
The Impact of Innovation Capability on Product Innovation Performance (Case Study of Manufacturing Industry in Indonesia)

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Abstract

Manufacturing industry contributes the highest to Indonesian's GDP, but it continues to slide from 2015-2018 due to low number of new products and low diversification products. Thus, this study focuses on the capability in enhancing product innovation performance. Capabilities relate to RBV (resource-based view) of a firm. It explains how firms renew their competencies in order to adapt to the changing environment. In analysing the relation between innovation capability and product innovation performance, this study also considers the role of R&D performance. Many studies mentioned that innovation capability impacts R&D performance and product innovation performance. But there is still limited study that explores innovation capability as a moderating role towards R&D performance and product innovation performance. This study uses Structural Equation Method (SEM) which consist of 100 respondents of senior management in the manufacturing industry in Indonesia. Our study shows that innovation capability enhances product innovation performance better through R&D performance; rather than direct relation. But innovation capability has no moderating role towards the relation of R&D performance and product innovation performance.

Keywords: Innovation capability, Product Innovation performance, R&D performance, Manufacturing Industry.

I. INTRODUCTION

Manufacturing industry sector is often recognized as the economic backbone of most countries [1]. In Indonesia, the manufacturing sector contributed to approximately 20 percent of Indonesia's GDP. However, based on the data from (BPS, 2019) the contribution of the manufacturing industry continues to slide from 2015 to 2018 which is 20.99% to 19.8%. The decrement manufacturing industry in Indonesia caused by lack of creativity and innovation as the critical problem of few new products that appeared in the market Hausmann (2017). It also mentions that a low amount of diversification products in Indonesia's manufacturing industry caused by the industry focus depended on natural resources. At the same time, it would be best for the development of the manufacturing sector to focus on new and innovative electronics and machinery products.

Reddy (2017) [2] states that lack of innovation will suffer losses and won't be able to survive in the long run. This shows that innovation is essential in predicting long term survival of the firm [3]. Moreover, firms with less capability to innovate may find it difficult to practice and sustain targeted innovative projects to improve their competitive advantage, performance, and business operations [1]. Innovation capability has a long history of research; it was developed from the resource-based view (RBV) theory [4]. According to Wernerfelt (1984) [5] RBV shows the firm as integration of resources and capabilities and the firm can achieve excellent performance by developing unique and distinguished organizational resources and capabilities [3]. Innovation capability has the ability to integrate key capabilities and resources to stimulate innovation [6]. According to Lawson and Samson (2001) [7] the essential role of innovation capability is to transform ideas and knowledge into a product; thus, it affects the manufacturing process and product development [8]. The term "innovation" itself is usually related with Research and development (R&D) since it plays major role in creating new product [9]. Therefore, firm with excellent R&D and supported by the ability of innovation will increasingly encourage companies to have the capability to innovate [10]. A study from Lazzarotti (2006) [11] expresses R&D performance as the impact of market dynamic increment, thus the number of competitors also increase, and product complexity also growing.

Therefore, this study aim is to examine the effect of innovation capability to product innovation performance, both directly and indirectly (mediated by R&D performance). This study examines whether R&D performance moderate the relation of innovation capability and product innovation performance.

II. LITERATURE REVIEW

a. Innovation Capability

Innovation capability is an important factor that facilitates an innovative formal culture, characteristic of internal promoting activities and capabilities of understanding and responding appropriately to the external environment [12]. Assink (2006) [13] defines innovation capability as internal driving energy to generate and explore radical new ideas and concepts, to experiment with solutions for potential opportunity patterns and develop it into marketable and effective innovation. Innovation capability is the ability of a firm in generating innovative outputs [14]. Lawson and Samson (2001) [7] define innovation capability as “the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders”. Rangone (1999) [15] defines innovation capability as an organization’s ability to develop new products and processes, and to achieve superior technological and management performance. Innovation capability is usually divided into technological innovations and managerial innovations [16], whereas in this study the perspective of the innovation capability is more towards managerial innovations.

b. R&D performance

According to Avermate (2004) [17] The word research refers to the start of an innovation’s investigation that is expected to contribute in developing new products or improving existing products or processes. While the word development is the result of research conducted to create new products or improve existing products [17]. If those two words are combined and lead to new terms, namely research and development (R&D).

