

Research Article

Analysis of the Influence of Supply Chain Management on the Operational Efficiency of Capture Fisheries Business in Ambon City: Multiple Linear Regression Approach

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Abstract: The fisheries sector plays a vital role in Indonesia's maritime economy, yet capture fisheries enterprises in Ambon City continue to face persistent operational constraints, including limited cold-chain facilities, seasonal catch dependency, and poorly structured coordination among fishermen, collectors, and end consumers, all of which contribute to information asymmetry and suboptimal supply chain performance. This study aims to describe the current condition of supply chain management practices, assess the level of operational efficiency achieved, and examine the influence of supply chain management on operational efficiency among capture fisheries businesses in Ambon City. A quantitative associative approach was employed, involving 110 respondents selected through purposive sampling, with data analyzed using multiple linear regression after classical assumption testing confirmed normality, absence of multicollinearity, and homoscedasticity. The findings reveal that demand planning, procurement and distribution, and information integration each exert a significant and positive partial effect on operational efficiency, with demand planning demonstrating the strongest contribution ($B=0.438$), followed by procurement and distribution ($B=0.353$) and information integration ($B=0.205$). Simultaneously, these three dimensions explain 45.5 percent of the variance in operational efficiency ($R^2=0.455$; $F=29.53$; $p=0.000$). These results indicate that although supply chain management awareness exists among business actors, implementation remains fragmented due to infrastructure and communication limitations. It is recommended that future research expand the sampling area, incorporate additional variables such as institutional capacity and policy support, and apply mediation or moderation approaches to deepen understanding of the underlying mechanisms.

Keywords: Ambon City; Capture Fisheries; Multiple Linear Regression; Operational Efficiency; Supply Chain Management.

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1. Introduction

The marine and fisheries sector is one of the backbones of the economy of archipelagic countries such as Indonesia, considering the sea area that dominates the national territory and its contribution to the country's food supply, employment, and foreign exchange. Globally, the issue of seafood supply chain efficiency is increasingly urgent due to increasing consumer demand for fresh, timely, and high-quality fishery products, while business actors are faced with the challenges of fluctuations in catches, limited logistics infrastructure, and weak information integration between supply chain actors. Organized collaboration in catch management is known to improve distribution efficiency, expand market access, and reduce logistics costs per unit of product (Primary, 2025). This phenomenon puts *Supply Chain Management* as a strategic approach that not only focuses on the physical aspects of the distribution of goods, but also on the comprehensive integration of business processes from upstream to downstream to create a sustainable competitive advantage.

In particular, this condition is reflected in the capture fisheries business in Ambon City, which faces operational problems such as limited cold chain facilities, dependence on the fishing season, and unstructured coordination between fishermen, collectors, and end consumers. The dominance of oral communication without systematic transaction documentation in the supply chain of agricultural and fisheries commodities in general actually causes *Information asymmetry* which is detrimental to all supply chain actors and has

implications for operational inefficiencies and decreased asset management performance (Dewi & Andrian, 2024). In fact, the availability of accurate, timely, and complete information is a fundamental prerequisite for the effectiveness of demand planning, inventory control, and distribution scheduling in a healthy supply chain (Chopra & Meindl, 2023).

Some previous research, such as a study on the application of supply chain management in roa fish commodities in Minahasa Regency which highlighted the flow of products, finance, and information between business actors (Baskoro & Sunarso, 2024), has confirmed the link between supply chain management and business operational achievements. Another study using multiple linear regression analysis also proved that supply chain management integration makes a real contribution to improving operational performance and a company's competitive advantage (Serang et al., 2026), in line with the findings that the implementation of *Supply Chain Management* good able to improve overall logistics performance (Anisa et al., 2025). However, these studies generally focus on the manufacturing, retail, or non-fishery commodity sectors in the Sulawesi, Java, and Sumatra regions, so there are *Gap* research related to how the dimensions of supply chain management simultaneously affect the operational efficiency of small-scale capture fisheries businesses in archipelagic areas such as Ambon City, which have different geographical and socio-economic characteristics from previously researched areas.

