Implementation of Open Innovation and Its Effect on Innovation Performance in Small and Medium Enterprises in Indonesia

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Abstract— This study aims to determine the influence of internal and external knowledge sources based on market, science and open source and collaboration on product innovation and the effect of product innovation on innovation performance in SMEs in Indonesia. By using secondary data obtained from the results of a survey conducted by the Research Center for the Development of Science and Technology (PAPPIPTEK). The survey was conducted in 2014 as many as 833 samples and there were 564 small companies or 67.7% and medium companies as many as 269 or 32.2%. Data analysis was performed using multiple linear regression analysis with the help of SPSS 20 application. The results of this study indicate that internal knowledge sources, market-based external knowledge sources and collaboration can significantly affect product innovation while science-based and open source knowledge sources are not significant. in influencing product innovation and product innovation has a positive effect on the innovation performance of Small and Medium Enterprises (SMEs).

Index Terms— PAPPIPTEK, Innovation Performance, Product Innovation, Internal Knowledge Sources and External Market Based, Science and Open Source.

I. INTRODUCTION

The business world is currently experiencing increasingly fierce competition with evidence that more and more new businesses are entering the market. Companies need to innovate on an ongoing basis so that they can provide added value for customers so that the company survives and excels in the competition. The implementation of innovation is not only for large companies but also in the small and medium business sector. New SMEs are always present and showcase their products, they must be able to adapt to changes in business and competition and adapt to technological advances. SMEs are one of the sectors that greatly contribute to economic growth in Indonesia. This is evidenced by the SME macro data published by the Ministry of Cooperatives and SMEs which shows the contribution of SMEs in creating national added value in 2013 was 60.34 percent of the Gross Domestic Product. Utilization of internal and external knowledge sources, collaborative activities or external collaboration can also increase company innovation. External collaboration is an effective mechanism to increase the innovation capacity of companies. External cooperation is collaborating with several organizations such as customers, suppliers, competitors, universities, consultants, government

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and private research and development.

According to Whitehead, cooperation can be carried out for long-term or long-term interests which must start from the trust of both parties. The benefits of working together are to withstand environmental shocks, increase economic and living efficiency, access complementary resources, learn new skills, absorb technology, manage relationships with competitors, and compete with competitors. In addition, research that discusses the topic of SMEs by involving collaboration factors, internal and external sources of knowledge, open innovation and innovation performance is also still limited. Therefore, there is no accurate understanding of the elements of collaboration, external and internal sources, and the role of open innovation in SMEs in Indonesia in incorporating the innovation performance of SMEs. This makes research on the application of open innovation in Indonesian SMEs interesting by being linked to the practice of internal knowledge sources and collaborative activities to test product performance. Although research on open innovation and performance has been carried out in Indonesia, this research focuses more on large companies.

II. LITERATUREREVIEW

A Internal Knowledge Source and Product Innovation Internal source knowledge can be obtained from employees and owners. Companies can take advantage of new ideas from employees by implementing a suggestion system where employees transfer ideas to support their company's innovation. Sharing knowledge as well as enabling employees to share experiences and dialogue with others can build ideas to explore sources of innovation. Research by Gomez et.al (2015) shows that 6 sources (internal, suppliers, customers, competitors, consultants and universities) have a positive effect on product innovation [1]. These results are in line with research by Amara & Landry (2005) that innovations are developed using knowledge from various sources of innovation [2].

H1: Internal knowledge sources have a positive effect on product innovation

B External Knowledge Sources (Market, Science and Open Source) and Product Innovation

The application of open innovation in companies aims to



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provide direction from internal and external sources of information or knowledge that can be used to develop innovation [3]. In the midst of today's business competition, the Company does not only rely on its own internal knowledge to innovate [4]. Because one of the successes of current innovation is utilizing their collaboration to effectively, effectively and integrate various sources [5]. According to Lichtenthaler (2008) who has conducted a survey on the manufacturing SME sector in Germany, Austria and Switzerland stated that 32.5% of respondents have been involved in open innovation. benefits include minimizing innovation costs, time efficiency, developing the latest technology to reducing risk so that it can bring up the latest ideas that are in demand by the market [6]. Therefore, many companies change their innovation strategy from closed innovation to open innovation [7].

