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**THE ROLE OF SUPPLY CHAIN DRIVERS ON R&D PERFORMANCE IN  
MANUFACTURING COMPANIES  
(Empirical Evidence on Family Business)**

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**Abstract**

The current condition of family businesses engaged in manufacturing that are closely related to the supply chain is expected to perform optimally, where the company's performance is influenced by several supply chain drivers, namely growth and innovation. R&D performance. The purpose of this research is to determine the effect of growth & innovation on R&D performance through partnership in R&D as a mediating variable that can have an impact on the competitiveness of companies and countries. The research focuses on family-owned manufacturing companies. The research uses a quantitative approach and a descriptive type of research. This study applies a random sampling technique and the data obtained and can be processed are 51 data which are owner of Indonesian manufacturing industry companies. Collecting data by distributing questionnaires online, analyzed using PLS. This study finds that growth does not affect partnerships in R&D, innovation is the driving force for R&D partnerships, and growth, innovation, and R&D partnerships have an impact on R&D performance. In addition, partnership in R&D as a mediating variable does not affect the relationship between growth and R&D performance but affects the relationship between innovation and R&D performance.

**Keywords:** Growth, innovation, R&D cooperation, R&D performance, manufacturing, supply chain management

**1. Introduction**

The coronavirus, which has been declared a pandemic, has greatly influenced many things, including the business world. This coronavirus has revealed an important fact that the supply chain is like the lifeblood of a country's economy, companies, and also every individual in society (Ivanov, 2020). Based on data (Consultancy. EU, 2020) 69% of companies in DACH

(Germany (D), Austria (A), Switzerland (CH)), and the UK experienced a decline in revenue. The coronavirus has had a significant impact on the majority of companies, apart from a decline in market demand, as well as supply chain bottlenecks. The epidemic that started in Wuhan, China immediately had an impact on Chinese export activities and reduced the availability of global supplies (Ivanov, 2020) thus affecting Indonesia as a Chinese importer. This greatly affects the manufacturing industry which is closely related to the supply chain and as an industry that contributes greatly to the achievement of gross domestic product (Kemenperin, 2019). Especially with the government's policy regarding Large-Scale Social Restrictions (PSBB) which makes manufacturing companies unable to operate optimally (Mahy, 2020).

The impact of the pandemic not only has an impact on the supply chain, but Indonesia's logistics costs have skyrocketed. Based on data from the General Chairperson of the Indonesian Logistics Association (ALI), logistics activities in Indonesia have decreased drastically by up to 80% and due to various health protocols, logistics companies have to spend quite a lot of money to comply with existing protocols. Even before the pandemic, Indonesia's logistics costs were still very expensive compared to other Asian countries. Based on data from Databook's (Jayani, 2019) Indonesia's logistics costs to GDP are high in Asia, at 24%. The lack of connectivity between regions or between islands makes logistics difficult to operate and requires high funds for transportation costs. This is because uneven infrastructure development makes logistics costs high and the performance of manufacturing companies is not optimal and does not contribute optimally to Indonesia's GDP figure.

This is also related to Indonesia's logistics performance index (LPI) which is at the level of 3.15 (Databook's, 2019), which indicates that Indonesia's logistics competitiveness has not been maximized due to expensive logistics costs. This has an impact on the growth of the Indonesian economy and companies in Indonesia, especially manufacturing companies because long supply chains cause production costs to be more expensive (Suharyanto, 2017). Based on data from the World Economic Forum (WEF) in 2016-2017, the growth of manufacturing companies that have not been maximized has an impact on Indonesia's low competitiveness, which is at number 41 out of 138 countries because the innovations carried out by companies is minimal, which can be seen in the Indonesian innovation index which is in the order of 31st.