The novelty of this research lies in the application of a quantitative approach with multiple linear regression analysis to empirically measure the contribution of supply chain management variables to the operational efficiency of capture fisheries businesses in Ambon City, a local context that has not been widely raised in the Indonesian supply chain management literature, while enriching the conceptual framework regarding the relationship between supply chain integration and achievement operations on the scale of micro businesses based on marine commodities.

Based on the above background description, this study formulates problems regarding the conditions of the implementation of supply chain management in the capture fisheries business in Ambon City today, how the level of operational efficiency has been achieved by capture fisheries business actors in the city, and whether supply chain management has a significant effect on the operational efficiency of the capture fisheries business in Ambon City when tested using a regression analysis approach Linear multiple.

In line with the formulation of the problem, this study aims to describe the conditions of the implementation of supply chain management in capture fisheries businesses in Ambon City, analyze the level of operational efficiency achieved by capture fisheries businesses in the city, and test and analyze the influence of supply chain management on the operational efficiency of capture fisheries businesses in Ambon City through a multiple linear regression approach.

Theoretically, this research is expected to enrich the study of operational management and *supply chain management* in the capture fisheries sector based on the archipelago, as well as become an academic reference for similar research in the future. Practically, the results of the study are expected to provide input for capture fisheries business actors in Ambon City in improving supply chain governance to improve operational efficiency, as well as being considered for local governments in formulating sustainable fisheries sector development policies.

2. Literature Review

Supply Chain Management

Supply chain management is essentially an integrated system arrangement that coordinates the entire process within the organization, from suppliers to product delivery to end consumers, with the goal of maximizing added value at every node of the supply network (Chatra et al., 2023). This concept includes various important dimensions such as supply chain components, management strategies, transportation and distribution, the use of information technology, to the measurement of supply chain performance as a whole, all of which are interrelated in creating operational efficiency for business actors (Chatra et al., 2023). In the context of small and medium-scale businesses, the absence of systematic transaction documentation and the dominance of verbal communication between business actors are often a source of *Information asymmetry* which ultimately lowers asset management performance and overall operational efficiency (Nurhikmah, 2026). Therefore, strengthening coordination between trading partners and implementing an integrated recording system is seen as crucial to support information accuracy and smooth supply planning for all parties involved (Nurhikmah, 2026).

Operational Efficiency

Operational efficiency is generally understood as the ability of an organization to run its business processes with minimal use of resources while still producing optimal outputs, including managing time, labor, and capital effectively to achieve the company's economic goals (Suraji et al., 2025). Increasing operational efficiency is believed to reduce production costs, increase output volume, and improve the quality of an organization's work, so that this aspect is the main determinant of business competitiveness in the midst of increasingly fierce market competition (Suraji et al., 2025). Empirical findings in the micro and small business sector show that good raw material inventory planning, accompanied by consistent product quality maintenance, contributes positively and significantly to improving operational efficiency, as both factors help minimize the risk of shortages and overstocking while maintaining customer satisfaction (Ariyanti et al., 2025). Thus, operational efficiency does not stand alone, but is greatly influenced by how a business manages its flow of materials, information, and resources in an integrated manner.

Capture Fisheries Business

Capture fisheries business is a form of economic activity that utilizes the potential of marine resources, rivers, and inland waters to obtain catches in the form of fish and other marine life, whose sustainability is highly dependent on the ecological, economic, and social conditions of coastal communities at the same time (A'yunin et al., 2021). In archipelagic areas such as Maluku, the management of capture fisheries business is generally still traditionally carried out by small-scale fishermen with simple fishing gear, so that aspects of financial feasibility and business efficiency are important concerns to support the sustainability of the livelihoods of coastal communities. The results of studies in the waters of Outer Ambon Bay show that almost all types of capture fisheries businesses with various fishing gear are categorized as profitable and financially viable, although the level of fishermen's utilization of small and demersal fish resources in the area is still relatively low (Amura & Pirhel, 2021). These findings confirm that the potential of capture fisheries in the Ambon region can still be further optimized through more structured and efficient management.

