The current issue and full text archive of this journal is available on Manova at:
https://doi.org/10.15642/manova.v8i2

Product Innovation and Its Impact on Total Sales of Manufacturing Firm in Indonesia: A Propensity Score Matching Analysis

Received 20 June 2025
Revised 2 July 2025
Accepted 10 July 2025

Widya Septyati[1*], Rachmat Pambudi[2], Lukman M Baga[3], Khairunnisa Ramadini[4]
Maritim Raja Ali Haji University, Indonesa[1], Institut Pertanian Bogor, Indonesia[2,3],
Sekolah Tinggi Ilmu Pertanian Sriwigama, Indonesia[4]
widyaseptyati@umrah.ac.id[1]
rachmatpa@apps.ipb.ac.id[2],
lukmanba@apps.ipb.ac.id[3]
khairunnisarmdn7@gmail.com[4]

Abstract

Objective – This research aims to analyze the impact of product innovation on total sales of manufacturing firm in Indonesia

Design/methodology/approach – Employing a quantitative approach, this study utilizes secondary data from the World Bank's Indonesia Enterprise Survey 2015 Report. The data analysis method applied in this research is Propensity Score Matching (PSM).

Findings – The results of the study show that manufacturing companies that innovate products receive total sales 4.57% higher than the control group (companies that do not innovate products), ceteris paribus. From these results, it can be concluded that the product innovation which firms invested has a real impact on total sales.

Research limitations/implications – The secondary data used in this research was the survey data of 1025 Indonesian manufacturing companies in 2015 which conducted by The World Bank. This survey was conducted on small, medium and large manufacturing companies located in the provinces of West Java, East Java, Central Java, DKI Jakarta, Banten, South Sulawesi, North Sumatra, Bali and Lampung. As a recommendation, the author suggests further research in a different kinds of companies in Indonesia.

Practical implications – This study will encourage companies to do more innovation in their business as the innovation has a positive relation with total sales.

Originality/value – Currently there is no research that analyzes how and how much impact the innovation has on the company's total sales, especially in Indonesia. Therefore the originality lies in the whole research.

*Corresponding author

Jurnal Manajemen dan Inovasi
© Manova Publishing
2746-282X
DOI 10.15642/manova.v8i2.2153

INTRODUCTION

Market demand is very diverse and dynamic. Companies are required to always be able to identify market changes. One strategy for companies to be adaptive is to innovate. Innovation has important role in companies, as a source of competitive advantage (Hoffman et al., 1998) and a strategy for business growth and company survival (Baumol, 2002). In addition, innovation is important not only in the scope of the company, but also as a source for long-term national economic growth (Schumpeter, 1976). It is said that countries can achieve higher growth rates and profitable trade by specializing in high value-added intensive products (OECD, 2005). Economic growth due to innovation can be given in the form of various contributions to the country such as employment opportunities, Gross Domestic Product (GDP) and exports. Modified or newly created products (product innovation) and changes in production methods (process innovation) tend to be seen in the manufacturing industry (Canh et al., 2019).

Competitive Industrial Performance (CPI) Index is an indicator to measure the innovation performance of manufacturing industry. According to the Global Innovation Index report (2020), it shows that Indonesia's economic innovation performance is still lagging behind its neighbouring countries. In fact, for the world ranking, Indonesia was ranked in the 80s from 2015 to 2019. Based on Figure 1, The Indonesian Manufacturing' CPI Index shows a fluctuating trend. Indonesia is ranked 38 or 39 in the world out of 155 countries and is still lagging behind neighbouring countries such as Singapore, Malaysia and Thailand.

Source: United Nations Industrial Development Organization, 2020

Figure 1: CPI INDEX INDONESIA 2015-2018

Damuri et al., 2018 stated that the limited spending of companies on R&D activities both at the micro and macro levels, is the cause of the weak performance of innovation in Indonesia. R&D spending in Indonesia is mostly centered on the government and universities reaching 80% (Aminullah et al., 2015). There is little R&D activity in the private sector. The small companies tend to have a low level of innovation awareness, except for large companies. Several research results from Hartono and Kusumawardhani 2019; Mahendra, Zuhdi, and Muyanto 2015; show that there are several factors that hinder the innovation performance of manufacturing companies in Indonesia. These factors are limited financial access, access to information and technology, rigid organizational management and others.