R&D does not simply create something new in terms of technology or engineering, but is related to various aspects of manufacturing [18]. R&D (research and development) is defined as a systematic and creative work to increase the amount of knowledge, which is used to form new technologies, products, services or systems [19]. Medda (2018) [20] mentions that R&D is the main factor that formed technological knowledge of the firm. Therefore, a study from Zahra and George (2002) [21], concludes that R&D is the initial step of a firm in expanding knowledge. In order to increase or expand knowledge in research and development, firms must combine current knowledge and learn new skills to enlarge their capabilities in adapting and sustaining rapid changes in the market [22].

c. Product Innovation Performance

The ultimate dependent variable of most management researches are mostly firm performance. However, according to Alegre (2006) [23] innovation performance could be considered as an intermediate variable between certain processes (in this study context, innovation capability and R&D) with general firm performance. Innovation capability could influence innovation performance through Organization, Process, Product, and Marketing towards firm performance [24]. Our study context focuses on product innovation performance as innovation performance.

Product innovation focuses on bringing or improving products to market [25]. In addition, product innovation is the continuous introduction of new and valuable goods or services which is significantly improved and modified from existing products in respect to its characteristic or intended uses [26], [27]. On the other hand, Tohidi and Jabbari (2012) [28] states that product innovation is a process that includes technical design, research and development, production, management and commercial activities which are associated with marketing a new product.

Product innovation performance therefore can be stated as the innovation performance in terms of industry producing innovative products or services in answering market demands to give certain performance for the firm [29]. Goffin et al., (2000) [30] finds that without frequent introduction of new products to the market, firms can quickly lose competitiveness and market share. Moreover, when a firm can compete in the market price, they can generate more profit and market share [25].

III. THEORETICAL FRAMEWORK AND HYPOTHESES

Innovation capability has the ability to integrate key capabilities and resources to stimulate innovation [6]. Being more innovative promises to open more new directions for a firm can be achieved by gathering new knowledge [31]. R&D is known to increase stock of knowledge, to bring the company to be more innovative and ultimately influence the output produced [31]. R&D is known to have a very important role because its role does not only affect a single performance which affects the process, product and service development of the company so that it can be said that innovativeness of the companies are often characterized by their excellent R&D activities which support the capability of a firm to innovate [10]. In regards, we hypothesize that:

Hypothesis 1. Innovation capability has a positive and significant effect on R & D performance.

Referring to Zahra and George (2002) [21] R&D activities are input innovation and become a combination of new knowledge base and improve existing knowledge to create innovative products. A study from Heij *et al.*,(2019) [32] shows that when a firm wants to produce innovation products, there must be a lot of investment in R&D that will produce optimal results in producing innovative products, thus we describe the hypothesis as follows:

Hypothesis 2. Research and development performance positive and significance effect to product innovation performance.

A study conducted by Wolff and Pett (2006) [33] states that innovation capability has a significant influence on new product improvement. High level of innovation capability has an important role in developing a creative idea to deal with an ever-changing market, then the idea will be transformed into a new product that innovates or enhances the current product that can form a meaningful value for stakeholders, which also improve the firm's economy and the standards of living [14]. Therefore, we describe the hypothesis:

Hypothesis 3. Innovation capability positively impact product innovation performance

Damanpour (1991) [16] and Alegre (2008) [34] finds that innovation is a moderator to enhance firm performance. Innovation activities may moderate the effect of R&D performance in creating new products [16]. So, when innovation activities are carried out such as trying new ideas [7], applying external knowledge [16], and trying to be more creative [35] will enhance the performance of the product innovation. Therefore, this study expects that innovation capability will enhance the effect of R&D performance in producing product innovation performance. Thus, we describe the following hypothesis:

Hypothesis 4. Innovation capability moderates the relation between R&D performance and product innovation performance.