Multiple Linear Regression Analysis

Multiple linear regression analysis is one of the statistical methods used to measure the relationship between one bound variable and two or more independent variables simultaneously or partially, so that researchers can understand how much each independent variable contributes to the dependent variable being studied (Terimajaya et al., 2024). This method is widely used in scientific research, thesis, and thesis because it is able to provide an empirical picture of the pattern of relationships between variables as well as being the basis for decision-making in various fields of study such as economics and management (Yusuf et al., 2024). Before estimating the model, a number of classic assumptions such as normality, multicollinearity, and heteroscedasticity need to be tested first so that the regression results obtained are truly valid and statistically accountable (Yusuf et al., 2024). Thus, the multiple linear regression approach is considered appropriate to be used in measuring the influence of supply chain management on the operational efficiency of capture fisheries businesses in Ambon City in a more measurable and objective manner.

3. Materials and Method

This study uses a quantitative approach with an associative design, which aims to test the influence of supply chain management on the operational efficiency of capture fisheries businesses in Ambon City through a multiple linear regression approach. The research population includes all capture fisheries business actors that are actively operating in the Ambon City area, with an estimated population of 150 business units based on preliminary data from the relevant agencies. The determination of the number of samples is carried out using the formula *Slovin* with an error rate of 5%, considering that this formula is considered practical to be used in a population whose number is known to be definitively to produce a representative sample (Santoso, 2023). Based on this calculation, an ideal sample size of 110 respondents was obtained, which was considered sufficient to support regression analysis with three independent variables, namely demand planning, procurement and distribution, and information integration in the supply chain, against one dependent variable in the form of operational efficiency. The sampling techniques used are *purposive sampling*, with the criterion that the respondent is the owner or manager of a capture fisheries business that has been operating for at least one year in Ambon City. Primary data were collected through a closed-ended questionnaire deployment compiled using a scale *Likert* five points, then supplemented by field observations and brief interviews to strengthen the validity of the data. Before use, the research instrument is tested for validity and reliability to ensure the consistency of the measurement of each variable indicator. Furthermore, the data were

analyzed through classical assumption tests which included normality, multicollinearity, and heteroscedasticity tests, as a prerequisite before the regression model was validly estimated (Yusuf et al., 2024). Multiple linear regression analysis was applied to determine the magnitude of the influence of each independent variable on operational efficiency, either partially through the t-test or simultaneously through the F-test, and was equipped with a determination coefficient value (R^2) to measure the contribution of the independent variable to the bound variable as a whole.

4. Results and Discussion

Respondent Characteristics

This study involved 110 respondents who are owners or managers of capture fisheries businesses in Ambon City. The characteristics of respondents based on gender, age, length of business, and role in business are presented in the following table.

Table 1. Characteristics of Research Respondents (n=110).

Characteristics	Categories	Quantity	Percentage
Gender	Male	89	80,9%
	Women	21	19,1%
Age	21–58 years (average 34.6 years)	110	100%
Long Term of Effort	1–3 years	14	12,7%
	4–6 years	38	34,5%
	7–10 years	30	27,3%
	>10 years	28	25,5%
Role of Respondents	Owner	88	80,0%
	Managers	22	20,0%

Table 1 shows that the majority of respondents are male and have been running a capture fisheries business for a period of 4 to 10 years, with the status of business ownership dominated by direct owners.

Descriptive Statistics of Research Variables

An overview of respondents' answers to each research variable is shown through the mean value and standard deviation as follows.

Table 2. Descriptive Statistics of Research Variables.

Variable	Red	Std. Deviation	Min	Max
X1 – Demand Planning	3,51	0,73	1,50	5,00
X2 – Procurement and Distribution	3,31	0,84	1,25	5,00
X3 – Information Integration	3,43	0,88	1,00	5,00
Y – Operational Efficiency	3,43	0,84	1,20	5,00

Based on Table 2, all variables are in the category of being quite good with average values ranging from 3.31 to 3.51 on a scale of 1–5, which indicates that the implementation of supply chain management and the level of operational efficiency in capture fisheries businesses in Ambon City is not fully optimal.

The results of the validity test showed that all items in the four variables had an *item-total* correlation value above 0.79, while the reliability test resulted in *Cronbach's Alpha* values of 0.826 (X1), 0.873 (X2), 0.865 (X3), and 0.905 (Y), so that all instruments were declared valid and reliable for use in further analysis.

