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ORIGINAL PAPER

THE MEDIATING ROLE OF SUPPLY-CHAIN RESPONSIVENESS IN THE RELATIONSHIP BETWEEN SUPPLY-CHAIN INTEGRATION AND OPERATIONAL PERFORMANCE

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ABSTRACT. Background: The study investigated the impact of supply-chain integration on operational performance in the food manufacturing industry, specifically in East Java. That capacity for innovation did not directly affect operational performance or mediate the relationship between supply-chain integration and operational performance. The purpose of this study was to investigate the impact of supply-chain integration on operational performance in food manufacturing enterprises, both directly and through the mediation of inventory management reaction and capacity for innovation.
Methods: The study employed a quantitative approach, distributing online questionnaires to 507 mid-scale food and beverage industries. A total of 121 valid responses were collected, which were then analyzed using partial least squares.
Results: The results reveal that inventory management integration impacts efficiency in operation with a mediation process on network responsiveness. Capacities for innovation do not significantly affect operational performance directly or as a mediation of supply-chain integration because the food industry does not require scarce resources.
Conclusions: This research is helpful in validating the theory and in proving empirically that operational performance can be improved by increasing supply-chain integration; therefore, food industry players can pay more attention to the above. Further studies can be conducted by focusing more on each dimension of each construct.

Keywords: innovative performance, operational efficacy, supply-chain coordination, supply-chain response.

INTRODUCTION

The manufacturing industry is an essential part of the global economy. Manufacturing creates money and employs a sizeable share of the labor force in both Europe and America [Ajoudani et al. 2020]. The sector that produces items is referred to as the manufacturing industry [Kurniawan and Antonio 2022]. It includes numerous subsectors that engage in domestic and international competition. The economy depends heavily on manufacturing since it creates wealth and job possibilities. Compared to other industries, it is distinguished by better productivity, which promotes overall economic growth. In the manufacturing sector, operational performance is essential for increasing earnings and attaining organizational objectives. Increased operating performance, customer loyalty, and employee productivity have all been demonstrated to be favorable effects of lean manufacturing processes [Jagan Mohan Reddy, Neelakanteswara Rao, and Krishnanand 2020].

Demand uncertainty causes customer value to become a moving target for companies [Cheng, Chaudhuri, and Farooq 2016; Disney and Towill 2002]. A successful company always wants high customer value for customer satisfaction. Good operational performance is one way to achieve high customer value [Fianko et al. 2023; Huo 2012]. Operational performance can be seen from the quality and productivity of the management of the company's resources [Kafetzopoulos and Psomas 2015]. Resource-based view (RBV) theory states that companies can achieve competitive advantage by relying on their resources, which are managed in a value chain that provides optimal value [Barney 1986,

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1991]. An optimal supply chain indicates an optimal value chain. Previous studies have found a positive relationship between supply-chain integration and improved operational performance [Cheng et al. 2016; Yu et al. 2019]. With supply-chain integration, the production process transcends organizational boundaries through improved communication, good cooperation, and partnerships [Ayoub, Abdallah, and Suifan 2017]. Supply-chain integration also improves supply-chain responsiveness, and it will reduce uncertainty [Danese, Romano, and Formentini 2013; Handfield and Bechtel 2002], shorten the lead time between consumer demand and product supply [Danese and Romano 2011; Nenavani and Jain 2022], and improve supplier-company-customer commitment and collaboration, thus reducing equivocality and creating a competitive advantage [De Stefano and Montes-Sancho 2023; Yu et al. 2019]. The results of previous studies could be more consistent. Many studies state a positive influence between operational performance and supply-chain integration-responsiveness. However, some indicate an insignificant effect on operational performance [Danese and Romano 2011; Wiengarten et al. 2019] and some state that the positive impact is significant only under certain conditions [Mackelprang et al. 2014], while others conclude that it produces an unclear effect [Wiengarten et al. 2019; Wong, Wong, and Boon-itt 2013].

Previous studies suggest that innovation capability also affects operational performance [Kafetzopoulos and Psomas 2015; Xu et al. 2023]. High innovation capability enables customers with different needs to be facilitated by creating products according to consumer desires, increasing operational performance. This finding is also supported by Spillane (2022), who states that existing customers are 50% more likely to buy new products and spend up to 31% more on new products. However, previous studies have shown mixed results [Fianko et al. 2023; Saunila 2014; Wiengarten et al. 2019] using different dimensions and contexts [Rousseau et al. 2016].

Moreover, previous studies indicate several different results [Kafetzopoulos and Psomas 2015], showing the influence on operational performance innovation capability in the manufacturing industry. The research by Cahyaningratri and Naylah (2023) discusses how the combination of supply-chain capability directly and revealingly affected effectiveness according to Idris [Idris et al. 2023] conclude that strategies for environmental management of supply chains have a positive and significant influence on operational efficiency in manufacturing. No studies explain the direct aspects of the supply network integrators on the operation performance.