Manufacturing companies that do not perform optimally cause Indonesia's competitiveness to be unable to compete with other countries. So as an industry that plays a major role in the economy and competitiveness of Indonesia, it is necessary to improve supply chain management strategies to achieve the goals to be achieved to maximize company performance (Ariani & Dwiyanto, 2013), one of which is by conducting research and development (R&D). With the creation of maximum R&D performance, companies can catch up with Indonesia's competitiveness. Maximum R&D performance can be achieved by utilizing the existence of partnerships in R&D. Through partnerships, it will be easier for companies to get things that cannot be obtained without a partnership in R&D such as information, technology, etc. (Rezaei et al., 2018).

Efforts to invest in sustainable R&D with the Resources Based View (RBV) theory stated by (Barney, 1991) that having valuable, rare, difficult to imitate, and irreplaceable resources, can make it easier for companies to get partners or establish partnerships in R&D based on complementary needs between partners. This is also in line with the dynamic capabilities' theory

proposed (Teece et al., 1997) about the company's capabilities to see opportunities and measure their capabilities in taking these opportunities. So that the partnership in R&D is expected to be able to increase the company's capabilities and increase opportunities to take these opportunities.

R&D partnerships are like the heart of a company because to create new products takes a lot of ideas, information, technology that can be obtained by establishing partnerships in R&D (Agostini & Caviggioli, 2015). R&D partnership exists within the company due to supply chain drivers, including growth and innovation, where the company can be said to experience growth if there is an increase in the number of existing products and or the emergence of new products so that there is an increase in sales and profits and a stable income stream (Rezaei et al., 2018). The more the company experiences growth, the more complex and larger the costs incurred. Therefore, companies need to establish partnerships in R&D to create cost efficiency. This statement is supported by (Badillo et al., 2017) which states that growth has an effect on partnerships in R&D. The size of the company has an influence on the company to establish R&D cooperation, where the larger the size of the company, the greater the use of resources for R&D so that the partnership in R&D plays an important role in achieving company growth. Likewise with innovation, where innovation is marketing that relies on ideas, experiences that are not only product creation innovations, but also services, or even technology to create competitive advantages (Teofilus et al., 2020).

From the innovations made by the company, the results of each company will definitely be different, so through this statement it can trigger companies to establish partnerships in R&D so that through partnerships in R&D will help companies create new findings that were not previously in the company's strategy and plans. This is supported by research (Rezaei et al., 2018) which states that there is a positive influence between innovation and partnership in R&D. So that the hypothesis can be formulated as follows:

H1: Growth affects the partnership in R&D

H2: Innovation affects partnership in R&D

The company's success in realizing growth, innovation, and R&D partnership will have an impact on R&D performance which can support an optimal supply chain and increase the company's competitiveness, where R&D performance is used as a benchmark for the company in terms of productivity, growth and competitive advantage. After several years, the company will only be able to see and draw conclusions from the results of the company's R&D performance (Salimi & Rezaei, 2017). In companies that have succeeded in achieving growth through increased sales, profits, assets, and qualified workforce, it can provide an illustration that the company's R&D performance has been running effectively and efficiently. As well as the addition of a qualified workforce capable of conducting good research so that it will produce good R&D performance as well. This is in line with research (Buchdadi et al., 2018) which explains that growth affects firm performance, including R&D performance. Likewise with the innovations carried out by the company to be able to bring positive things to the company's future with various creative ideas and the application of technology in product creation so that from the use of technology they can produce quality products which will be reflected in the company's optimal R&D performance. This is also supported by research (Salimi & Rezaei, 2017) which states that innovation influences the company's R&D performance. For companies

that have succeeded in establishing partnerships in R&D, the results of this collaboration will be reflected in the company's R&D performance by looking at the quality of the products produced, the number of products, to how the market responds to the products produced by the company. The more optimal the partnership in the R&D of a company, the better the R&D performance will result in better competitiveness of the company. On the other hand, if the partnership does not work as expected, the R&D performance will also be bad and affect the company's competitiveness. This statement is supported by research (Rezaei et al., 2015) which states that there is a positive relationship between partnership in R&D and R&D performance. So that the hypothesis can be formulated as follows:

- H3: Growth affects R&D performance
- H4: Innovation affects R&D performance
- H5: Partnership in R&D affects R&D performance

