and Innovation Activities*. Paris: OECD Publishing. Retrieved from <http://www.oecd.org/sti/inno/Frascati-Manual.htm>
- [22] Orens, Raf, Walter, A., & Nadine, L. (2009). Intellectual Capital Disclosure, Cost of Finance and Firm Value. *Management Decision*, 47(10), 1536-1554.
- [23] Putra, A. (2015). The Impact of Implementation Good Corporate Governance to Firm Value (Evidence from Indonesia Public Banking Sector). *Review of Integrative Business and Economics Research*, 4(1), 95-102

- [24] Pindado, J., de Queiroz, V., & de la Torre, C. (2010). How do Firm Characteristics Influence The Relationship between R&D and Firm Value. *Financial Management*, 757-782.
- [25] Prapaska, Ruth, J., Siti, & Mutmainah. (2012). *Analisis Pengaruh Tingkat Profitabilitas, Keputusan Investasi, Keputusan Pendanaan dan Kebijakan Deviden Terhadap Nilai Perusahaan*. Thesis, Diponegoro University, Faculty of Economics and Business .
- [26] Setiono, A. P. (2013). *Analisis R&D pada Nilai Perusahaan dengan Karakteristik Perusahaan sebagai Variabel Pemoderasi*. digilib.uns.ac.id.
- [27] Shefer, D., & Frenkel, A. (2005). R&D, Firm Size and Innovation : an Empirical Analysis. *Technovation*, 25, 25-32.
- [28] Tang, S. H. (2015). Does Research and Development Intensity Enhance Industrial Growth Performance during Economics Downturns? Inter-Industry Evidence from Australia. *The Australian Economic Review*, 48(3), 43-57.
- [29] Tsai, C. F., Lu, Y. H., & Yen, D. C. (2012). Determinant of Intangible Assets Value : The Mining Approach. *Knowledge Based System*, 31, 67-77.
- [30] Wade, D., & Recardo, R. (2012). *Corporate Performance Management*. Boston: USA Press.