The study aims to investigate whether the impact of supply-chain integration on operational performance in food and beverage enterprises was mediated by the supply chain's response and advancement ability. Inventory management in the manufacturing industry is a critical aspect that various factors have impacted [Nivedha and Rathika 2022]. The pandemic crisis caused the profitability of the food and beverage industry to decline, thus making the economy unstable and the effectiveness of the food industry. This means that food industry players need to improve products and services, especially understanding supply-chain integration so that the food and beverage industry can develop further. This crisis has an impact on the entire global food and beverage industry. Therefore, even though food competition is very strong, the government is trying to develop the country's economic and encourage new business actors. Therefore, operational performance is a must. The research contributed to the manufacturing industry by improving the supply chain.

LITERATURE REVIEW

Supply-chain integration involves a series of interrelated companies, from planning coordination to control of raw materials into finished goods in the production process [Danese and Romano 2011]. Supply-chain integration can also be defined as the coordination and collaboration of the manufacturers with their suppliers and customers in developing an effective and efficient flow of materials, resources, parts and information with the ultimate goal of providing goods and services in the correct quantity [Cheng et al. 2016], at the right time [Nenavani and Jain 2022] and on the

suitable feature [Danese et al. 2013] for the customers within the low cost [Flynn, Huo, and Zhao 2010]. Supply-chain responsiveness is the ability to respond to changes in the market and environment that might occur [Su et al. 2019; Yu et al. 2019]. This responsiveness refers to how quick it is to respond to changes in market needs, including competitors, by providing new products and services or process improvements through strategic collaboration. The company cannot make changes alone: they must be made together with its partners, suppliers, and customers.

Market uncertainty requires a high degree of flexibility and direction. The supply chain with suppliers and customers is critical. Prevalent techniques, collaborative problem-solving, and information and technology exchange with partners are critical in gaining a competitive advantage. The flow of information at every stage of the supply chain, from downstream to upstream, can also promote confidence to improve the responsiveness of all partners.

H1: supply-chain integration influences supply-chain responsiveness

The company implements various collaborative capability enhancements to increase innovation capability. With stronger collaboration between supply chains, trust will grow. Trust encourages creating, transferring, and sharing knowledge between partners to reduce inventory costs, improve process improvement, and capture changing customer demands [Jimenez-Jimenez, Martínez-Costa, and Sanchez Rodriguez 2019]. Therefore, the company's competitiveness can also increase due to the creation of these innovative products. This study develops a hypothesis to investigate the implications of integrating the supply chain on innovative capability.

The ability of a firm to originate, develop, and present new ideas in order to launch new items onto the general market is referred to as its innovation capability [Ruiz-Torres et al. 2018]. Innovation capability results from product innovation [Jimenez-Jimenez et al. 2019] or the innovation process [Fianko et al. 2023; Su et al. 2019]. The project aims to cooperate with the company's internal activity (i.e., operations) and external productivities (i.e., products/services) that are connected with generating customer satisfaction. Operational performance is declared as the excellence of the company in the context of quality, delivery and flexibility that can be achieved through the fluent flow of information, goods, and funds, as well as the speed of each part in the supply chain in response to changes in consumer demand [Hu et al. 2019].

H2: supply-chain integration influences innovation capability

Supply-chain integration is one of the strategic approaches taken by companies. This is because synchronization and collaboration between companies and partners can improve the efficiency and effectiveness of processes, reduce non-value-added activities, and create more value for their customers [Kunnapapdeelert and Pitchayadejanant 2021]. It is called improving operational performance. Supply-chain integration leads to the exchange of relevant and accurate information about products, processes, schedules, and production capabilities. Supply-chain integration can help all partners anticipate factory needs, automate to meet customer demand, and develop new products from the research stage until the goods are ready to be launched and delivered on time [Ahmad 2022; Caniato and Größler 2015]. The formulated hypothesis research thus:

H3: integration of the supply chain influences productivity

The existence of a supply network response allows companies to be effectively competitive. The company responds to dynamic customer demand and competitor strategies, which results in increased sales [Nenavani and Jain 2022]. In other words, activities responsive to customer needs will attract customers aggressively. Moreover, supply-chain responsiveness can also optimize the use of resources within the company, which can increase the company's operational performance. Operational performance leads to the right amount of product being delivered at the right place and time. The responsive supply chain has many advantages,

including reduced cost and lead time, increased delivery accuracy, and excellent product quality. The formulated hypothesis can be seen below:

H4: supply network response influences toward productivity

Innovative qualities have a favorable impact on productivity. The majority of past research indicates a positive association between firm innovation and profitability. Innovation activities in a company can increase the productivity of the process and the knowledge of every related party. Moreover, the invention also has a positive impact on company profits. Companies that often carry out innovation activities have higher yields and growth rates compared to companies that do not carry out any such activities [Kafetzopoulos and Psomas 2015]. Innovation development is more effective if the company has common goals and sound integration with suppliers, customers, and departments. It can be seen below:

H5: innovation capability influences operational performance

Supply-chain responsiveness can be optimized if supply-chain integration also functions well. Supply-chain integration refers to the flow of information and products. Thus, each partner in the supply chain can respond and anticipate all the changes quickly [Tarigan, Siagian, and Jie 2021]. This can decrease forecasting errors and reduce the supply chain's bullwhip effect to increase efficiency and effectiveness, reduce costs, and improve delivery accuracy and product quality [Jaipuria and Mahapatra 2014]. Supply-chain integration has an essential influence on supply-chain responsiveness. The existence of supply-chain responsiveness can make operational performance increase with collaboration among the concerned parties. Therefore, this study formulates the following hypothesis:

H6: integrated supply chains mediate the impact of a supply system's responsiveness on productivity.

Improvements in customer integration can lead to an understanding of consumers' needs and potential needs [Singhry and Abd Rahman 2019]. Customer integration is an important channel for exploring new ideas from customers. It only happens with customers. However, integration with suppliers also produces the same result. Collaboration with partners will generate fresh information and learning. Therefore, the increase in customer value can be effected with supply-chain integration, which will drive process and product innovation and ultimately achieve better operational performance. In this regard, this study formulates a hypothesis that can be seen below:

H7: through the potential to innovate, the chain of supply connectivity has an impact on productivity

Based on the explanation above, the research model is outlined as follows:

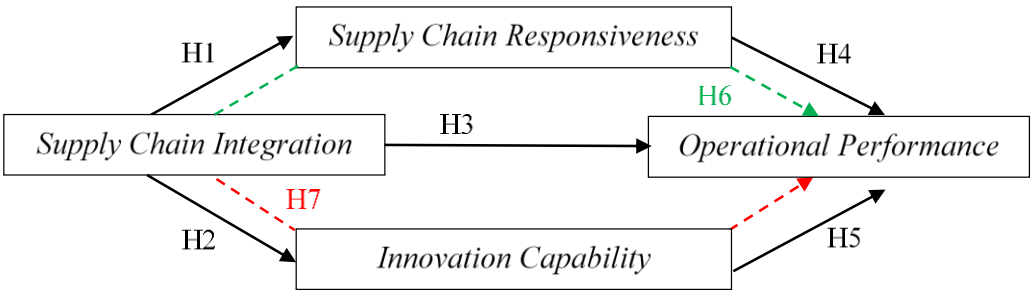

Fig. 1. Research model
Source: Own work

MATERIALS AND METHOD

This study employs quantitative approaches to explain the impact of supply-chain connectivity characteristics on productivity through mediation between two variables: innovation capability and supply-chain responsiveness. The population for this study is food manufacturing companies in East Java with a mid-scale, i.e. with revenue between IDR. 2,500,000,000 - IDR. 50,000,000,000, - (according to Law No. 20 of 2018). This population was chosen based on the suitability of the research needs. The choice to focus on the food manufacturing industry in East Java was based on East Java being one of the major industrial regions in Indonesia, particularly in the food manufacturing sector (East Java Central Statistics Agency, 2019). It has many foods manufacturing enterprises, making it an ideal location for researching the relationship between supply-chain integration, responsiveness, innovative capabilities, and operational achievement in this industry. Moreover, this research had access to resources and networks in East Java, making it more feasible to conduct the study in this region. Conducting research in other regions may require additional resources and logistical considerations.

A sample of 507 companies was selected for analysis. All of these companies were sent questionnaires, but only 132 were returned, and 121 were valid. Before the questionnaire was distributed, it was tested on five company managers to test whether the wording of the questionnaire was clear enough to describe the intended variables and avoid sample bias. After going through adjustments and word corrections, the questionnaire was sent via email to the company's website. The sampling technique in this study used the non-probability side with reference to statistical data, which means setting targets from the population that are eligible to be used as respondents. The initial population was 507 people who were channeled to the company, but only 132 people were returned to the researcher. Of the 132 samples, there were 11 invalid samples. The researcher received the total sample; only 121 valid samples were examined.

All the variables were measured using the semantic differential method using a bipolar scale, with 1 = strongly disagree and 5 = agree. The construct was reliable if the Cronbach alpha value is> 0.7. Data analysis using partial least square (PLS) with the structural equation model (SEM) equation. Validity and reliability tests were conducted.