In addition, companies that want to achieve growth and innovation that utilize the role of partnership in R&D as a mediating variable can indirectly affect the company's R&D performance. By research (Badillo et al., 2017) states that the larger the size of the company (growth), the company will be interested in establishing partnerships in R&D to achieve cost efficiency which will have an impact on the company's R&D performance more optimally through the quantity and quality of research activities. and development of more and better. It is the same with innovation that makes companies interested in cooperating in R&D which will be reflected in optimal R&D performance that can produce output according to market demand. This is by research (Rezaei et al., 2018) which states that with R&D partnerships, innovation will be easier to realize by complementing the needs of companies that can affect good R&D performance which will be seen from the quality of the products produced and how the market responds. to the new product. So that the hypothesis can be formulated as follows:

- H6: Partnership in R&D mediates the effect of growth on R&D performance
- H7: Partnership in R&D mediates the effect of innovation on R&D performance

From the results of the literature review that has been stated, a conceptual framework for this research can be drawn up:

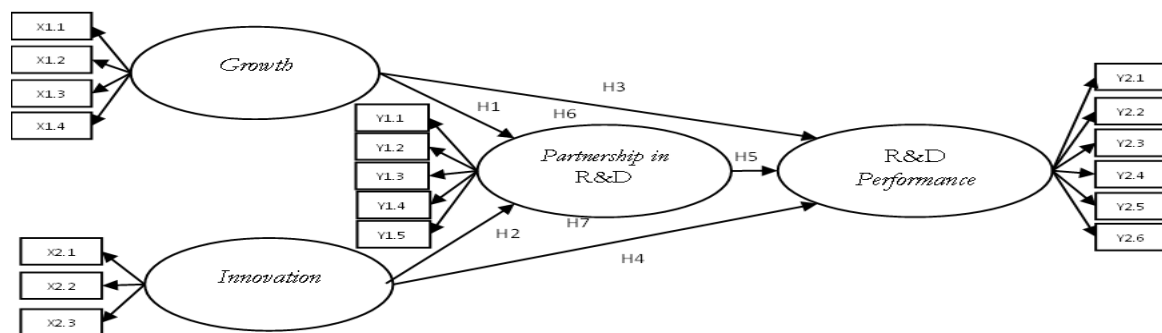


Figure 1. Research Conceptual Framework

## 2. Method

To test the hypothesized research model, the research uses a quantitative and descriptive approach that aims to analyze the data that has been collected without any intention to create a general conclusion or generalization. Data collection is carried out from respondents who have worked for a long time for the purpose of respondents having had a lot of insight about growth, innovation, to partnerships in R&D and R&D performance that the company has achieved.

The measurement scale in this study is an interval scale between 1-7, namely (1) strongly disagree, (2) disagree, (3) disagree, (4) neutral, (5) somewhat agree, (6) agree, (7) strongly agree. The sampling technique used is random sampling where all members of the population have the same opportunity or opportunity to become a sample and are selected randomly. The data collection technique in this study is primary data, namely through questionnaires distributed online to the community of family business owners engaged in product manufacturing which consists of 311 members who own manufacturing companies in Indonesia. The data were analyzed using Partial Least Square (PLS) based on the relatively small number of samples that must be obtained at least 50 samples to be used in a study (Hair et.al, 2019). Data collection was carried out in the period May-September 2021, and the total respondents who filled out questionnaires that could be processed were 51 respondents with a response rate of 16.7%.