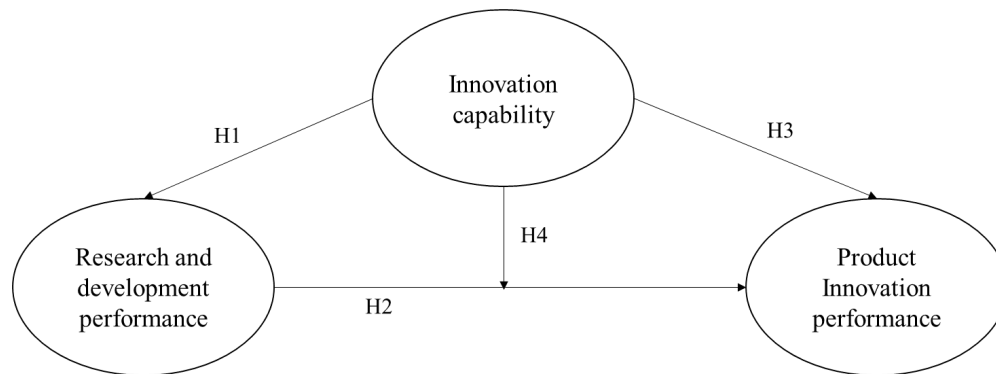


Figure 3-1 Proposed Research Framework

IV. RESEARCH METHODOLOGY

Samples. Referring to the manufacturing directory of the Statistic Center Agency (BPS,2019), the population of this study in the manufacturing industry in Indonesia is 33.923 companies (from small to large scale). The sample targets of this study are senior managers from manufacturing industry in Indonesia due to their current position and experience could supply accurate information of their companies in regard to the issue under this study. In a total of 155 returned, only 100 are valid and adequate to be analyzed. The criteria of the answer for this study are people who have been working more than 10 years in the sub-sector metal and non-metal industry, food and beverages industry, chemical and pharmaceutical industry.

Procedures. Data from 100 respondents are collected via online questionnaires. For data and model analysis, this study used the PLS-SEM approach - more specifically using SmartPLS version 3.0 software.

Measures. For innovation capability (IC) there are 4 dimensions with a total of 19 measurement items adapted from Salimi and Rezaei (2017) [36]. For research and development performance (RDPERF) consist of 6 dimensions with a total of 19 measurement items adapted from Alegre et al. (2006) [23] and Adams et al. (2006) [37]. And for product innovation performance is adapted from Adams et al. (2006) [37] and Saunila and Ukko (2012) [38] which consist of 5 dimensions with a total of 19 measurement items.

V. RESULT

The analysis of data in this study uses SPSS version 26 for the descriptive statistic and SMARTPLS version 3.0 for inferential statistics; likewise, validity and reliability and hypothesis testing using Structural Equation Modelling (SEM). Table 1 shows a descriptive statistic analysis whereas table 2 shows validity & reliability result and table 3 shows hypothesis testing result.

Table 1. Table of Descriptive statistic of latent variable

Latent Variables	Mean	Std. Dev	Min	Max	Variable Correlation**		
					RDPERF	PIP	IC
RDPERF	4.74	0.729	2	6	1		
PIP	4.59	0.846	1	6	.817**	1	
IC	4.75	0.941	1	6	.788**	.793**	1

**) Pearson Correlation is significant at the 0.01 level (2-tailed)

Table 2. Table of Validity and Reliability Measurement

Item		Results			
Construct	Dimension	Factor Loading	AVE	CR	Cronbach alpha
IC	Work climate and well being	0.801	0.642	0.966	0.96
	Individual activity	0.925			
	Know-how development	0.916			
	External knowledge	0.904			
	Strategic orientation	0.858			
	Strategic leadership	0.927			
RDPERF	Internal business	0.836	0.521	0.932	0.925
	Customer Perspective	0.885			
	Innovation and learning	0.902			
	Financial Perspective	0.883			
PIP	Effectiveness of innovation	0.852	0.605	0.953	0.951

	Efficiency of Innovation	0.935			
	Commercialization	0.867			
	Project management	0.874			
	Portfolio management	0.858			

To indicate validity, all variables/constructs have a factor loading (Outer Loading) above >0.7 and Average Variance Extracted above >0.5 ; which according to Sekaran and Bougie (2013) [39] indicates a good validity. To indicate reliability, all variables/constructs have a Cronbach Alpha as well Composite Reliability above >0.7 ; which refers to Sekaran and Bougie (2013) [39] indicates a good reliability. Thus, the variables/constructs in the model proposed by this research study have a good validity and reliability.

Table 3. Table of Hypothesis testing result

Hypothesis	Relation	β - Coefficient	T-stat	P-value	Conclusion
H1	IC-RND	0.785	18.137	0	Accepted
H2	RND-PIP	0.691	7.179	0	Accepted
H3	IC-PIP	0.21	1.966	0.05	Accepted
H4	IC as moderating role	0.025	0.306	0.76	Rejected

This study were using 95% confidence interval for the significance level, therefore as it shown in table 3 all the t-values are above >1.96 indicates the significance level in the path coefficient between construct except t-values for hypotheses 4 which has t-value below <1.96 , whereas the hypothesis was rejected and hypothesis 1,2, and 3 were accepted.

Table 4. Table of comparison result of direct and indirect effect of IC towards PIP (H3)

	Direct	Indirect
β - Coefficient	0.21	0.503
T-stat	1.966	6.649
P-value	0.05	0

Table 4 shows a comparison between indirect path and direct path of *Innovation Capability* affecting *Product Innovation Performance*, whereas the indirect path as bigger β – Coefficient value which indicates stronger path of *Innovation Capability* in affecting *Product Innovation Performance*.