Table 1. The definition of operational variables and indicators is adopted from previous studies

Definition	Source
Supply-chain integration is described as a sequence of interconnected firm processes, which range from planning coordination to control of raw materials into finished goods in production.	[Tseng and Liao 2015]
This variable was measured using the level of information interaction between supplier partners, the level of computerized data integration, the level of participation of suppliers and customers in the preparation of production plans, the level of cross-departmental coordination, the level of frequent contact with customers and the level of collaboration of activities between departments.	[Shukor et al. 2021]
Supply-chain responsiveness is defined as the supplier's ability to respond to changes in the market and environment.	[Irfan, Wang, and Akhtar 2019]
This variable measured factors including the speed to handle changes in customer demand, the speed of response to required strategical changes, the speed of launching new products to the market, and the level of flexibility of the supply-chain strategy to customer needs.	[Yu et al. 2019]
The level of invention in a corporation with a transitory and multifunctional character is defined as its innovation capabilities.	[Kafetzopoulos and Psomas 2015]
The operational variables are the ability to introduce new products and services, the ability to develop new marketing ideas, creativity in operations, the development of innovative production techniques, the intensity of new product development, and the intensity of new product marketing.	[Al-Sa'di, Abdallah, and Dahiyat 2017; De Zubielqui, Lindsay, and O'Connor 2014]
Operational performance is quality or productivity obtained from a collection of company operational achievements.	[Duhaylongsod and De Giovanni 2019]
Operational performance measurement using indicators modified from the research are cost efficiency, improved product quality, delivery accuracy, and flexibility in serving customer needs.	[Mackelprang et al. 2014]

RESULTS

This study begins with the test of validity and reliability of the data obtained. The convergent validity test results in Table 1 show that the variables in this study can explain variants with 20 indicators. It is indicated by the outer loading value, above 0.7, and the VIF value, above 0.5; therefore, the indicator can be said to be valid.

Table 2. Convergent validity test results (outer loading)

Item	***Outer Loading***	**VIF**
SC1	0,702	1,577
SC2	0,758	1,709
SC3	0,734	1,528
SC4	0,738	1,653
SC5	0,742	1,631
SC6	0,718	1,681
SCR1	0,765	1,666
SCR2	0,882	2,116
SCR3	0,700	1,390
SCR4	0,724	1,397
IC1	0,728	1,617
IC2	0,738	1,573
IC3	0,705	1,696
IC4	0,708	1,823
IC5	0,724	1,631
IC6	0,724	1,517
OP1	0,705	1,386
OP2	0,751	1,420
OP3	0,746	1,328
OP4	0,707	1,233

Table 3. Fornell-Larcker discriminant validity test results

	Innovation Capability	**Operational Performance**	**Supply-Chain Integration**	**Supply-Chain Responsiveness**
Innovation Capability	**0,721**			
Operational Performance	0,556	**0,728**		
Supply-Chain Integration	0,558	0,613	**0,732**	
Supply-Chain Responsiveness	0,594	0,559	0,513	**0,771**

The Discriminant Validity Test is seen from the diagonal value, which indicates a number more significant than the other correlations. Therefore, the value of the variance in the variables with the indicators in this study is better than the correlation of other variables (Table 2).

Indicators are considered to be able to explain variables more accurately than other variables if the cross-loading value of an indicator is more significant than other variable indicators. (Table 3). Therefore, the cross-loading value will strengthen the study results from the Fornell-Larcker analysis.

Table 4. Reliability test results

Variable	**Cronbach's Alpha**	**Description**
Supply-Chain Integration	0,770	*Reliable*
Supply-Chain Responsiveness	0,828	*Reliable*
Innovation Capability	0,816	*Reliable*
Operational Performance	0,706	*Reliable*

The reliability test on the four variables in this study indicated that the data was reliable because each Cronbach's Alpha value was ≥ 0.7. It indicates that 111 respondents in this study passed the reliability and validity tests.

Table 5. R-square value result

Variable	R-Square Value
Supply-Chain Responsiveness	0,263
Innovation Capability	0,311
Operational Performance	0,479
Averages	0.,351

Source: own work based on SmartPLS result.

