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Demand Forecasting Capability and Inventory Flexibility in Enhancing Supply Chain Agility through Demand Information Sharing in Distribution Companies

Yuyun Ristianawati[1*], Rahmad Akbar[2], Muhammad Firjatullah Nur Akbar[3]
[1] Universitas Muhammadiyah Semarang, Indonesia
[2] Politeknik Kampar, Indonesia
[3] Universitas Pahlawan Tuanku Tambusai, Indonesia
Email: yuyun.ristianawati@unimus.ac.id[1], rahmadakbar@poltek-kampar.ac.id[2], mfirjanurakbar@gmail.com[3]
**Corresponding Author: yuyun.ristianawati@unimus.ac.id*

Abstract. Market uncertainty and demand volatility require distribution companies to develop supply chain capabilities that support rapid and effective responses to changing customer requirements. This study examines the effects of demand forecasting capability and inventory flexibility on supply chain agility through the mediating role of demand information sharing. A quantitative explanatory approach was employed using data from 300 managers, supervisors, and employees responsible for inventory, demand planning, procurement, logistics, and distribution activities. Respondents were selected using purposive sampling, and data were collected through a five-point Likert-scale questionnaire. The relationships among constructs were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results indicate that demand forecasting capability and inventory flexibility significantly improve demand information sharing and supply chain agility. Demand information sharing also has a significant positive effect on supply chain agility and partially mediates the effects of both demand forecasting capability and inventory flexibility. These findings emphasize the importance of integrating forecasting, flexible inventory practices, and demand information exchange to strengthen supply chain agility in distribution companies.

Keywords: Demand Forecasting Capability; Demand Information Sharing; Distribution Companies; Inventory Flexibility; Supply Chain Agility.

1. INTRODUCTION

Distribution companies increasingly operate under market uncertainty and demand volatility, creating substantial challenges for inventory and distribution management. Unpredictable demand can generate inventory imbalances, stockouts, excess stock, additional operating costs, and disruptions in customer delivery (Kosorukov et al., 2022). Such conditions require firms to manage the relationship between forecasting and inventory decisions more effectively. Inventory policies that are disconnected from forecasting may reduce operational performance, particularly when companies face rapid changes in market demand (Goltsos et al., 2022).

Demand forecasting capability therefore represents an important organizational capability for anticipating customer requirements and supporting inventory decisions. Effective forecasting enables firms to estimate future demand and determine appropriate replenishment requirements based on available information (Zougagh et al., 2020). Advanced analytical techniques can further improve forecasting performance when companies encounter complex and changing demand patterns (Anitha et al., 2023). Consequently, stronger forecasting capability can support responsive inventory decisions while reducing the operational

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consequences associated with demand uncertainty (Bais & Amechnoue, 2025). Nevertheless, forecasting accuracy alone may not guarantee effective supply chain responses when inventory cannot be adjusted rapidly. Inventory flexibility enables companies to modify inventory levels, allocation, and replenishment decisions according to changing demand conditions. This capability becomes particularly important during unexpected demand shocks because firms must respond rapidly while maintaining appropriate inventory positions (Udenio et al., 2018). Integrating forecasting with flexible inventory decisions can therefore help companies balance product availability and inventory efficiency under uncertain market conditions (Goltsos et al., 2022).

Demand information sharing provides a critical mechanism for transforming operational capabilities into coordinated supply chain responses. Timely exchange of demand and market information reduces information asymmetry and supports better decision-making among supply chain partners (Jin, 2019). Reliable information transmission also strengthens coordination between organizations when responding to changing customer requirements (Huang et al., 2022). Furthermore, effective information sharing can enhance supplier flexibility by providing relevant information for faster operational adjustments (Dwaikat et al., 2018).

Although forecasting, inventory management, information sharing, and supply chain agility have received scholarly attention, their integrated relationships remain insufficiently explained. Demand forecasting has been associated with stronger supply chain agility, particularly when supported by complementary organizational capabilities (Bai, 2023). Information sharing has also been demonstrated to strengthen supply chain flexibility and coordination (Dwaikat et al., 2018). However, limited research explains demand information sharing as a mediating mechanism connecting demand forecasting capability and inventory flexibility with supply chain agility. Therefore, this study examines these relationships within distribution companies.