In the manufacturing industry, innovation serves as a critical tool for developing and sustaining core competencies by enhancing internal capabilities, organizing research and development (R&D) departments, and defining strategic research and investment priorities (Canh

et al., 2019). Innovation is a key focus not only for industry practitioners but also for researchers, especially in studying its impact on company performance. Many studies assess the effects of product innovation using indicators such as the number of R&D projects, the frequency of new product launches, and market share. According to Canh et al. (2019), product innovation contributes to increasing the market share of manufacturing firms in Vietnam. Similarly, Rosli and Sidek (2013) found that innovation positively influences market share, labor productivity, profitability, return on sales, and assets among small and medium-sized manufacturing enterprises in Malaysia. Additional empirical research by Cheng, Lai, and Wu (2010) and Kafetzopoulos and Psomas (2015) also confirms that innovation positively impacts company performance.

However, currently there is no research that analyzes how and how much impact the innovation has on the company's total sales, especially in Indonesia. Meanwhile, according to Cohen and Klepper (1996) stated that the company's total sales is very important in innovation. Large sales volume implies that fixed costs of innovation can lead to greater sales, and high profits can encourage subsequent innovation. Product innovation has an impact on total sales which is measured as one of the company's performance. Therefore, this study aims to analyze how the impact of product innovation on the total sales of manufacturing companies in Indonesia.

THEORETICAL BACKGROUND AND RESEARCH MODEL

Factors Influencing Product Innovation

In general, numerous factors influence a company's level of innovation, but these variables are not universally consistent and can differ depending on the specific characteristics of each company. Jang (2017) found that in high-tech manufacturing firms, exports are the only factor with a significant positive impact on innovation. In contrast, for low-tech firms, not only exports but also foreign ownership and collaboration with external partners significantly promote innovation. Interestingly, profit was identified as having no significant influence on innovation, indicating that a company's profitability does not necessarily drive its innovation efforts. This aligns with findings by Adeyeye et al. (2016), which suggest that innovation is not dependent on company size and can occur across micro, small, medium, and large enterprises. Furthermore, Adeyeye et al. (2016) also found that intramural R&D and investment in machinery and equipment positively and significantly affect product innovation within manufacturing firms in Nigeria

Rahman and Kavida (2019) found that company size plays a significant role in driving product innovation. This supports Schumpeter's (1976) view that larger firms are more likely to innovate due to their stronger financial and R&D resources. Notably, Rahman and Kavida (2019) introduced a new dimension to their analysis—the interconnection between companies and external entities. Their study revealed that these connections, particularly with customers, government bodies, and research institutions, are key drivers of product innovation, especially among Small and Medium Enterprises (SMEs) in India's manufacturing sector. Engaging with customers helps companies tailor products to market needs, while partnerships with research institutions such as universities or R&D centers provide valuable innovation insights. Additionally, collaboration with government agencies grants firms easier access to programs and policies that support new product development. Another influential factor in innovation is the educational background of employees and company leadership; having well-qualified staff and CEOs significantly enhances a firm's ability to produce innovative products.

In Indonesia, research by Mahendra et al. (2015) shows that there are two determinants of the level of innovation by companies, namely financial access and government policy. These two variables can differ based on company size. Financial access is more relevant for SMEs while government policy is more important for large companies. According to Mahendra et al. (2015), the quality of government policy is indeed important. However, if the goal is to increase and reduce the innovation gap between companies, then increasing financial access is very important. Thus, the results of the study suggest that improving the quality of policies to reduce friction in the credit market by reducing asymmetric information sources is a good policy mix to promote innovation in companies.

Impact of Innovation on Company Performance

Innovation is widely recognized as a key competitive strategy and is often considered a core capability of a company. Numerous studies have demonstrated that innovation positively influences business performance, which in turn encourages firms to innovate. Since company performance is viewed as a multidimensional concept (Naser et al., 2004), the effects of innovation on performance can differ across studies. For instance, Kafetzopoulos and Psomas (2015) found that innovation has a direct impact on product quality and operational efficiency, and an indirect effect on financial outcomes. Similarly, Onikoyi (2017) reported that product innovation contributes to a 21.1% increase in profitability and an 18.1% rise in market share. These findings align with research by Canh et al. (2019), which confirmed that product innovation boosts market share in Vietnam's manufacturing sector. Innovation enhances the appeal of products through improved features and pricing, helping companies retain or expand their customer base.

What distinguishes Onikoyi's (2017) findings is that Canh et al. (2019) revealed that to get an impact on profitability requires more time because innovation is a very expensive activity. Canh et al. (2019) also stated that the type of open innovation carried out with the support of external partners tends to be more profitable, especially in the context of companies in developing countries. Where, SMEs tend to have limited resources. In addition to having an impact on market share and profitability, innovation can also have an impact on labor productivity, return on sales, return on assets and profits (OECD 2005; Hartini 2012; Rosli and Sidek 2013).