Table 1. Variable Operationalization

Variable	Definition	Indicator
<b>Growth</b> (Rezaei et al., 2018)	Growth is a process of developing company assets both in terms of company size, number of products produced, and company profits.	<ol style="list-style-type: none"> <li>1. Increasing firm's sales</li> <li>2. Company growth</li> <li>3. Growth of the number of employees</li> <li>4. Sales volume growth</li> </ol>
<b>Innovation</b> (Rezaei et al., 2018)	Innovation as an important factor for the company's economic growth by creating new products to be able to create competitive advantage.	<ol style="list-style-type: none"> <li>1. Jointly product development and product innovation</li> <li>2. Access to technology</li> <li>3. Enhancing innovation potential</li> </ol>
<b>Partnership in R&amp;D</b> (Rezaei et al., 2018)	R&D partnership is a collaboration established with external parties, who have resources that are not owned by the company and are needed by the company for research and development purposes.	<ol style="list-style-type: none"> <li>1. Control R&amp;D</li> <li>2. Decision R&amp;D</li> <li>3. Risk/Reward R&amp;D</li> <li>4. Investment R&amp;D</li> <li>5. Communication R&amp;D</li> </ol>
<b>R&amp;D Performance</b> (Rezaei et al., 2018)	R&D performance is a measure of a company's productivity, growth and competitive advantage.	<ol style="list-style-type: none"> <li>1. Customer satisfaction</li> <li>2. % Of product succeeding in the market</li> <li>3. Agreed milestone/objectives met</li> <li>4. Number of products/projects completed</li> <li>5. Speed</li> <li>6. Quality of output/work</li> </ol>

### 3. Results

The majority of family business manufacturing companies participating in this study are companies with <100 employees and followed by companies with 100-500 employees, which based on data (Central Agency, 1988) states that companies with more than 100 employees are large companies. In addition, when viewed from the location of the company, the majority are located in East Java, namely 23 respondents (45.10%) and followed by West Java and South Sulawesi, each with 6 respondents (11.76%).

Table 2. Characteristics of Respondents

Item		Amount	Percentage
Long working experience	< 1 year	2	3,92%
	1 year – 2 years	13	25,50%
	2 years – 3 years	6	11,76%
	3 years – 4 years	4	7,84%
	> 4 years	26	50,98%
Company Location	Central Java	4	7,84%
	East Java	23	45,10%
	West Java	6	11,76%
	DKI Jakarta	4	7,84%
	Central Kalimantan	1	1,96%
	South Sulawesi	6	11,76%
	South Sumatra	1	1,96%
	Bali	1	1,96%
	Riau islands	1	1,96%
	Banten	4	7,84%
Number of employees	< 100	20	39,2%
	100-500	17	33,3%
	500-1000	6	11,8%
	1000-3000	2	3,9%
	> 3000	6	11,8%
Impact of Corona Virus	No impact	2	4%
	Little impact	20	40%
	Medium impact	15	30%
	Big impact	11	22%
	Very impactful	2	4%

Source: Respondent data processed (2021)

Based on Table 2, the data is dominated by respondents who have worked for more than 4 years, namely 26 respondents (50.98%) which can be concluded that respondents have information and insight about how the growth that has been experienced by the company, planned and successfully realized innovation, partnership in R&D & how the company's R&D performance. Based on the respondent's data that has been obtained, the majority of companies affected by the coronavirus, both those with moderate to severe impacts, are dominated by large companies, ranging from companies with employees above 100 people to several respondents who fill the number of employees of 3000 people. While small companies dominate in companies that are not slightly affected by the coronavirus. It can be said that large manufacturing companies that already have long supply chain activities and involve many parties feel the big impact of this

pandemic because supply chain activities and company operations are severely hampered, causing growth and disrupting company innovation which results in the company's competitiveness decreases.

**Confirmatory Factor Analysis**

To be able to find out whether the instrument in the questionnaire complies with the requirements for validity and reliability, it can be seen in the results of loading factor > 0.7 and average variant extracted (AVE) > 0.5 and for reliability testing using composite reliability results > 0.7 and reinforced values Cronbach's alpha > 0.7 (Sarstedt et al., 2020)