The relationship between companies with the aim of conducting open innovation has been widely practiced by several industries such as the technology industry, pharmaceuticals, including the food and beverage industry. This explains that the challenge in facing competition is to exploit external knowledge sources using open innovation implementation in order to improve innovation performance [8]. Parida (2012) states that the application of open innovation can affect the performance of SMEs and even the performance of large companies.[9] Singapurwoko & Hartono (2020) research states that external knowledge of the market (ie suppliers, customers, and competitors) and open (company associations) positively sources affects innovation.[10] In addition, research from Levebvre et al (2013) states that market-based external sources have a positive and significant effect on product innovation [11]. Fukugawa (2006) the fact that establishing contact with external knowledge sources has an important influence on the company's innovative ability [12].

H2: Market-based external knowledge sources have a positive effect on product innovation.

H3 : External knowledge sources based on science have a positive effect on product innovation.

H4: External knowledge sources based on open source have a positive effect on innovation product.

C Product Collaboration and Innovation

Cooperation in the business world can be done with consumers, suppliers, universities, research institutes, consultants, investors/financiers, government and so on. Cooperation involving consumers plays an important role in product innovation so that it can influence purchasing decisions and satisfy consumers. Therefore, suppliers are one of the company's external strength factors.

In addition to cooperation with customers and suppliers, collaboration with public research institutions and universities is the most important source of knowledge for SMEs in developing countries. According to Lasagni (2012), collaboration with research institutes and universities also has a positive effect on innovation. working with consultants has

become a source of knowledge in companies to meet company needs and to achieve successful implementation results [13] Positive cooperation between the company and external consultants plays an important role in the implementation of enterprise systems, which took place several months or years ago. Collaboration between companies is a factor that drives innovation.

H5: Cooperation/cooperation activities have a positive effect on product innovation.

D Product Innovation and Innovation Performance

Tjiptono (2008) states that innovation is the practical application of ideas into a new product or process. Innovations made on products that are needed with the aim of maintaining consumer buying interest. Product innovation that is carried out effectively with high intensity can determine marketing performance in a company. [14] Product innovation is also important to create competitive advantage and improve company performance. Because the performance of innovation in the company is one of the achievements of how well the activities and processes are able to be carried out by the company in increasing profitability so that it can be used as a benchmark for the excellence of a company. This is in line with research conducted by Buwana and Nursyamsiah (2018) which states that adopting innovative practices (including product innovation) tends to lead to superiority and lead to better business performance [15].

Laraswati's research (2020) entitled the influence of the breadth of shared creativity on innovation performance through product innovation and knowledge sharing as a mediating variable states that there is a positive and significant influence of product and process innovation on innovation performance [16]. In line with the research of Najib and Kiminami (2011) based on the results of the analysis and discussion of product innovation and SME performance, it can be said that the research describes the characteristics of SMEs which have a positive and significant relationship between product innovation and innovation performance [17].

H6: Product innovation has a positive effect on innovation performance

III. METHODOLOGY

This type of research is quantitative research where the data used is secondary data. Secondary data obtained from the 2014 Indonesian Innovation Survey Data conducted by PAPPIPTEK (Center for Research on the Development of Science and Technology) LIPI. Currently, the national innovation survey by companies in Indonesia is only carried out in three waves, namely in 2008, 2011 and 2014, therefore the 2014 data is the last data owned by Indonesia. Data collection in 2014 was carried out in 2011-2013 on manufacturing and service companies in Indonesia. The data



International Journal of New Technology and Research (IJNTR) ISSN: 2454-4116, Volume-8, Issue-2, February 2022 Pages 56-65

collection carried out in this study used a questionnaire and a measurement scale with the sampling method in this study carried out by multi-stage random sampling. Multi-stage random sampling is a subset of simple random sampling. The research will take samples based on the criteria of companies in the manufacturing and service sectors that carry out collaborative activities and use internal and external knowledge sources as input for product innovation and improve innovation performance. The questionnaire produced by the Indonesian innovation survey refers to the Oslo Manual developed by OECD/Eurostat in 2005. The Oslo Manual is a guide in conducting surveys and translating the results of survey innovations used by developed countries in the European part [18]. Secondary data obtained from the questions on the questionnaire are made very clear so that



IV. RESULTS AND DISCUSSION

A Results

1 Descriptive Analysis

This descriptive analysis is used to explain descriptive research on variables consisting of market-based internal and external knowledge sources, science and open source as well as innovation performance. internal and external sources of knowledge use a measurement scale to a value of 0 which means very unimportant with 4 which means very important. Meanwhile, performance is measured using a percentage. The results of the descriptive analysis on the variables.