The supply-chain responsiveness variable has an R-squared value of 0.263, which means that the supply-chain integration variable can explain this variable by 26.3%. In the innovation capability variable, the R-Square value is 0.311, which means that the supply-chain integration variable can explain this variable by 31.1%. Lastly, in the operational performance variable, the R-Square value is 0.479%, which means that the supply-chain integration variable can explain this variable by 47.9%. Q2 indicates that the structural model can explain the amount of data diversity by 73.5%. Therefore, the Goodness of Fit (GoF) in the structural model of this research is promising. The hypotheses written as the following below (Table 6):

Table 6. Hypotheses test (direct effect)

Hypotheses		*Original Sample*	*T-Statistics*	*P-Values*	Description
H1	*Supply-chain integration → supply-chain responsiveness*	0,513	5,723	0,000	Affected
H2	*Supply-chain integration → innovation capability*	0,558	6,079	0,000	Affected
H3	*Supply-chain integration → operational performance*	0,374	4,032	0,000	Affected
H4	*Supply-chain responsiveness → operational performance*	0,248	2,689	0,007	Affected
H5	*Innovation capability → operational performance*	0,201	1,913	0,056	Not Affected

Table 7. Hypotheses test (indirect effect)

Hypotheses		*Original Sample*	*T-Statistics*	*P-Values*	Description
H6	*Supply-chain integration → supply-chain responsiveness → operational performance*	0,127	2,249	0,025	Affected
H7	*Supply-chain integration → innovation capability → operational performance*	0,112	1,790	0,074	Not Affected

According to the results of the PLS test, supply-chain integration can greatly increase supply-chain responsiveness [Danese et al. 2013; Yu et al. 2019]. The integration of computerized information management significantly affects the department's responsiveness to suppliers and customers. Previous studies state that supply-chain responsiveness starts with a good relationship with suppliers [Handfield and Bechtel 2002; Orji and Ojadi 2023] and continues with good relationships between departments to supply products to customers efficiently and precisely [Holweg et al. 2005]. Collaboration activities with supplier partners can influence the company in fulfilling customer expectations. Suppliers can participate in providing production materials quickly; thus, production can be carried out efficiently [Disney and Towill 2002], so responsiveness is improved. Besides, long-term partnerships with suppliers and customers will be achieved through

supply-chain integration. It will reduce uncertainty, increase the understanding of customer needs and responsiveness [Fianko et al. 2023], and enhance product development and problem-solving with suppliers [Disney and Towill 2002]; therefore, in the end, the company will produce higher-quality products [Flynn et al. 2010], which are more flexible [Nenavani and Jain 2022] and on time [Danese et al. 2013]. This aligns with the company's strategy, which always expects an annual increase in value.

DISCUSSION

Supply-chain integration has several dimensions: technology integration [Jimenez-Jimenez et al. 2019], activity integration [Wu et al. 2006], and information integration. In this study, supply-chain integration is considered a single entity; most of the previous studies did the same, and their studies gave similar results [Yu et al. 2019]. However, other studies divide supply-chain integration into two dimensions, namely internal and external, and using these dimensions indicates findings with different levels of significance [Danese et al. 2013; Mackelprang et al. 2014]. However, no previous studies found that supply-chain integration does not influence supply-chain responsiveness [Yu et al. 2019].

The second hypothesis indicates that supply-chain integration can significantly increase innovation capability. It aligns with previous studies [Jimenez-Jimenez et al. 2019]. This condition shows that food manufacturing companies in East Java are highly dependent on partners in their supply chain to spur innovation capability. Customers, internal parties, and suppliers obtain information about new products and food processing techniques. In other words, this encourages the transfer and sharing of knowledge among suppliers, internal parties, and customers [Orji and Ojadi 2023]. However, this differs from the studies by Ayoub et al. [2017] and Wong et al. [2013], which state that only supplier integration and customer integration affect innovation capability, while internal integration does not. This condition can occur if there is a high internal knowledge gap and the imitation strategy is the company's dominant strategy [Holweg et al. 2005]. The competition of food manufacturing companies in East Java is relatively high. Therefore, increasing the role of supply-chain integration is crucial to convey information about the possibility of new product development quickly and improve innovation capability along with the increase in potential customer needs.

Operational Performance will improve along with improved supply-chain integration. It is related to the research by Weerabahu et al. [2022], who found that supply-chain integration has a powerful effect on the emergence of operational performance. The justification for the result of this study is that if the company is close enough to its customers, then all information on customer needs, both in terms of production and shipping plans, will be communicated with related departments and suppliers [Fianko et al. 2023]. Non-value added will be reduced [De Stefano and Montes-Sancho 2023]. Thus, cost efficiency will increase, an inventory reduction will occur [Disney and Towill 2002], and it will improve operational performance. Food manufacturing companies are particularly at risk of high inventory regarding durability issues.

On the contrary, if the level of supply-chain integration is low, the uncertainty of orders, order progress, and material price fluctuations may cause the "nervousness" effect, harming cost improvement [Disney and Towill 2002]. However, this study's results may need to be more consistent when companies prioritize different competitive strategies [Wiengarten et al. 2019]. This result does not align with the research [Danese and Romano 2011]. Integration with customers that are too close can cause customers to request additional product features, which leads to a decrease in operational performance.