**Table 3. Calculation Results of Loading Factor**

Variables	Indicator	Loading Factor
Growth (X1)	Increasing firm's sales (X1.1)	0.912
	Company growth (X1.2)	0.896
	Growth of the number of employees (X1.3)	0.846
	Sales volume growth (X1.4)	0.888
Innovation (X2)	Jointly product development and product innovation (X2.1)	0.858
	Access to technology (X2.2)	0.902
	Enhancing innovation potential (X2.3)	0.864
Partnership in R&D (Y1)	Control R&D (Y1.1)	0.919
	Decision R&D (Y1.2)	0.908
	Risk/Reward R&D (Y1.3)	0.943
	Investment R&D (Y1.4)	0.879
	Communication R&D (Y1.5)	0.925
R&D Performance (Y2)	Customer satisfaction (Y2.1)	0.879
	% Of product succeeding in the market (Y2.2)	0.888
	Agreed milestone/objectives met (Y2.3)	0.800
	Number of products/projects completed (Y2.4)	0.888
	Speed (Y2.5)	0.824
	Quality of output/work (Y2.6)	0.790

Source: Data processed (2021)

Table 3 shows the results of the loading factor of each indicator above 0.7 which indicates that the indicator research on each variable can be used to test the research hypothesis.

**Table 4. Reliability and Validity Test Results**

Variables	AVE	Cronbach's Alpha	Composite Reliability	R-Square
X1	0.785	0.936	0,909	
X2	0.766	0.907	0,847	
Y1	0.837	0.963	0,951	0,423
Y2	0.716	0.938	0,920	0,588

Source: Data processed (2021)

Table 4 shows the results of the AVE with the results of each variable > 0.5 which can be stated that the model is good. Likewise, the results of composite reliability and Cronbach's alpha of each variable (construct) are above 0.7 which reflects that the variable has good reliability.

Meanwhile, to calculate the Goodness of fit in the PLS test, it can be determined by calculating Q2. Q2 has the same meaning as R-Square where the higher R-Square indicates the model is more fit with the data. Likewise, with Q2, the higher the results indicate the model has predictive relevance. The following is the calculation of the Q2 value:

$$\begin{aligned}
 \text{Q-Square} &= 1 - [(1 - R^2_1) \times (1 - R^2_2)] \\
 &= 1 - [(1 - 0,423) \times (1 - 0,688)] \\
 &= 0,814
 \end{aligned}$$

The Q2 result of this study is 81.4% which gives an understanding that the structural model of this study has a good predictive ability.

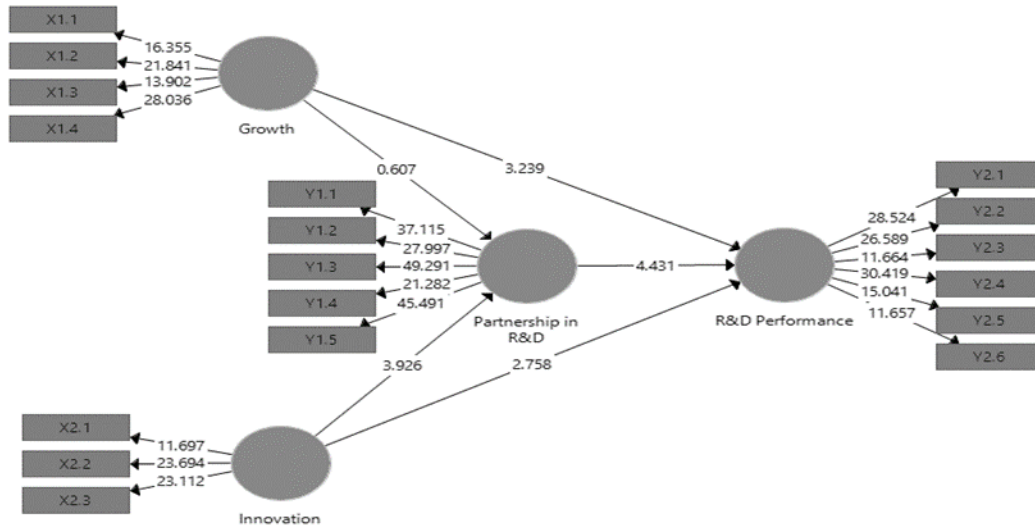


Figure 2. Inner Model Test Results

Source: Data processed (2021)