VI. DISCUSSION AND IMPLICATIONS

a. Discussion

This study draws attention to the importance of Innovation Capability on the relationship of R&D Performance and Product Innovation Performance of manufacturing industry in Indonesia. The main findings of this study are summarized below.

Innovation Capability has a positive and significant influence towards those two variables. This particular study analyzes two different roles of Innovation Capability; first as a driving force which facilitates R&D Performance (H1) to further influence Product Innovation Performance (H2 and H3); second as a moderator of R&D Performance relation with Product Innovation Performance.

As it has been mentioned and shown previously in the result interpretation, this study finds that Innovation Capability influence significantly and positively to the Product Innovation Performance mediated through R&D performance as the indirect pathway has stronger influence value (Table 3). Innovativeness is often characterized by the excellent R&D activities which support the capability of an industry to innovate [10]. Innovation Capability allows the firm to have learning environment in order facilitate firm to gain and acquire new knowledge [40] and allows them to have the potential to generate innovative outputs [41] likewise in this study context could lead to the increment of the Product Innovation Performance mediated by R&D since it is an important input to accelerate the formation of innovation products [9]. R&D can be the platform which is capable of combining existing knowledge with new various knowledge [42] and exploit it which further to be implemented through innovative processes and lead to improvement of the production of product innovation [21]. When knowledge is produced rapidly, the variety of innovative products will be produced and the more complex the knowledge, the higher the quantity and quality of innovative products. Since this study found that Innovation Capability more likely to become the main driver (driving force), the second role (moderator) we analyzed was rejected. This study confirms that Innovation Capability does not moderate the relation between R&D Performance and Product Innovation Performance. McClelland and Judd (1993) [43] also confirms the difficulties encountered by researchers to detect moderator effects.

From the theoretical perspective, unfortunately authors could not find the literature or previous studies regarding the moderating role of Innovation Capability in this particular relationship, but previous study conducted by Yang (2012) [35] which find the positive moderating role of Innovation Capability in the relation of Logistic Service Capability towards Firm Performance. In that study it was found that Innovation Capability also influences Firm Performance (which in this particular study context is the Product Innovation Performance) but it is not determined whether Innovation Capability acts as a mediator or has a direct relation with the other variables (Logistic Service Capability). In our logical reasoning perspective, since Innovation Capability has a positive impact towards R&D Performance then later to Product Innovation Performance both directly and indirectly in the context of Manufacturing Industry Indonesia. Therefore, it is fair to say that there is little possibility that Innovation Capability also moderate the relationship of Product Innovation Performance and R&D performance. In line, a study from Rajapathirana and Hui (2018) [24] finds that Innovation Capability influences Firm Performance through 4 different types, which one of them is Product Innovation. Thus, it clears that Innovation Capability positively influences Product Innovation Performance and not acting as a moderator.

b. Implication

This study shows the importance of Innovation Capability; this study also finds that the most preferred factors in shaping the innovation capability is work climate and wellbeing which indicates that in generating innovation, organization needs to create an adequate work climate and well-being. It can facilitate and support employees in generating innovation as it enables industry to transform resources and knowledge into product, process, and etc. In line with this finding, R&D performance in manufacturing industry Indonesia is mainly determined by firm internal business as it found by this study which represented by the competence of the firm such as processes and the behavior of individuals [36] involving in the department itself, which will goes down to the level of the whole R&D Performance in implementing innovation into final goal or products. And the most important factor representing the performance of product innovation in manufacturing industry Indonesia is the commercialization of the product. Thus, this study implies managers in leveraging their innovation capability by paying more attention to the industry work climate and well being since innovativeness of organization depends on the culture which supported by the right people in the organization to produce an idea especially to convert idea into a profitable product and also supported by the commercialization process of the organization [24].

VII. CONCLUSIONS

The main finding of this study is Innovation Capability has a significant role in leveraging the Product Innovation Performance mediated with the Performance of R&D in the firm in forming an innovative product in the Manufacturing Industry Indonesia. Another interesting finding is Innovation Capability has no moderating role/effect in the relation between Product Innovation Performance and R&D Performance. Therefore, Innovation Capability in the Manufacturing Industry Indonesia acts as a driving force to increase Product Innovation Performance that facilitated through excellent performance of their R&D division and could lead the industry to more marketable innovative and diverse product production which further increase the performance of the whole industry.

There are some limitations of this study. First, this study is cross sectional and only represents condition at the specific point of time. Second, the context is specific which only focuses on the manufacturing industry and in specific sub sectors. Thus, the author recommends exploring the impact of innovation capabilities in different industries and exploring the impact of innovation capabilities in manufacturing industries in ASEAN countries.

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