The research results also show that increasing supply-chain responsiveness will improve operational performance. The research findings show that supply-chain responsiveness positively affects operational performance with a p-value <0.05. This means that Hypothesis 4 can be accepted. The justification for the research results is that high supply-chain responsiveness indicates a rapid response to market changes

[Nenavani and Jain 2022]. Changes in customer demand lead to instability in production schedules, ordering of materials, and delivery of goods [Ruiz-Torres et al. 2018]. If this change is balanced with high supply-chain responsiveness, operational performance will remain high [Handfield and Bechtel 2002]. The change in consumer demand will be acceptable if the company understands its customer's movements [Singhry and Abd Rahman 2019] and is balanced with an excellent information-sharing system [Wu et al. 2006]. Therefore, the company quickly understands changes in demand and reduces demand uncertainty [Holweg et al. 2005]. Providing products in the correct quantity, time and specification is the key to a company's success, which can only be obtained from high supply-chain responsiveness. This is different from previous studies, which state that market changes and demand uncertainty do not strengthen the importance of the supply-chain responsiveness effect on operational performance [Wong et al. 2013; Yu and Huo 2018].

The fifth hypothesis indicates that innovation capability does not significantly affect operational performance. It is in line with the research by Xiaosong Peng, Schroeder, and Shah [2011]; Xu et al. [2023] states that radical innovation capability will have an impact on increasing operational costs, and if the innovation is not in line with customer demand, then operational costs increase. As a result, operational performance will decrease. Increasing innovation capability must be considered because innovation contains research and development costs [Xu et al. 2023]. Therefore, innovation capability must align with consumer desires [Ayoub et al. 2017] and potential market demand. The results of this study are different from many previous studies. Many previous studies have found that innovation capability significantly influences operational performance [Gohr, Scoralick de Almeida Tavares, and Morioka 2022; Kafetzopoulos and Psomas 2015; Saunila 2014; Wong et al. 2013]. Innovation capability is considered as multiple skills and competencies that are critical in the new product delivery strategy [Huo 2012]. However, the food industries in East Java have not experienced the need for intense innovation because the food industry in East Java tends to stagnate.

According to the study results, supply-chain integration influences business efficiency through the mediation of responsiveness to demand; it indicates that stronger integration between supply chains will increase supply-chain responsiveness and ultimately improve the company's operational performance. This aligns with the research by Nenavani and Jain [2022] and Holweg et al. [2005]. The company's strategy to satisfy consumer desires can be initiated by integrating all related parties, suppliers, departments, and customers. By integrating, every party can respond to any changes that occur quickly. The flow of funds, information, and goods will improve and joint problem-solving will occur [Handfield and Bechtel 2002]. The ultimate consequence of this process is a reduction in costs [Weerabahu et al. 2022]. Delivery will be more effective, and the quality of the goods better [Xiaosong Peng et al. 2011] also reduce the defect rate [Yu and Huo 2018]. All components cause operational performance to increase. This should be an essential concern for the company. The company's strategy of providing goods at the right place and time in the proper quantity is necessary with quality supply-chain integration [Holweg et al. 2005; Theixar and Wairocana n.d.]. In the opposite case, if supply-chain integration is not well maintained, it will cause all processes to stall and operational performance to drop.

Integrated supply chains influence profitability by mediating the ability for creativity, which cannot be accepted empirically. In resource-based view theory, it is said that supply-chain integration is a vital input resource to form innovation capability, which will create superior value for customers [Huo 2012; Yu and Huo 2018]. However, innovation capability will only lead to operational performance under certain conditions [Rousseau et al. 2016]; the company has scarce resources and valuable innovation capabilities, is path-dependent, challenging to obtain, and expensive to imitate [Barney 1991; Fianko et al. 2023]. The justification for this study is that food manufacturing in East Java does not have the abovementioned characteristics. This results in

hypothesis 6 being rejected. The results of this study are also in line with Xu [2023], who states that strong integration between supply-chain partners can improve operational performance with radical innovation capabilities, while the food industry does not require radical innovation capabilities yet [Ayoub et al. 2017].

CONCLUSION

Operational performance is an important factor that the company must improve to achieve the highest customer value. Improving operational performance cannot be achieved individually; every party involved must pursue this goal together. Therefore, supply-chain integration is a must. The study results indicate that improving operational performance can be influenced by improving supply-chain integration directly or by being mediated by supply-chain responsiveness. Because of the high supply-chain integration, each partner's responsiveness will increase and ultimately improve operational performance. Meanwhile, innovation capability needs to mediate between the effects of supply-chain coordination and operation capability. This is because the effect of capability for innovation on operational performance will only occur in specific situations/contexts.