	Ν	Minimum	Maximum	Mean	Std.Deviation
RD_STAFF	833	0	4	1.33	1.415
MKTG_STAFF	833	0	4	1.76	1.661
PROD_STAFF	833	0	4	1.54	1.544
MANAGEMENT	833	0	4	1.83	1.672
RD_FIRMSGRO	822	0	4	1 15	1 269
UP	033			1.15	1.208
Rata-rata				1.52	1.512

Table 1: Assessment of Internal Knowledge Source Variables

Based on table 1 shows that the average respondent's assessment of internal knowledge sources is 1.52. This shows that innovation based on internal knowledge sources carried out by SMEs is quite important in their innovation. The average score for internal knowledge sources is above 1 so it is very relevant if it is said to be quite important in SME innovation.

Table 2 : Market, Science and Open Source External Knowledge Source Assessment

	1		U		
	Ν	Minimum	Maximum	Mean	Std.Deviation
Market-Based External Know	ledge Sour	rce			
SUPP	833	0	4	1.61	1.576
CUSTOMER	833	0	4	1.97	1.751
COMPETITORS	833	0	4	1.66	1.578



they can interpret the research objectives. Questions related to qualitative type indicators use a binary scale (yes or no), and an ordinal scale [19].

The data analysis method used includes descriptive analysis and quantitative analysis consisting of validity, reliability, classical assumption tests and multiple linear regression. This study uses five independent variables, namely internal knowledge sources, market-based external knowledge sources, science-based external knowledge sources, open source-based external knowledge sources, and collaboration. As for the independent variables, there are product innovation and innovation performance. The research framework described in this study.

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CONSULTANT	833	0	4	1.08	1.173
COMMLAB	833	0	4	0.94	1.012
Rata-rata			·	1.45	1.418
Science-Based External Know	wledge Sou	irce			
UNIV	833	0	4	0.91	0.975
POLTECH	833	0	4	0.84	0.889
GOV_RD	833	0	4	0.86	0.918
NONPROF_RD	833	0	4	0.85	0.904
Rata-rata				0.86	0.92
Open Source Based External	Knowledge	e Source			
CONFERENCE	833	0	4	1.19	1.283
PUBLICATION	833	0	4	1.02	1.103
INVESTORS	833	0	4	1.21	1.290
ASSOCIATION	833	0	4	1.14	1.227
INTERNET	833	0	4	1.63	1.590
ENTREP	833	0	4	1.56	1.548
Rata-rata				1.29	1.34
Rata-rata Total				1.20	1.22

Based on the descriptive analysis as shown in table 2, it is explained that the average external respondents' assessment of the source of knowledge is 1.20. This shows that market-based, science and open source external knowledge sources perceived by SMEs are quite important in their innovation. The highest score is found in market-based knowledge sources which have a score above 1 with an average of 1.45 compared to 2 other external knowledge bases such as science and open source. Sources of science-based knowledge are a basis that is not too important according to SMEs in carrying out innovation.

Table 3 : Assessment of Innovation Performance Variables

	Ν	Minimum	Maximum	Mean	Std. Deviation
Radical Innovation	833	0	100	12.06	23.073
Incremental Innovation	833	0	100	20.85	31.072
Innovation Performance	833	0	100	32.91	40.768

Based on descriptive analysis such as table 3 shows that the average assessment of innovation performance is 32.91. When compared with innovation on innovation, it can be obtained that its performance has a lower value of 12.06% compared to performance on incremental innovation which has a value of 20.85%. This shows that SMEs tend to choose to innovate using existing products and processes to improve, rather than having to make significant changes because innovating as a whole certainly requires large costs and adequate internal and external.

2 Quantitative Analysis

a) Validity test

The variables that were tested for validity were internal and external sources of information with the help of SPSS software version 25 for windows. In conducting the validity test, the technique used is the product moment correlation technique where each item or indicator can be declared valid if it has r arithmetic r tables, and vice versa if r count < r table then it is declared invalid. The validity test uses a significant standard of 5% or 0.05. The following are the results of the calculation of the validity test in table 4 below:

Table 4 : Variable Validity Test Results

		Koefisien	r	Descripti
Variable	Item	Korelasi	table	on
	Staff R&D	.913	0.068	Valid
	Marketing department	.946	0.068	Valid
	Production department	.923	0.068	Valid
	Management staff	.932	0.068	Valid
	Other R&D units			
	within the same company	.867	0.068	
Internal Knowledge Source	group			Valid
	Suppliers of			
	equipment, materials,	.913	0.068	
Market-based External Knowledge Sourcer	components or software			Valid