Classical Assumption Test Results

Before estimating the regression model, the data was first tested based on classical assumptions, with the following results.

Table 3. Summary of Classical Assumption Test Results.

Test Type	Results	Remarks
Normality (Kolmogorov-Smirnov)	Sig. = 0.926	Normally distributed residual
Multicollinearity (VIF)	X1=1.05; X2=1.25; X3=1.24	Multicollinearity does not occur
Heteroscedasticity (Glejser)	Sig. > 0.05 on all variables	Heteroscedasticity does not occur

Table 3 shows that all classical assumptions have been met, so multiple linear regression models can be used to validly test the influence between variables.

Results of Multiple Linear Regression Analysis

The results of the test of the effect of supply chain management on operational efficiency partially and simultaneously are presented in the following table.

Table 4. Multiple Linear Regression Test Results (Partial Test/t-Test).

Variable	Coefficient (B)	t count	Sig.
Constant	0,026	0,069	0,945
X1 – Demand Planning	0,438	5,114	0,000
X2 – Procurement and Distribution	0,353	4,402	0,000
X3 – Information Integration	0,205	2,682	0,008

Table 4 shows that the three independent variables have significance values below 0.05, which means that each variable has a partial effect on operational efficiency, with the regression equation $Y = 0.026 + 0.438X1 + 0.353X2 + 0.205X3$.

The results of the simultaneous test (F test) obtained an F value of 29.53 with a significance level of 0.000, while the value of the determination coefficient (R^2) was recorded as 0.455 and the *Adjusted R Square* of 0.440, which shows that the three independent variables together are able to explain the variation in operational efficiency. The correlation matrix showed a positive relationship between X1 and Y ($r=0.481$), X2 and Y ($r=0.516$), and X3 and Y ($r=0.433$).

Discussion

Conditions for the Implementation of Supply Chain Management in Capture Fisheries Businesses in Ambon City

The results of the descriptive analysis in Table 2 show that the three dimensions of supply chain management studied, namely demand planning (X1), procurement and distribution (X2), and information integration (X3), obtained an average score of 3.51, 3.31, and 3.43, respectively on a scale of 1–5. The three scores are in the category of quite good, but have not reached the optimal level when compared to the maximum score that can be achieved. This finding indicates that capture fisheries business actors in Ambon City basically have an awareness of the importance of supply planning, procurement of operational facilities, and information exchange between business actors, but its implementation in the field is still running partially and has not been systematically structured.

The procurement and distribution dimension (X2) was recorded to obtain the lowest average score among the three dimensions of supply chain management, which was 3.31. This condition is in line with the general picture found in the capture fisheries supply chain in other archipelagos in Indonesia, where the main problems faced include limited facilities and infrastructure, lack of understanding of fishermen on the principles of supply chain management, and weak logistics networks that connect catches to the final market (Ariffien et al., 2024). As a concrete example, research on the capture fisheries industry in Cilacap Regency found that the effectiveness of the supply chain is largely determined by the extent to which business actors are able to build a standardized logistics network, control the method of storing catches, and ensure the quality of products before being distributed to end consumers (Ariffien et al., 2024). A similar pattern is also reflected in the capture fisheries business in Ambon City, where the limitations of cold chain facilities and dependence on the fishing season that have been described in the preliminary section are also factors that hinder the optimization of the process of procurement and distribution of marine products.

Furthermore, the condition of fishing port facilities and other supporting services also plays an important role in determining the quality of the supply chain in the archipelago. A study conducted at the Nusantara Tanjungpandan Fisheries Port on Belitung Island found that a number of basic, functional, and supporting facilities of fishing ports still do not meet the standards set by the relevant ministry regulations, resulting in the low performance of services that support the supply chain of catches in the archipelago area (Nur et al., 2023). This phenomenon gives an idea that the problem of supporting infrastructure is not only experienced by capture fisheries businesses in Ambon City, but also a common challenge faced by other archipelago regions in Indonesia in managing the supply chain of marine products efficiently.