The limitation of this study is the use of aggregate variables, for example, supply-chain integration, which can be examined from supplier, internal, and customer integration. Thus, the variable innovation capability can be broken down into process and product innovation. Therefore, future studies can use more specific variables in different industries. Based on the limitations of this study, there are several recommendations for future research, such as, firstly, expanding the scope, since this study focused on the food manufacturing industry in East Java. Future research can consider other industries or regions to enhance the generalizability of the findings; secondly, adopting a qualitative approach: While this study used a quantitative method, future research might consider incorporating qualitative methods such as interviews or case studies to capture the complexity of the relationships between supply-chain innovation capability, responsiveness, integration, operational performance; thirdly, Larger sample size: this study relied on a sample of 121 respondents, which may limit the representativeness of the findings. Future research might aim for a larger sample size to increase the statistical power and reduce potential bias. Overall, addressing these recommendations can contribute to a more robust and comprehensive understanding of the factors influencing operational performance in supply-chain management.

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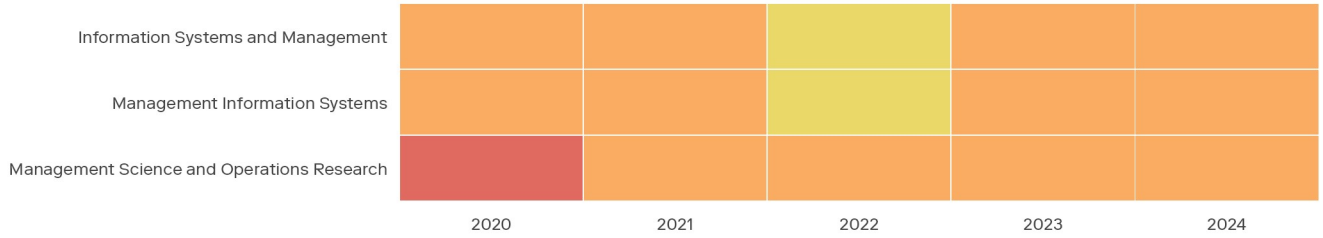

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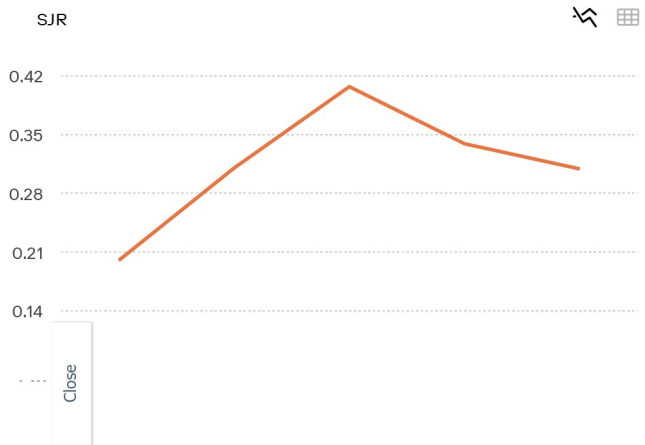

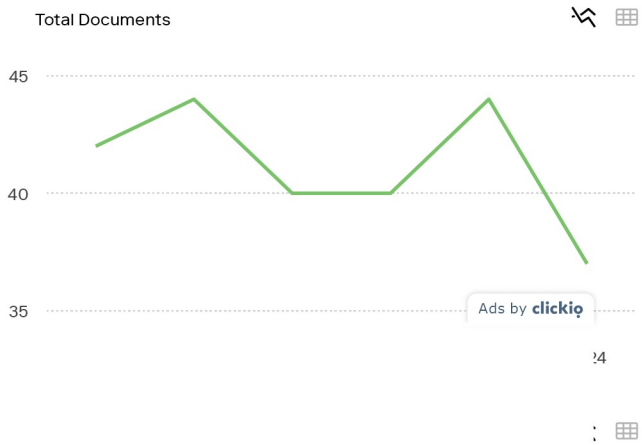

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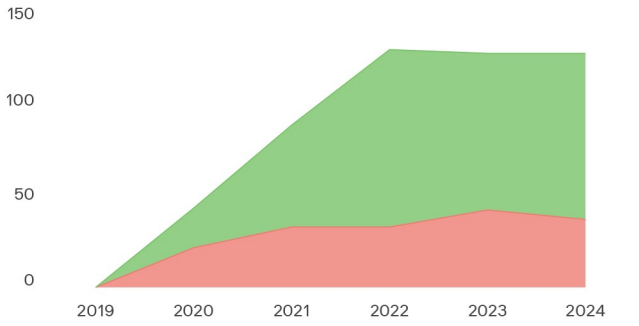