Table 5. Path Coefficients

Research Hypothesis	Hypothesis	T-Statistic	P-Values	Note
RH1	<i>Growth → partnership in R&amp;D</i>	0,607	0.544	<b>Unsupported</b>
RH2	<i>Innovation → partnership in R&amp;D</i>	3.926	0.000	Support
RH3	<i>Growth → R&amp;D performance</i>	3.239	0.001	Support
RH4	<i>Innovation → R&amp;D performance</i>	2.758	0.006	Support
RH5	<i>Partnership in R&amp;D → R&amp;D performance</i>	4.431	0,000	Support
RH6	<i>Growth → partnership in R&amp;D → R&amp;D performance</i>	0.598	0.550	<b>Unsupported</b>
RH7	<i>Innovation → partnership in R&amp;D → R&amp;D performance</i>	2.306	0.022	Support

Source: Data processed (2021)



#### **4. Discussion**

The results of the study found that growth on partnerships in R&D with p-values of 0.544 where the value was greater than 0.05 so that growth had no significant effect on R&D partnerships, hypothesis one was rejected. Based on growth indicators, growth can be seen from the increase in sales, assets, to the number of employees who are very important in contributing to the company. In general, the more a company experiences growth, the company will see the cost efficiency that the company must do, namely by establishing partnerships in R&D. Companies that establish partnerships in R&D can achieve more optimal growth without having to invest a lot in company assets such as production equipment to achieve greater production capacity.

However, in this study, it was found that there was no relationship between growth and partnership in R&D. Through R&D partnerships, companies will find it easier to develop new products or processes, can also reduce the risk of a research (Hagedoorn, 2002; Narula, 2001; Sakakibara, 2002) which through R&D partnerships also requires large costs to support the establishment of cooperation. optimally so that this does not make growth a driving force for companies to establish partnerships in R&D. This is in line with research (Rezaei et al., 2018) which explains that the possibility that occurs in companies that have experienced growth is the need for new markets and increased sales which make companies more focused on establishing cooperation in marketing and sales rather than R&D cooperation. When viewed from a demographic perspective, the respondents are dominated by the East Java region, it can be said that this is influenced by East Java being one of the locations for the manufacturing industry that is competitive compared to other provinces (Ariyanti, 2013).

To keep companies growing and competing competitively in the business environment, companies need to cooperate in marketing and sales, which is by previous research (Rezaei et al., 2018). After experiencing growth, the company needs to expand its market so that it can expand its market segment. So that the company's hope through cooperation in marketing and sales is an even more significant increase in sales and profits. Especially in the conditions of the corona virus pandemic which has an impact on the company's growth process, including family business manufacturing companies that have to reduce their assets such as workers to maintain the company's position and avoid bankruptcy.

This study found innovation to partnership in R&D with p-values of 0.000 where the value is smaller than 0.05 so that innovation has a significant effect on partnership in R&D, so the second hypothesis is accepted. Based on the results of the study, innovations applied by family business manufacturing companies such as the application of technology help companies implement company innovations so that the company's work becomes more efficient and each company's innovation is different. so that through the results of these innovations, companies are interested in establishing partnerships in R&D because through this collaboration they can help companies create breakthroughs that have never existed in the company's strategies and plans. It also concludes that R&D partnership is an investment for a better future of the company and helps to improve the competitiveness of the company. Departing from the dynamic capability theory, innovation is considered as the key to see the company's capabilities in adapting and seeing opportunities in various market conditions (Teece et al., 1997). In today's era many companies are involved in supply chain partnerships to improve company performance. Rapid technological

change means that manufacturing companies need to constantly update their technological know-how.