International Journal of New Technology and Research (IJNTR) ISSN: 2454-4116, Volume-8, Issue-2, February 2022 Pages 56-65

	Client or customer	.934	0.068	Valid
	Competitors or other companies	.930	0.068	Valid
	Consultant	.857	0.068	Valid
	Commercial laboratories or private R&D institutions	.852	0.068	Valid
	University or other higher education institution	.942	0.068	Valid
	Polytechnic	.951	0.068	Valid
	Government R&D Institute	.962	0.068	Valid
Science-based External Knowledge Source	A non-profit R&D institute.	.952	0.068	Valid
	Conference or trade show	.889	0.068	Valid
	Scientific journals and trade/technical publications	.893	0.068	Valid
	Investors (banks, capital, ventures, etc.)	.889	0.068	Valid
	Industry association	.899	0.068	Valid
	Internet	.899	0.068	Valid
External Knowledge Source based on Open Source	Experienced entrepreneur	.913	0.068	Valid

Based on table 4, it can be said that the results of the correlation coefficient on all research variables have a value (r count) > rtable. So that all the questions contained in the research instrument can be declared valid.

b) Reliability Test

Reliability test is often interpreted as a level of confidence. According to Arikunto (2002), a good measuring instrument must also have a level of constancy, meaning that it has been tested many times [20]. The reliability test in the SPSS used is Cronbach Alpha, where the assessment is if Cronbach Alpha > 0.60 then the variable is declared reliable or consistent and if Cronbach Alpha < 0.60 then the variable is declared unreliable or inconsistent [21]. The following are the results of the reliability test calculations in table 5 below.

Alpha Crobach	Critical value	Description
0.951	0.6	Reliable
0.932	0.6	Reliable
0.965	0.6	Reliable
0.948	0.6	Reliable
	Alpha Crobach 0.951 0.932 0.965 0.948	Alpha Crobach Critical value 0.951 0.6 0.932 0.6 0.965 0.6 0.948 0.6

 Table 5 : Reliability Test Results

Based on table 5, it can be seen that the results of the reliability test on each variable have a Cronbach Alpha coefficient value> 0.6 which means that all items in the research instrument are declared reliable.

3. Regression Analysis

This research is a quantitative research that uses multiple linear regression analysis where the analysis aims to determine the effect of internal, external and collaborative knowledge sources on product innovation. Before performing data analysis, it is necessary to test the classical assumptions first using the IBM SPSS 23 for Windows help program. The stages of testing classical assumptions include the following.



Classic assu	mption test
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Normality test

Table 6Kolmogorov-Smirnov Test . One Sample Normality Test

		Unstandardized Residual
Ν	-	833
Normal Parameters ^a	Mean	.0000000
	Std. Deviation	.38979226
Most Extreme Differences	Absolute	0.209
	Positive	0.149
	Negative	-0.209
Kolmogorov-Smirnov Z		1.036
Asymp. Sig. (2-tailed)		.174

a. Test distribution is Normal.

Heteroscedasticity Test

The results of the heteroscedasticity test can be seen that the two independent variables have a significance value of more than 0.05 as shown in Table 7. Thus there is no heteroscedasticity problem in this regression model.

		Unstandardized Coefficients		Standardize d Coefficients		
Model		В	Std. Error	Std. Error Beta		Sig.
1 (Co	onstant)	.167	.299		.558	.578
si_]	ln	.111	.097	.119	1.145	.255
sep	_ln	.034	.140	.030	.247	.806
ses	_ln	013	.095	015	140	.889
seo	_ln	.141	.110	.147	1.277	.204

Table 7: Heteroscedasticity Test of Glejser Coefficientsa . Method

Variable: Dependent a. Product_Innovation

Multicoenerality test

The results of the multicollinearity test presented in Table 8 show that there is no multicollinearity problem. This can be seen from the VIF value for the two independent variables < 10 and the Tolerance value > 0.100.

Table 8 Multikoeneralitas Coefficients ^a test	
Tolerance	VIF
.761	1.315
.570	1.754
.691	1.448
.620	1.612

Multiple Regression Analysis

The results of the multiple linear regression analysis obtained are as follows.