Innovation is also a strategy for business growth and company survival (Baumol 2002). This is in line with the results of research by Cefis and Marsili (2005) which shows that innovation increases the likelihood of a company's survival rate by 11%. Not only survival, research by Zhang et al. (2018) found that innovation measured by various different dimensions, including patents, inventions and trademarks significantly reduces the likelihood of a company failing and exiting the market. Although innovation has many positive impacts, innovation also has a high level of risk. Developing innovation requires a lot of capital, skills, costs and time. Another risk is that innovation can attract many imitators from other companies that can give them more profit. This of course can lead to failure. So, companies must really consider the cost-benefit ratio related to the innovation they want to do.

Research Hypothesis

In general, there are many variables that influence a company's decision to innovate products. However, the variables are not absolute and can vary between companies. Prahalad and Krishnan (2008) stated that the role of managers as leaders in a company will be very important in organizing and carrying out innovation. Managers with more experience can cope with market changes with their capabilities as seen from the managerial mindset, skills, behavior and decision structure of managers. Thus, the hypothesis is formulated as follows:

H1: Manager working experience has a positive effect on product innovation

Internationalization is widely recognized as a key strategy for enhancing the long-term growth and survival of companies. One common form of internationalization is exporting, which is closely linked to a company's market performance. This performance is influenced not only by the company's competitive advantages but also by its ability to introduce both new and existing products to foreign markets. According to Rodil et al. (2016), the manufacturing sector tends to engage in export activities more than the services or construction sectors. Numerous empirical studies have also shown a positive correlation between exporting and innovation. For instance, Bhattarcharya and Bloch (2004) suggested that exporting increases a company's openness, which in turn promotes innovation, serving as a complementary strategy for business growth. Similarly, Jang (2017) demonstrated that exporting plays a significant role in driving innovation among small and medium-sized manufacturing enterprises (SMEs), regardless of whether they are low-tech or high-tech. Thus, the hypothesis is formulated as follows:

H2: Export has a positive effect on product innovation

According to Schumpeter (1976), large companies have the means (finance, marketing

infrastructure, large-scale production capacity) to exploit new technologies and innovate. On the other hand, small companies, although they have limitations, have the flexibility to adjust employees in innovation-related projects. A less complex management structure in implementing new projects encourages innovation in small companies. Previous research from Bhattacharya and Bloch (2004) and Jong and Vermeulen (2014) found that company size and innovation have a positive relationship. Thus, the hypothesis is formulated as follows:

H3: Company size has a positive effect on product innovation

Research and development (R&D) activities play a crucial role in building a company's innovation capabilities and overall competitiveness (Rammer et al., 2008). According to Grassano and Castello (2014), R&D serves three primary functions: (1) generating foundational knowledge that enhances a firm's ability to innovate, either independently or through collaboration; (2) supporting key areas such as production processes, customer relations, and general business operations; and (3) fostering the development and application of new technologies. Escribano et al. (2009) argue that investing in R&D enables firms to efficiently access new knowledge and significantly boost innovation efforts. Beyond simply acquiring knowledge and skills, R&D investment is seen as one of the most vital factors influencing innovation levels across industries (Baldwin & Hanel, 2003). Similarly, Hendrey (1998) emphasizes that R&D is a strategic driver for companies aiming to reach global competitiveness, particularly within the manufacturing sector. Thus, the hypothesis is formulated as follows:

H4: R&D activities have a positive effect on product innovation.

The tendency to launch new products is closely linked to a company's commitment to providing employee training (Bauernschuster et al., 2009). Organizations that invest in training their workforce tend to be more innovative. Findings from Dostie (2018) indicate that firms offering training have a 4.6% to 6.1% greater likelihood of innovation compared to those that do not. As a result, companies allocate significant resources to developing their employees' skills through training programs focused on new technologies or research and development activities (Cohen and Levinthal, 1990). Thus, the hypothesis is formulated as follows:

H5: Employee training has a positive effect on product innovation

Specifically, internal funding plays a more important role in innovation, especially for small companies (Love and Roper 2015). The finance can be used to conduct research, adopt technology and commercialize innovation. Small companies tend to have difficulty in accessing external finance for innovation. Therefore, access to loans/capital to institutional institutions can help companies in stimulating and carrying out product innovation. Thus, the hypothesis is formulated as follows:

H6: loans have a positive effect on product innovation

RESEARCH METHODS

This study utilizes secondary data drawn from a 2015 survey of 1,069 Indonesian manufacturing firms, conducted by the World Bank. The survey covers a wide range of topics, including firm characteristics, annual revenue, gender involvement, financial access, input and labor expenses, workforce structure, corruption, permits, infrastructure, competition, and more. Therefore, the Indonesian Company Survey data is highly relevant for this research, as it contains the necessary information for the analysis.