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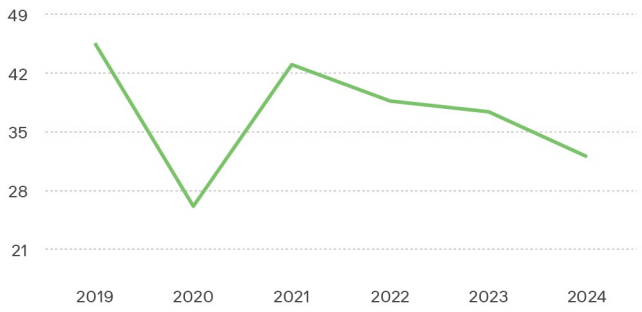

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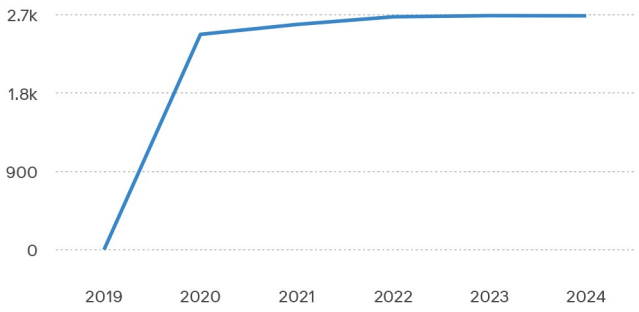

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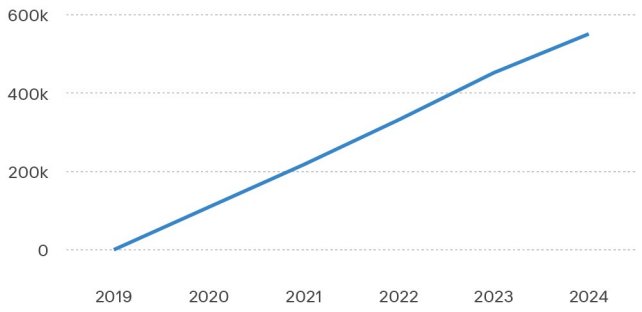

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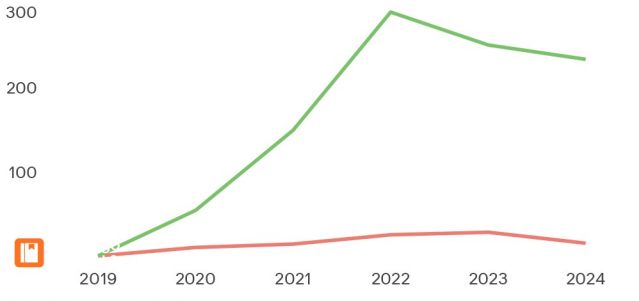

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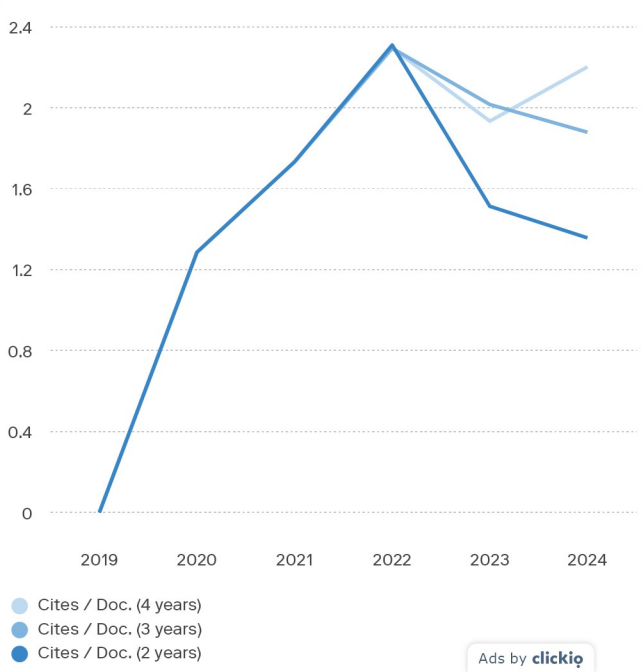

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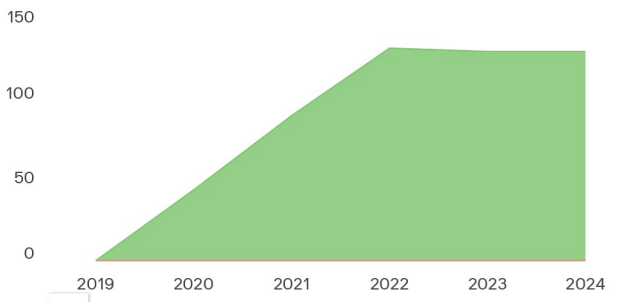

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