Table 9 Coefficients^a



	Unstandardized Coefficients		Standardized Coefficients		
Model	В	Std. Error	Beta	t	Sig.
(Constant)	.137	.021		6.650	000
SPI_X1	.013	.005	.187	2.743	006
SPE_PASAR	.022	.007	.276	3.211	001
SPE_SAINS	.000	.008	.000	010	992
SPE_OPENSOURCE	.009	.005	.134	1.696	090
KOLABORASI	.161	.041	.113	3.895	000
a. Dependent	V	ariable:			

Product_Innovation

The result of the regression equation is that if the proper regression coefficient shows 0.013, the internal knowledge source variable has increased or decreased by one unit, then the product innovation variable has increased or decreased by 0.013. This also applies to other variables.

F Uji test

The test is used to determine the effect together on the dependent variable. The F test is done by comparing the significance value (probability) of an F test with an error rate (α) of 5%. If the significance level < = 0.05, then the independent variables have a joint effect on the dependent variable.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	81.924	5	16.385	107.337	$.000^{a}$
	Residual	126.240	827	.153		
	Total	208.163	832			

a. Predictors: (Constant), COLLABORATION, SPE_SAINS, SPI_X1, SPE_OPENSOURCE, SPE_PASAR

b. Dependent Variable:Product_Innovation

Based on the anova table, it can be seen that the value of sig (0.000) < sig a (0.05) it can be said that safety (internal knowledge sources, market-based external knowledge sources, science-based external knowledge sources, open source-based external knowledge sources and collaboration) together can affect the dependent variable (product innovation).

Coefficient of Determination Test

The coefficient of determination (R2) is basically used to measure how far the model's ability to explain the variation of the dependent/bound variable. When the R2 value obtained is close to 1, then the influence of the independent variable on the dependent variable is very high.

Table 11 Model Summary

Model	R	R Square	Adjusted R Square	Std. Estim	Error ate	of	the
1	.627 a	.394	.390	.39	1		

a. Predictors: (Constant), COLLABORATION, SPE_SAINS, SPI_X1, SPE_OPENSOURCE, SPE_PASAR



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Table 11 Model S	Summary ^b
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Model	R	R Square	Adjusted R Square	Std. Estima	Error	of	the
1	.627 ª	.394	.390	.391			

b. Dependent Variable:

Product_Innovation

The table explains that the coefficient of determination (R2) between internal knowledge sources, market-based external knowledge sources, science-based external knowledge sources, open source-based external knowledge sources and collaboration on product innovation is 39.4% while the rest of the results are 61.6% influenced by variables that do not exist in this study.

t test

The test used to test the presence or absence of the influence of the independent variable on the dependent variable.

Table 12	Coefficients ^a
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Model	Т	Sig	Description
(Constant)	6.650	.000	-
SPI_X1	2.743	.006	Significant
SPE_PASAR	3.211	.001	Significant
SPE_SAINS	010	.992	Not significant
SPE_OPENSOURCE	1.696	.090	Not significant
KOLABORASI	3.895	.000	Significant

Based on the table, it shows that the variables of internal knowledge sources, market-based external knowledge sources and collaboration have a positive and significant effect on product innovation and science-based and open source knowledge sources have no significant effect on product innovation.

B DISCUSSION

1. The Influence of Internal Knowledge Sources on Product Innovation

The results based on the research that has been obtained are able to prove that there is a significant influence related to internal knowledge sources on product innovation. This explains that the importance of utilizing knowledge sources in the SME environment is able to contribute to product innovation. There is an influence of internal sources of knowledge on product innovation that can be recognized by the company by conducting internal research and development activities and taking into account the history of the company as a material for continuous improvement. The ability of employees is very important for new knowledge so it is necessary to hold an internal company education and training program to further develop and improve the internal knowledge base. Employees who work to convey ideas will improve the quality of employees in analyzing ideas and build quantity on the ideas they produce, so that they will make a high contribution to the company. So the results of this study are in line with research conducted by Gomez et.al (2015) showing that internal sources have a positive effect on product innovation [22].

2. Effect of Market-Based External Knowledge Sources on Product Innovation

The results of the analysis are able to prove that there is a positive and significant influence of market-based external sources on product innovation. This explains that the use of market-based external knowledge sources in SMEs is able to contribute to product innovation. Suppliers can also gain knowledge and expertise owned by the company regarding the latest technological developments in the production process to the demands and trends that are demanded by the market. in addition to suppliers utilizing the knowledge of customers are able to obtain the wants and needs of customers and consumers in the market. This shows that the higher the orientation of market-based external sources owned by the organization will increase the product innovation that is made. The results of the study support the research of Levebvre et al (2015) which states that market-based external sources have a positive and significant effect on product innovation [23].