The analysis of the impact of product innovation on company total sales is estimated using the Propensity Score Matching (PSM) technique. PSM is a method used to estimate the impact of a treatment on a particular subject (Khandker *et al. 2010)*. The advantage of PSM is that it has the ability to correct selection bias and at the same time can also calculate the impact of a program. The first stage is conducted by diving observations into two groups. The group that carries out product innovation is called the treatment group, while the group that does not carry out product innovation is called the control group. A test is then carried out to identify the appropriate model and variables for the estimation.

The logit regression model is used to calculate the propensity score of the treatment group and the control group. Companies that innovate are worth 1, while those that do not innovate are worth 0. Mathematically, the logit function model can be written in general, developing the model used by (Scott et

al., 1991):

$$P_i = \ln\left(\frac{P_i}{1-P_i}\right) = \alpha+\beta_1 YRM_i + \beta_2 LBPD_i + \beta_3 EXP_i + \beta_4 LB_i + \beta_5 RND_i + \beta_6 TRA_i + \beta_7 FIN_i + \varepsilon_i \text{............} (1)$$

Where:
YRM : Manager's work experience (years)
SAL : Ln total company sales
LBPD : Company efficiency in using its labour (total sales/labour)
EXP : Export dummy, 1= yes 0= no
LB : Company workforce (people)
R&D : R&D dummy, 1= yes 0= no
TRA : Employee Training dummy, 1= yes 0= no
FIN : Loans dummy, 1= yes 0= no

The second step aims to assess the overlap and common support between the treatment and control groups by comparing their distributions. A strong overlap indicates that the common support assumption is satisfied. The greater the overlap between the treatment and control groups, the more effective the matching process will be. Additionally, a balancing test in Propensity Score Matching (PSM) is essential to ensure that the average characteristics of the treatment and control groups are not significantly different. The difference of outcome variable can be seen from the difference average of treatment and control group. Rosenbaum and Rubin (1984) explained that this difference is a reflection of the impact of the treatment given, known as ATT. The third step, choosing a matching method from the both groups. There are four matching methods that can be used, namely (1) Nearest-Neighbor Matching (NNM), (2) stratification and interval smatching, (3) calliper and radius matching, and (4) kernel and loca linear matching. Of the four methods, the NNM method is the most frequently used matching technique. NNM is a method in which each participant unit adjusts to its closest propensity value. This adjustment is carried out giving the same weight to each unit with a comparison of the closest propensity value. In this method, the treatment given by exposing all units to treatment that have partner. After that, the difference between results of the both groups is calculated. In the end, the average treatment effects on the treated (ATT) value is obtained from the average difference.

The fourth step involves evaluating the quality of the matching. According to Rosenbaum and Rubin (1984), this can be done using standardized bias (SB) and the t-test. If the covariates (X) are evenly distributed across both groups, the pseudo R^2 value should be relatively low. The average effect of the innovation is reflected in the ATT results from the PSM analysis. One common challenge when applying PSM is that it does not allow for direct comparison of outcomes between the treatment and control groups at the same time. However, the ATT approach within the PSM framework enables estimation of the effects across both groups. The ATT model can be written in the following equation (Khandker et al. 2010);

$$ATT = E[Y_{1i} \mid D_i = 1] - E[Y_{0i} \mid D_i = 0] \text{..........} (2)$$

Where ATT is the impact calculated from the outcome variable (total company sales), namely E[Y1i | Di = 1] minus companies that do not innovate, E[Y0i | Di = 0]. E[Y1i | Di = 1]

RESULTS AND DISCUSSION

Statistical Description of Research Variables

Table 1 presents the results of the descriptive statistical analysis, highlighting the characteristics of companies that engage in innovation compared to those that do not. A t-test was also performed to determine whether there are statistically significant differences between the two groups. The analysis reveals that, at the 1% significance level, the two groups differ notably in terms of managerial experience, total sales, export activity, number of employees, research and development (R&D), and access to loans.

Based on the manager's work experience, companies that innovate are larger, which is 19 years, compared to companies that do not innovate, which is 16 years. Companies that innovate have a higher

average total sales, which is Rp3.410.000.000.000, while companies that do not innovate have Rp560.000.000.000. There is an average of 26% of companies that innovate their market location is international and 74% are domestic. Meanwhile, for companies that do not innovate, their market location is 8% international and 92% national.