Obtaining external knowledge through R&D collaboration with partners is important for the company's innovation activities so that it can create quality output from the results of the collaboration. This finding is in line with research (Rezaei et al., 2018) which states that through various innovation strategies each company will be even better if companies collaborate through partnerships in R&D to be able to produce even better research and breakthroughs. R&D partnership can help gather creative ideas and share risks and costs compared to without a partnership. In this condition of the corona virus pandemic, family business manufacturing companies must be able to maintain partnerships in R&D to continue to be able to innovate to minimize shared risks. Companies must also be able to sort out what kind of innovations are possible to implement in a pandemic condition which is full of risks so as not to reduce the company's competitiveness.

This study found that growth on R&D performance with p-values of 0.001 where the value is smaller than 0.05 so that growth has a significant effect on R&D performance. Growth can be seen from various aspects such as an increase in sales, an increase in profit, as well as an increase in assets, including labor. Companies that have quality human resources will achieve growth more easily to produce optimal company performance. In addition to human resources, technology is also an important asset for company growth. This is in line with research (Gerybadze, 2010) which sees growth in terms of technology investment to support more optimal R&D performance. The results of this study are also supported by (Buchdadi et al., 2018) which states that growth has a significant effect on firm performance, including R&D performance which is one of the important supporting factors in influencing company performance. By the conditions of the corona virus pandemic, where the family business manufacturing company is trying to maintain its position so as not to suffer losses. where if a manufacturing company can maintain its sales, its assets, and its workforce, it will maintain optimal R&D performance which is reflected in whether the product is still accepted by the market in a pandemic condition, the quantity of the product produced, and the quality of the product produced.

This study found that innovation on R&D performance with p-values of 0.006 where the value is smaller than 0.05 so that growth has a significant effect on R&D performance, then the fourth hypothesis is accepted. The company's good R&D performance indicates that the company has utilized the role of technology in its research and development activities. This finding is in line with research (Salimi & Rezaei, 2017) which says that innovation affects R&D performance. Innovation is carried out for many things, one of which is supporting maximum R&D performance which can be done with technological innovation in producing new products to help companies gain a competitive advantage. The current state of the corona virus pandemic has also made many changes, such as people's behavior and habits that require family business manufacturing companies to be responsive and rack their brains to change their innovation strategies so that the planned innovations can still be implemented and produce good R&D performance which can be seen from whether the product can be accepted by the market. with market conditions that have changed due to the pandemic.

This study found that R&D partnership affected R&D performance with p-values of 0.000 where the value was smaller than 0.05 so that R&D partnership had a significant effect on R&D performance, so the fifth hypothesis was accepted. Through R&D partnerships, companies can obtain more ideas, knowledge, technology from the results of collaboration with partners which can be said as an investment for the company's future where all of this support the creation of optimal R&D performance to be able to create products according to company expectations and accepted by the market. This is in line with research (Rezaei et al., 2015) which states that R&D partnerships have an influence on the overall performance of the company, including R&D performance. Through cooperation in R&D, complementary information, required technology, R&D decision making will become easier, thus supporting R&D and optimizing R&D performance. Especially in the conditions of the corona virus pandemic which poses obstacles to the supply chain, while partnerships must be related to external parties, thus requiring family business manufacturing companies to be able to choose partners correctly who can still meet the needs of manufacturing companies so that the company's competitiveness against competitors is maintained.

In this study, partnership in R&D as a mediating variable on the effect of growth on R&D performance resulted in p-values of 0.550 which was greater than 0.05 so that the hypothesis was not accepted. This is in line with research (Rezaei et al., 2018) which states that R&D partnerships are not partnerships that companies choose when they want to achieve growth, but companies will choose partnerships in marketing & sales. So, there is no significant relationship between growth and R&D performance through partnerships in R&D. In a pandemic condition, family business manufacturing companies also need to maintain the growth that has been achieved by the company by cooperating in marketing and sales so that the company's revenue does not experience a significant decline until it reaches bankruptcy.