3. The Effect of Science-Based External Knowledge Sources on Product Innovation

The results of the analysis in this study are able to prove that there is no positive and significant influence of science-based



external knowledge sources on product innovation. This explains that the use of knowledge sources in SMEs has not been able to provide external contributions to product innovation. There is no influence of science-based external knowledge sources on SMEs, this could be due to the fact that retrieval of science-based information really requires a lot of funds so that it can only be done by large companies and companies that have patented or received public funds to innovate [24]. So that this science-based external source is very relatively low in application because SMEs tend to take advantage of internal R&D capabilities in developing knowledge. The results of this study confirm the results of previous studies, that science-based external sources have no effect on product innovation (Capitanio et al., 2010) [25].

4. The Effect of Open Source-Based External Knowledge Sources on Product Innovation

There is no influence of open source external sources on product innovation due to challenges or difficulties in data originating from platforms and social media that must be carried out by internal R&D experts at the company. So that external sources of knowledge are also needed, such as experienced entrepreneurs or universities who have integrity in solving problems. The results of this study are not in accordance with research conducted by Singapurwoko & Hartono (2020) which states that external knowledge from open sources positively affects innovation [26].

5. The Effect of Collaboration on Product Innovation The results of the analysis in this study are able to prove that there are positive and significant interactions with product innovation. This explains that collaborating with SMEs is able to contribute to product innovation. Collaboration is joint involvement in coordinated efforts to solve problems together [27]. Collaboration in the business world can be done with consumers, suppliers, universities, research institutes, consultants, investors/financiers, government and so on. There is collaborative interaction on product innovation because it is an interest as well as an advantage for each group who is aware of the advantages of collaborating, such as cooperation in SMEs involving consumers, suppliers, research institutions, consultants, investors/financiers, government and others in products because it can affect the product. purchase decision and satisfaction. The results of this study are in accordance with research conducted by Najib & Kiminami (2011) showing positive external cooperation on innovation [28]. And in line with research obtained from Lasagni (2012) collaboration with research institutions and universities also has a positive effect on innovation [29].

6. The Effect of Product Innovation on Innovation Performance

The results of the analysis in this study are able to prove that there is a positive and significant effect of product innovation on innovation performance. Product innovation is a combination of several existing processes and the relationship between one product and another. There is a significant influence of product innovation on innovation performance because of the activities and processes effectively with high intensity carried out by SMEs to develop products and increase profitability, so this can be a benchmark for the excellence of an SME. The results of this study are in line with research conducted by Buwana and Nursyamsiah (2018) which states that adopting innovative practices (including product innovation) tends to be superior and lead to better business performance [30]. And the positive variable Laraswati's research (2020) entitled the influence of the breadth of creativity on innovation performance through product innovation and knowledge sharing as a mediation (a case study of silver crafts in the Kotagede area of Yogyakarta) states that there is a significant and significant effect of product innovation on innovation performance [31].

V. CONCLUSION

Based on the analysis and discussion related to the influence of internal, external and collaborative knowledge sources on product innovation and the effect of product innovation on performance, the following conclusions can be drawn:

SMEs that use internal knowledge sources can significantly influence product innovation. This shows that the use of internal knowledge sources is able to contribute to SMEs in innovating their products.

SMEs that use market-based external knowledge sources can significantly influence product innovation. This shows that the use of market-based external knowledge sources can contribute to SMEs in innovating their products.

SMEs that use science-based external knowledge sources are not significant in influencing product innovation. This shows that the use of science-based external knowledge sources has not been able to contribute to SMEs in innovating their products.

SMEs that use open source-based external knowledge sources are not significant in influencing product innovation. This shows that the use of open source-based external knowledge sources has not been able to contribute to SMEs in innovating their products.

SMEs that collaborate or collaborate can significantly influence product innovation. This shows that cooperation has been able to contribute to SMEs in innovating their products.

Product innovation has a positive effect on the innovation performance of SMEs. This shows that the higher the SMEs are able to implement open innovation to innovate products, the higher the performance of the resulting innovation. And if SMEs do not implement open innovation, it will reduce innovation performance.



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