Companies that innovate have an average of 310 employees, while companies that do not innovate have 148 employees. On average, 20% of companies carry out research and development (R&D) activities and 80% do not have R&D activities in the group of companies that innovate. Meanwhile, in the group of companies that do not innovate, R&D activities are carried out by 3% of companies. On average, 23% of companies provide training to their employees in the group of companies that innovate and 9% of companies in the group of companies that do not innovate. Borrowing from financial institutions is important, considering that this can help companies in operational activities or purchasing assets. In companies that innovate, an average of 50% of companies borrow funds from financial institutions. Meanwhile, in companies that do not innovate, 41% of companies borrow funds from financial institutions.

Table 1.
DESCRIPTIVE STATISTICAL ANALYSIS OF COMPANY CHARACTERISTICS

Variable	Total Sample		Companies that innovate		Companies that do not innovate		Mean Diff#
	mean	sd	mean	sd	mean	sd	
1	2	3	4	5	6	7	8=4-6
Manager's work experience (years)	16,0936	8,37412	18,6240	8,51878	15,7163	8,29122	2,90770***
Total sales (Rupiah)	9,30e+11	4,51e+12	3,41e+12	9,93e+12	5,60e+11	2,78e+12	2,85e+12***
Export (1:Yes)	0,11024	0,31334	0,26315	0,44201	0,08744	0,28264	0,17571***
Labour (People)	169,402	461,068	310,383	470,486	148,381	456,195	162,002***
R&D (1: Yes)	0,05463	0,22737	0,20300	0,40375	0,03251	0,17745	0,17049***
Employee Training (1: Yes)	0,11024	0,31334	0,23308	0,42439	0,09192	0,28908	0,14116***
Loans (1: Yes)	0,42243	0,49418	0,50375	0,50187	0,41031	0,49216	0,09344***
Observation (n)	1025		133		892		

Keterangan:
: Using t-statistics for significance
*** : Significant at level (α=1%)

Source: Researcher

Impact of Product Innovation on Total Company Sales

The logit regression is first discussed in this section which is then the logit result will be used to estimate the propensity score. The results of the logit analysis are presented in the Table 2. The results show that the variable of manager's work experience, R&D and export are positively and significantly influenced the product innovation. Meanwhile, other variables are not statistically significant in influencing the

company's decision to innovate products.

Table 2.
Factors Influencing Company Decisions in Conducting Product Innovation

Variabel	Odds Ratio	Std. Err	z	P>z
Manager's work experience (years)	1,050	0,011	4,57	0,000***
Export (1: Yes)	2,498	0,671	3,41	0,001***
Labour (people)	1,000	0,000	1,13	0,257
R&D (1: Yes)	5.149	1,724	4,89	0,000***
Employee training (1: Yes)	1,519	0,443	1,43	0,152
Loans (1: Yes)	1,118	0,238	0,83	0,405
*** : Significant at level (α=1%)				

Source: Researcher

Manager's Work Experience

Prahalad and Krishnan (2008) stated that the role of managers as leaders in a company is one of the determining factors for organizing and carrying out innovation. Manager experience will significantly influence the company's innovation process because of their position as strategic decision makers (Hambrick and Mason 1984). Manager work experience in the logit test results has a significant effect on the company's decision to carry out product innovation. This is indicated by the odds ratio value of the manager's work experience variable of 1.050 with a positive z value. This explains that companies whose managers have longer work experience have a 1.050 times greater chance of carrying out product innovation. This is in line with the research results of Koo 2019; Azeem and Baker 2020; Timothy 2022; where manager experience has a positive influence on product innovation.

Export

Export and innovation are complementary strategies for corporate growth (Golovko and Valentini 2011). Bhattacharya and Bloch (2004) found that openness through imports or exports stimulates innovation that may be an opportunity to compete effectively. Previous studies (Love and Ganotakis 2013; Jang 2017) are in line with the results of the logit analysis, that the export variable has a statistical effect on product innovation. The odds ratio value of the export variable is 2.498 with a positive value at the z value. This means that companies that export have a 2.498 times greater chance of innovating products.

Labour

Labour is used as an indicator of company size, with larger firms generally being more inclined to innovate compared to smaller ones, as suggested by Schumpeter (1976). Schmidt and Rammer (2007) also found a positive and significant relationship between firm size and both technological and non-technological innovation. However, in the logit test results, labour does not have a significant impact on a firm's decision to pursue product innovation. The odds ratio for the manager's work experience variable is 1 with a positive z-score, indicating that company size, as measured by the number of employees, does not significantly influence innovation opportunities. These findings are consistent with Isnasari and Prasetyoputra (2020), who also found that while company size based on labour has a positive relationship with product innovation, it is not statistically significant.