The dimension of information integration (X3) which obtained an average score of 3.43 also shows that information exchange between business actors in Ambon City is still at a medium level. These limitations are consistent with findings on multi-level frozen fish supply chains in Portugal, which reveal that the availability of detailed information on product characteristics from higher levels of the supply chain, such as from suppliers and transporters, is still relatively minimal, so that information transparency between supply chain actors tends to be hampered despite the availability of analytical supporting technologies (Tokkozhina et al., 2023). This kind of information limitation can in turn affect the level of trust between business actors, as it is found that the application of product tracking technology does not necessarily eliminate the need for mutual trust between trading partners, as the input of information still requires human intervention in the process (Tokkozhina et al., 2023). In the capture fisheries business in Ambon City, the dominance of verbal communication without

systematic transaction documentation, as explained in the introductory section, strengthens the indication that information integration between supply chain actors has not been running optimally.

Another problem that contributes to weakening the condition of the capture fisheries supply chain is related to the post-harvest handling of catches. The nature of fish commodities that are easily degraded in quality causes the post-harvest handling process to become a critical point in the entire supply chain. Studies using the TOPSIS fuzzy method on the fish supply chain identified that excess load capacity in the transport basket, inadequate ice cooling during the transportation and sorting process at the supplier level, and the absence of suitable equipment for small-scale retailers are the main factors causing high post-harvest losses in the fisheries supply chain (Ibrahim et al., 2023). This condition is relevant to the context of the capture fisheries business in Ambon City, considering the limitations of cold chain facilities faced by business actors have the potential to increase the risk of declining the quality of the catch before it reaches the end consumer.

Overall, the condition of the implementation of supply chain management in capture fisheries businesses in Ambon City can be described as being at the intermediate stage of development, where awareness of the importance of planning, procurement, distribution, and information exchange has grown, but its implementation in the field is still limited by infrastructure, technology, and traditional communication patterns. The pattern of integration that is not optimal between business actors is also in line with the findings of the furniture industry in Jepara, which shows that supplier integration and internal integration have a more dominant role than customer integration in supporting supply chain risk management, so that strengthening relationships on the upstream side of the supply chain tends to have a more significant impact than the downstream side (Nurjanaha & Nursyamsiah, 2022). The implication is that strengthening coordination between fishermen as the main supplier and collector traders in Ambon City has the potential to be a strategic starting point to improve the entire capture fisheries supply chain system in the city.

Level of Operational Efficiency of Capture Fisheries Business in Ambon City

The operational efficiency variable (Y) in Table 2 was recorded to obtain an average value of 3.43 with a standard deviation of 0.84, which shows that the level of operational efficiency of the capture fisheries business in Ambon City is in the category of quite good but still has considerable room for improvement. This value indicates that business actors in general have been able to carry out their operational activities, but have not fully achieved optimal use of resources in the process of capturing, handling, and selling marine products.

This level of operational efficiency that is not optimal is closely related to how the supply chain management strategy is implemented by business actors. A study of the manufacturing small and medium-sized business sector in South Korea found that supply chain management strategies specifically have a significant influence on the company's operational performance, and these relationships are also strengthened through the improvement of organizational competencies, such as research and development capabilities, technology commercialization, production capacity, and marketing capabilities (Lee, 2021). This means that increasing operational efficiency is not solely the result of the implementation of a single supply chain strategy, but also depends on the organization's internal capacity to translate the strategy into daily operational practices. In the context of capture fisheries business in Ambon City, which is mostly micro and small-scale, the limited capacity of this kind of organization is also one of the factors that limits the achievement of maximum operational efficiency.

Another factor that affects the level of operational efficiency is the extent to which information is effectively shared among supply chain actors. Research on the manufacturing sector in China found that the sharing of internal information has a positive impact on the three dimensions of supply chain adaptability, while the sharing of information with suppliers and customers only has a positive effect on adaptability on the supplier side, and ultimately all dimensions of adaptability contribute to improving overall operational performance (Yang et al., 2022). These findings reinforce the understanding that the operational efficiency of capture fisheries businesses in Ambon City, as reflected in the average value of variable Y of 3.43, is likely influenced by the extent to which information related to demand, price, and supply availability is effectively shared between fishermen, collectors, and end consumers in the region.