In this study, partnership in R&D as a mediating variable on the effect of innovation on R&D performance resulted in p-values of 0.022 which was smaller than 0.05 so that the hypothesis was accepted. A family business manufacturing company that innovates does not escape the role of technology so that it makes companies interested in conducting R&D cooperation because each company's innovation is different and unique. Through this collaboration, it can make it easier for companies to conduct research, make decisions in research easier, make it easier to control all activities in R&D, to share risks with partners in new product research. This is supported by (Rezaei et al., 2018) which states that companies that innovate will choose to establish R&D collaborations which of the results of the collaboration will increase the intensity of the company's R&D performance, so that the speed of work of R&D, as well as how the quality of the output generated from the collaboration will increase. This will be reflected in a more optimal R&D performance. Innovation must be carried out continuously, including in the conditions of the corona virus pandemic which requires food and beverage manufacturing companies to continue to innovate. However, these innovations must be carried out by minimizing the risk to a minimum, which can be achieved by collaborating with R&D in the hope that the R&D performance is in line with the company's expectations.

As an implication, this study provides information on the importance of family business manufacturing companies maintaining optimal R&D performance by producing products that are accepted by the market, of high quality, and in quantity. To obtain optimal R&D performance, it

must be supported by a partnership in R&D that makes it easier for companies to control, integrate, and make decisions in R&D activities so that R&D activities can run effectively and efficiently to increase opportunities to achieve company competitiveness. Likewise, growth must also be achieved such as adding employees, adding assets, to increasing sales if the company wants to achieve optimal R&D performance. In addition, the role of innovation as a driver for the creation of R&D partnerships is also important, where manufacturing companies must continuously innovate not only when starting a business, or when the company is growing rapidly, but also when the company is losing money.

The limitation of this research is due to the coronavirus pandemic which requires researchers to distribute online questionnaires to the community of owners of family business manufacturing companies in Indonesia so that getting a response is very difficult so in this study only 51 respondent data were obtained which could be processed.

Based on the results of research and data processing that has been carried out, it can be concluded that innovation is considered a driving force for companies to establish partnerships in R&D. Apart from that, there is also a relationship between innovation and R&D performance through partnership in R&D as a mediating variable. Innovation is closely related to technology that makes each company's innovation different, thus triggering companies to establish partnerships in R&D to collaborate on research between partners that are in line with research. Meanwhile, this study also finds that growth is not considered as a driving force for companies to establish partnerships in R&D and partnerships in R&D as a mediating variable nor does it affect the relationship between growth and R&D performance of companies (Rezaei et al., 2018). Because it reflects on growth indicators such as increased sales, profits, assets, making companies more willing to establish marketing and sales cooperation to help companies get higher profits and increase competitiveness. The findings of this study also state that growth, innovation, and also R&D partnerships have a direct impact on R&D performance (Buchdadi et al., 2018; Gerybadze, 2010; Rezaei et al., 2015; Salimi & Rezaei, 2017), so it becomes mandatory for companies to be able to realize growth, innovation, and even partnerships in R&D to be able to compete and achieve optimal company competitiveness.

Companies in the family business manufacturing industry are the industrial sectors that have also received the impact of the coronavirus pandemic. In a disrupted market condition like this, it tests how the dynamic capabilities of manufacturing companies in seeing opportunities and what steps the company must take to remain competitive. This pandemic has opened the company's eyes to how important it is to conduct partnerships in R&D, so that the impact of the pandemic has forced companies to rearrange strategies in partnering much better to avoid obstacles in the partnership in R&D which will have a bad influence on the company's performance, including R&D performance. the supply chain that is hampered so that the company's competitiveness decreases. Family business manufacturing companies must be able to choose the right partners so that partnerships and performance can run according to expectations and growth and innovation can be realized properly so that they can maintain the company's competitiveness against competitors as well as Indonesia's competitiveness because manufacturing companies are industries that contribute a lot to competitiveness. and the country's economy.

Suggestions for future research are to add more variables so as to be able to find other factors or independent variables, in addition to the variables that have been studied in this study, such as cost reduction, customer satisfaction, inventory optimization, and various other supply chain drivers. In addition, future research is expected to be able to find a scope from other populations as well as wider than the scope of this research, such as choosing a study on manufacturing companies in the tobacco, textile, and other industries.

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