Research and Development

R&D activities are an important pillar in the formation of innovation capabilities and company competitiveness (Rammer et al. 2008). Companies with high levels of R&D expenditures lead to the use of

internal and external knowledge and acceleration of product innovation. The results of the logit model on the R&D variable are significant at the real level α = 1% with a p-value of 0.000. R&D has a positive value at the z value and has an odds ratio value of 5.149. This means that companies that carry out R&D activities are 5.149 times more likely to carry out product innovation.

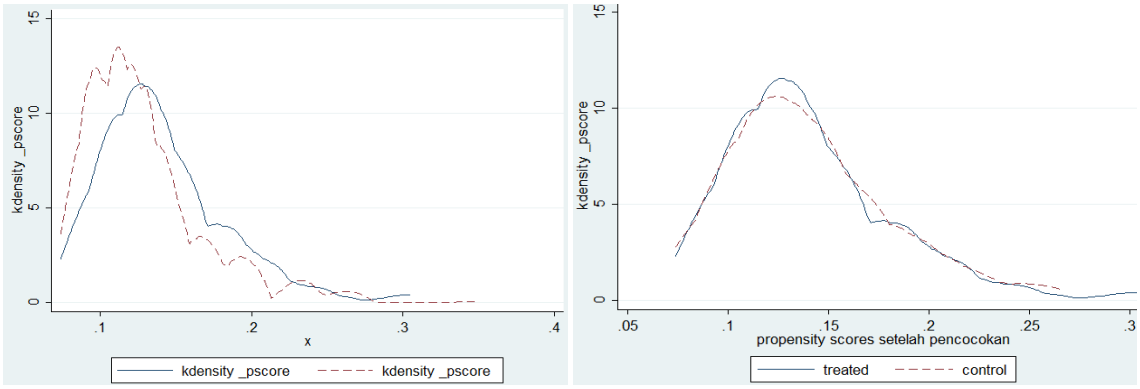
Training

Formal training for workers can increase innovation, one of which is product innovation (Freel 2006; Romijin and Albaladejo 2002). The training variable in the logit results does not significantly affect the company's decision to innovate products. This is indicated by the p-value obtained of 0.152. The odds ratio value of the training variable is 1.519 with a positive z value. The results of this study are in line with the studies of Adeyeye et al. (2016) and De Jong and Vermuelen (2006), which found that formal training has a positive but insignificant effect on product innovation. De Jong and Vermeulen (2006) explained that the lack of significance of this formal training is because the training is carried out to improve general skills only, not specifically training related to product innovation such as project management.

Loans

Access to financial resources is a key factor influencing the level of innovation within companies (Mahendra et al., 2015). Since innovation activities often involve substantial costs, companies that can secure loans from financial institutions are better positioned to support these initiatives. However, in the logit model results, the loan variable does not significantly affect a company's decision to pursue product innovation, as indicated by a p-value of 0.405. The odds ratio for borrowing funds is 1.118 with a positive z-value, but it still lacks statistical significance. This lack of impact may be due to the borrowed funds not being specifically designated for innovation-related activities.

After obtaining the covariate variables that influence the company's decision to innovate products, the next step is the matching process between the two groups. . Figure 2 is a balance plot that shows that the treatment and control groups have quite significant differences and there is no equal match between the two (left graph). So, if the two are compared directly, it will provide an incorrect conclusion due to bias. Furthermore, it is necessary to do a match between the two groups, so that the characteristics they have approach the 'same' conditions (Figure 2, right graph). So that, the PSM model after the matching process in the two groups that match and convince that the difference in total company sales can be an indicator of the outcome between the two groups is caused by innovation.



Source: Researcher

Figure 2: BALANCE PLOT BEFORE AND AFTER MATCHING

To assess the effect of innovation, the Nearest-Neighbor Matching method is applied. This approach generates the Average Treatment Effect on the Treated (ATT), which represents the difference in outcomes between the group that received the treatment and the control group. This

ATT value is the difference value that shows the impact between groups of companies that innovate and those that do not innovate. The ATT value in Table 2 is statistically significant (t-test> 2, for alpha 5%) and shows that innovation can increase the company's total sales. The average total sales of companies that innovate are 2.56 percent higher when compared to companies that do not innovate, cateris paribus.

Table 2.
IMPACT OF INNOVATION WITH PSMATCH METHOD AND NEAREST-NEIGHBOR MATCHING METHOD

Var Sampel	Treated	Controls	Difference	S.E.	T-stat
SAL Unmatched	23,8864963	22,055182	1,8313138	0,27796	6,59
ATT	23,8864963	21,320955	2,5655416	0,72761	3,53

Source: Researcher

After that, a balancing test is conducted to determine the possibility of bias from each variable. The results of the balancing test can be seen in Table 3. Innovation in this study has an impact on increasing the company's total sales. Table 4 shows that the ATT value is statistically significant (t-test> 2, for alpha 5%) and the average total sales of companies that innovate are 4.57% higher when compared to companies that do not innovate, cateris paribus.