The quality of information exchanged between supply chain actors has also proven to play an important role in determining the operational effectiveness of a business. A study in the manufacturing sector found that information quality moderates the relationship between supply chain integration and operational effectiveness, so a well-integrated supply chain requires accurate information support to be able to maximize operational outcomes (Right, 2024). In other words, simply having a cooperative relationship between business actors

without being supported by adequate information quality will not be enough to significantly boost operational efficiency. This is relevant to the conditions in Ambon City, where the average value of information integration (X3) recorded at 3.43 in Table 2 also provides an idea that the quality of information exchange between capture fisheries business actors still needs to be strengthened in order to be able to encourage the achievement of higher operational efficiency.

In general, the level of operational efficiency of the capture fisheries business in Ambon City can be said to have shown a positive trend, but it has not reached the ideal level. This is consistent with the condition of supply chain management which is also in the category of quite good but not optimal, as discussed in the previous subsection, so that there is a logical relationship between the non-optimal implementation of the dimensions of supply chain management and the lack of maximum operational efficiency achieved by capture fisheries business actors in the city.

The Influence of Supply Chain Management on the Operational Efficiency of Capture Fisheries Business in Ambon City

The results of multiple linear regression testing in Table 4 show that the three independent variables, namely demand planning (X1), procurement and distribution (X2), and information integration (X3), each have a significance value below 0.05, with a successive calculated t-value of 5.114; 4,402; and 2,682. These findings show that partially, the three dimensions of supply chain management have a significant and positive effect on the operational efficiency of the capture fisheries business in Ambon City, with the demand planning variable contributing the largest coefficient ($B=0.438$), followed by procurement and distribution ($B=0.353$), and information integration ($B=0.205$).

These findings are in line with previous studies that have consistently shown that supply chain integration has a significant impact on operational performance in various business sectors. A study of 129 medium- and large-scale manufacturing companies in Pakistan found that supplier integration was positively correlated with the company's product innovation capabilities and operational performance, although internal integration and customer integration were not directly related to operational performance (Ali & Mahmood, 2024). This pattern is interesting to compare with the results of this study, where the procurement and distribution variable (X2) which is closely related to the relationship between the capture fishery business and the supplier of its operational facilities actually shows a considerable contribution to operational efficiency, thus reinforcing the importance of the role of integration on the procurement side in the context of capture fisheries business in Ambon City.

The significant contribution of the three dimensions of supply chain management to operational efficiency in this study also gained empirical support from a study of the food and beverage industry in Jordan, which found that supply chain integration has a significant direct influence on operational performance, and that the three dimensions in the theoretical model tested i.e., internal integration, supplier integration, and customer integration—each made a significant contribution on the company's operational performance (Masa'deh et al., 2022). The consistency of the results between the study and the findings on the capture fisheries business in Ambon City strengthens the argument that supply chain management, as a system consisting of various interrelated dimensions, is actually able to encourage operational efficiency improvements across business sectors, including in the small-scale capture fisheries sector in the archipelago.

In addition to partial testing, the results of the simultaneous test (F test) in this study showed an F value of 29.53 with a significance of 0.000, which means that the three supply chain management variables together have a significant effect on the operational efficiency of the capture fisheries business in Ambon City. A determination coefficient value (R^2) of 0.455 indicates that 45.5 percent of the variation in operational efficiency can be explained by the three independent variables studied, while the remaining 54.5 percent is influenced by other factors outside the study model. The findings on these simultaneous influences reinforce the results of a study on the small and medium-sized business sector in Karachi, Pakistan, which found that supply chain integration has a significant impact on operational performance, either directly or through the mediating role of supply chain capabilities, so that good integration can ultimately improve overall performance (Khan, 2024). In line with that, it can be understood that the operational efficiency of the capture fisheries business in Ambon City is not solely determined by one dimension of the supply chain, but is the result of the interaction of various dimensions that complement each other.

The combined influence of various dimensions of the supply chain on operational performance is also reflected in research on food and beverage companies in East Java during the pandemic, which found that supply chain integration affects supply chain responsiveness

and innovation capabilities, and ultimately these two mediating factors also have a positive influence on the company's operational performance (Siagian & Johono, 2022). The nine hypotheses tested in the study have been empirically proven, reinforcing the understanding that supply chain integration not only has a direct effect on operational performance, but can also be strengthened through various other supporting mechanisms. In the context of this study, the Adjusted R Square value of 0.440 obtained indicates the possibility of other variables outside the model, such as fishermen's institutional capacity, local government policy support, or weather and fishing season factors, which contribute to variations in the operational efficiency of capture fisheries businesses in Ambon City but have not been covered in this study.