Table 3.
IMPACT OF INNOVATION WITH PSMATCH METHOD AND NEAREST-NEIGHBOR MATCHING METHOD AFTER BALANCING TEST

Variable Sample	Treated	Controls	Difference	S.E.	T-stat
SAL Unmatched	23,8864963	22,0551824	1,8313138	0,27796	6,59
ATT	23,8864963	19,3126876	4,5738087	0,44969	10,17

Source: Researcher

CONCLUSIONS

Factors that are positively and statistically significant in influencing a company's decision to innovate products are the manager's work experience, export and R&D. Meanwhile, labour as a company size, worker training and loans influence a company's decision to innovate products positively, but are not statistically significant. The result shows a statistically significant effect of impact product innovation on company total sales after balancing test using the NNM method. Companies that innovate products have a company total sales that is 4.57% higher than companies that do not innovate products. This means that product innovation has a real impact on total sales. Therefore, increasing product innovation in the manufacturing industry sector can be increased by focusing on activities (R&D and exports) that lead to increasing product innovation.

Companies must allocate dedicated funding to support R&D activities effectively. Additionally, expanding target markets internationally can stimulate product innovation. From a policy perspective, the government also plays a crucial role in enhancing innovation within the manufacturing sector. By supporting R&D and export-related initiatives, the government can help drive innovation and research development in businesses. This support is particularly vital for small enterprises, which often lack sufficient resources to carry out R&D effectively. To address this, the government can provide specific funding for research and development through research and community service programs at Indonesian universities. Given the limited studies on the impact of product innovation, further research is necessary. Future studies should not only focus

on sales performance but also consider other performance indicators. Moreover, it is recommended that innovation research be explored in greater depth, distinguishing between radical and incremental innovation.

REFERENCE

Adeyeye, AD., Jegede, OO., Oluwadare, AJ., & Aremu, FS. (2016). Micro-level determinants of innovation: Analysis of the Nigerian manufacturing sector. Innov Dev. 6(1):1–14. doi:10.1080/2157930X.2015.1047110.

Aminullah, E., Fizzanty, T., Indraprahasta, G. S., & Asmara, I. J. (2015). Technological convergence in Indonesian firms: cases of biobased chemical product innovation. Asian Journal of Technology Innovation, 23(August 2015), 9–25. https://doi.org/10.1080/19761597.2015.1011259

Arsyad, L. (2010). Ekonomi Pembangunan, Edisi 5. Yogyakarta: UPP STIM YKPN Yogyakarta.

Azeem, M. M., & Baker, D. (2020). Human Capital Endowments, Establishments' Practices, And Innovation: A Cross-Country Analysis Of The Food And Beverage Industry. International Journal of Innovation Management, 24(7). https://doi.org/10.1142/S1363919620500632

Baumol, W. J. (2002). Entrepreneurship , Innovation and Growth : The David-Goliath Symbiosis Entrepreneurship , Innovation and Growth : 7(2), 1–10.

Bhattacharya M, Bloch H. 2004. Determinants of innovation. Small Business Economics. 22(2):155-162. doi:10.1023/b:sbej.0000014453.94445.de

BPS. (2020). Statistik Indonesia 2020. Jakarta.

Canh, N. T., Liem, N. T., Thu, P. A., & Khuong, N. V. (2019). The impact of innovation on the firm performance and corporate social responsibility of Vietnamese manufacturing firms. Sustainability (Switzerland), 11(13). https://doi.org/10.3390/su11133666

Cheng, C. F., Lai, M. K., & Wu, W. Y. (2010). Exploring the impact of innovation strategy on R&D employees' job satisfaction: A mathematical model and empirical research. Technovation, 30(7–8), 459–470. https://doi.org/10.1016/j.technovation.2010.03.006

Cohen, W. M., & Klepper, S. (1996). Firm size and the nature of innovation within industries: The case of process and product R&D. Review of Economics and Statistics, 78(2), 232–243. https://doi.org/10.2307/2109925

De Jong, J., & Vermeulen, P. (2006). Determinants of product innovation in small firms: a comparison across industries. International Small Business Journal. 24(6):587-609. doi:10.1177/0266242606069268.

Freel M. 2006. Patterns of technological innovation in knowledge intensive business services. Industry and Innovation. 13(3): 335-359.

Golovko E, Valentini G. 2011. Exploring the complementarity between innovation and export for SMEs growth. J Int Bus Stud. 42:99–118.

Hambrick D, Mason P. 1984. Upper erchelons: the organization as a reflection of its top managers. Acad Manag Rev. 9:193–206.