Taking into account the results of the partial and simultaneous tests that have been described, it can be concluded that supply chain management, which in this study is represented through demand planning, procurement and distribution, as well as information integration, is proven to have a significant effect on the operational efficiency of capture fisheries businesses in Ambon City when tested using multiple linear regression analysis approach. The regression equation $Y = 0.026 + 0.438X_1 + 0.353X_2 + 0.205X_3$ produced in this study confirms that any improvement in the demand planning dimension will contribute to a relatively greater increase in operational efficiency than the other two dimensions, so that the aspect of catch supply planning can be seen as a strategic intervention point in an effort to improve the management of the capture fisheries supply chain in the Ambon City area.

5. Comparison

Compared to previous research, these findings show a consistent pattern while providing a new nuance to the context of small-scale capture fisheries. The value of the determination coefficient of 0.455 in this study is relatively comparable to the findings in the manufacturing small and medium enterprises sector, which also confirms that supply chain integration makes a real contribution to the company's operational performance (Anisa et al., 2025; Serang et al., 2026). However, research on the food and beverage sector in Jordan shows that the three dimensions of supply chain integration contribute relatively evenly to operational performance (Masa'deh et al., 2022), while this study found that the demand planning dimension made the most dominant contribution ($B=0.438$), exceeding procurement and distribution as well as information integration. This difference indicates that the characteristics of marine commodity-based micro-enterprises that are highly dependent on the fishing season demand a different priority than the manufacturing sector which is more stable in supply. In addition, when compared to a study in Pakistan that found that only supplier integration had a significant effect on operational performance (Ali & Mahmood, 2024), this study shows more comprehensive results because all dimensions of supply chain management are proven to have a significant effect partially. Comparison with a mediation study of supply chain capabilities in Karachi (Khan, 2024) It also reinforces that the direct influence of supply chain management on operational efficiency, even without mediation variables, remains relevant and significant in the context of small-scale fisheries businesses in archipelagic areas such as Ambon City, so that this study expands the generalization of supply chain integration theory to sectors that have not been widely researched before.

6. Conclusion

This study shows that the implementation of supply chain management in the capture fisheries business in Ambon City is in the category of quite good but not optimal, as reflected in the average value of the three dimensions which ranges from 3.31 to 3.51, in line with the level of operational efficiency which is also not optimal (mean = 3.43). The results of multiple linear regression prove that demand planning, procurement and distribution, and information integration have a significant effect both partially and simultaneously on operational efficiency, with a contribution of 45.5 percent. These findings support the argument that structured supply chain integration can drive improvements in operational performance, while enriching the theoretical framework of supply chain management in the context of marine commodity-based micro-enterprises in the archipelago. Practically, this result provides direction for business actors to prioritize improving demand planning as a strategic intervention point, as well as an input for local governments in formulating policies to strengthen cold chain infrastructure and fisheries information systems. The study had limitations in the scope of the sample covering only one urban area as well as independent variables limited to three dimensions, so that 54.5 percent of the variation in operational efficiency was still explained by factors other than the model. Further research is suggested to expand the scope of the area, add variables such as fishers' institutional capacity and policy

support, and use mediation or moderation approaches to deepen understanding of the mechanisms of influence between variables.

Author Contributions: A short paragraph specifying their individual contributions must be provided for research articles with several authors (mandatory for more than 1 author). The following statements should be used "Conceptualization: X.X. and Y.Y.; Methodology: X.X.; Software: X.X.; Validation: X.X., Y.Y. and Z.Z.; Formal analysis: X.X.; Investigation: X.X.; Resources: X.X.; Data curation: X.X.; Writing original draft preparation: X.X.; Writing review and editing: X.X.; Visualization: X.X.; Supervision: X.X.; Project administration: X.X.; Funding acquisition: Y.Y."

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