Hartono, A., & Kusumawardhani, R. (2019). Innovation Barriers and Their Impact on Innovation: Evidence from Indonesian Manufacturing Firms. Global Business Review, 20(5), 1196–1213. https://doi.org/10.1177/0972150918801647

Hoffman, K., Parejo, M., Bessant, J., & Perren, L. (1998). Small firms, R&D, technology and innovation in the UK: A literature review. Technovation, 18(1), 39–55. https://doi.org/10.1016/S0166-4972(97)00102-8

Isnasari Y, Prasetyoputra P. 2020. Determinants of innovation among manufacturing firms in a developing country: Insights from Indonesia. Di dalam: Hurriyati R, Tjahjono B, Yamamoto I, Rahayu A, Abdullah AG, Danuwijaya A, editor. Advances in Business Management and Entreprenuership. London (UK): CRC Press. hlm 581-584.

Jang, M. (2017). Determinants of innovation in SMEs : An empirical analysis of South Korea. 0–39.

Kafetzopoulos, D., & Psomas, E. (2015). The impact of innovation capability on the performance of

manufacturing companies the Greek case. Journal of Manufacturing Technology Management, 26(1), 104–130. https://doi.org/10.1108/JMTM-12-2012-0117
Khandker, S., Gayatri, S., & Hussain, K. (2010). Handbook on Impact on Evaluation: Quantitative Methods and Practices. Washington D.C: The World Bank.
Koo, K. J. (2019). Do not change horses: specialist CEOs enhance innovation. Technology Analysis and Strategic Management, 31(8), 875–887. https://doi.org/10.1080/09537325.2019.1566525
Love, J. H., & Ganotakis, P. (2013). Learning by exporting: Lessons from high-technology SMEs. International Business Review, 22(1), 1–17. https://doi.org/10.1016/j.ibusrev.2012.01.006
Mahendra, E., Zuhdi, U., & Muyanto, R. (2015). Determinants of Firm Innovation in Indonesia: The Role of Institutions and Access to Finance. Economics and Finance in Indonesia, 61(3), 149. https://doi.org/10.7454/efi.v61i3.512
Onikoyi IA. 2017. Impact of product innovation on organisational performance (A survey of Nestle Nigeria plc). Journal of Marketing & Consumer Research. 37(2004):23–31.
Prahalad CK, Krishnan MS. 2008. The New Age of Innovation: Driving Cocreated Value through Global Networks. New York: Mcgraw-Hill Professional.
Prihadyanti, D., & Laksani, C. S. (2015). R & D dan Inovasi di Perusahaan Sektor Manufaktur Indonesia. Jurnal Manajemen Teknologi, 14(2), 187–198. https://doi.org/10.12695/jmt.2015.14.2.5
Rammer C, Czarnitzki D, Spielkamp A. 2008. Innovation Success of Non-R & D-Performers Substituting Technology by Management in SMEs. Small Business Economics. 33:35–58. doi: 10.1007/s11187-009-9185-7
Romijin, H., & Albaladejo, M. (2002). Determinants of innovation capability in small electronics and software firms in Southeast England. Research Policy. 31(7): 1053-1067.
Rosenbaum, P. R., & Rubin, D. B. (1984). Reducing bias in observational studies using subclassification on the propensity score. Journal of the American Statistical Association, 79(387), 516–524. https://doi.org/10.1080/01621459.1984.10478078
Rosli, M. M., & Sidek, S. (2013). The Impact of Innovation on the Performance of Small and Medium Manufacturing Enterprises: Evidence from Malaysia. Journal of Innovation Management in Small & Medium Enterprise, 2013, 1–16. https://doi.org/10.5171/2013.885666
Schmidt, T., & Rammer, C. (2007). Non-technological and technological innovation: strange bedfellows?. ZEW-Centre for European Economic Research Discussion Paper. 07-052
Schumpeter, J. A. (1976). Capitalism, Socialism and Democracy (London. George Allen.
Scott, A. J., Hosmer, D. W., & Lemeshow, S. (1991). Applied Logistic Regression. In Biometrics (Vol. 47, Nomor 4). https://doi.org/10.2307/2532419
Timothy, V. L. (2022). The effect of top managers' human capital on SME productivity: the mediating role of innovation. Heliyon, 8(4), e09330. https://doi.org/10.1016/j.heliyon.2022.e09330
United Nations Industrial Development Organization. (2020). Competitive Industrial Performance (CIP) report. Vienna.
World Bank. (2012). Mempercepat Laju: Revitalisasi Pertumbuhan di Sektor Manufaktur Indonesia. Jakarta.