2. LITERATURE REVIEW

Supply Chain Management

Supply chain management (SCM) refers to the integrated management of interconnected activities and organizations involved in delivering products and services from their origin to final customers. SCM integrates procurement, production, inventory, distribution, logistics, and information flows to create coordinated operations across organizational boundaries (Liao & Widowati, 2021). This integration is important because

supply chain performance depends not only on individual organizational efficiency but also on effective coordination among participating actors. Modern SCM increasingly incorporates analytical capabilities to improve planning, resource allocation, and operational decision-making (Turgut et al., 2022).

The primary objective of SCM is to create customer value while controlling operational costs and developing sustainable competitive advantage. Effective supply chain practices enable organizations to coordinate suppliers, production processes, inventory, distribution, and customers as an integrated system. Such coordination can strengthen organizational competitiveness by improving operational efficiency and responsiveness to market requirements (Prabusankar, 2017). Furthermore, digital transformation and Industry 4.0 have increased the importance of integration, information visibility, sustainability, and technology-enabled decision-making within contemporary supply chains (Akhouri et al., 2024).

Distribution Companies

Distribution companies represent an important intermediary within supply chains because they connect manufacturers or suppliers with downstream customers. Their activities generally involve warehousing, transportation, inventory management, order processing, and product delivery. Consequently, distribution performance depends on the ability to maintain product availability while efficiently coordinating inventory and logistics activities. Service-parts planning illustrates how inventory positioning and distribution decisions must be integrated to ensure product availability at appropriate locations and times (Dickersbach & Passon, 2015).

The strategic role of distribution companies has expanded as supply chains become increasingly digital and customer oriented. Distribution firms are expected not merely to transfer products but also to process information and coordinate responses to changing customer requirements. Technology-enabled distribution models demonstrate how digital systems can facilitate connections between supply sources and markets while improving coordination across supply chain activities (Rafi & Mubeena, 2022). Therefore, distribution companies require responsive operational capabilities to manage uncertainty while maintaining reliable service and efficient resource utilization.

Demand Forecasting Capability

Demand forecasting capability refers to an organization's ability to systematically estimate future customer demand using historical information, analytical methods, market data, and appropriate technological tools. This capability enables organizations to anticipate future requirements and align procurement, inventory, and distribution decisions with expected

market conditions. Supply chain analytics provides organizations with opportunities to transform operational data into useful insights for forecasting and decision-making (Turgut et al., 2022). Consequently, forecasting capability becomes increasingly important as companies encounter more complex and volatile demand environments.

Strong forecasting capability also supports more informed decisions regarding inventory replenishment, resource allocation, and distribution planning. The growing availability of supply chain data allows organizations to apply machine-learning methods for identifying patterns and improving data-driven operational decisions (Arora et al., 2022). However, forecasting capability should not be considered merely a technical process because its organizational value depends on the ability to translate predictions into coordinated operational responses. It can therefore be viewed as a dynamic capability that supports adaptation when business environments change (Ahmed, 2024).

Inventory Flexibility

Inventory flexibility refers to the ability of an organization to adjust inventory quantities, positioning, allocation, and replenishment decisions in response to changes in demand and supply conditions. Flexible inventory management allows companies to respond to unexpected fluctuations without creating excessive shortages or unnecessarily high inventory levels. Effective planning is particularly important when organizations must maintain product availability across different locations while balancing inventory-related costs and service requirements (Dickersbach & Passon, 2015).

From a strategic perspective, inventory flexibility strengthens the organization's capacity to adapt its resources when environmental conditions change. Such adaptability is consistent with the dynamic capability perspective, which emphasizes the ability of firms to reconfigure resources and operational processes in response to changing environments (Ahmed, 2024). Flexible inventory arrangements can consequently support resilience and responsiveness by enabling faster adjustments to supply-demand mismatches. Within distribution companies, this capability becomes particularly relevant because inventory availability directly influences order fulfillment and customer service performance.

Demand Information Sharing

Demand information sharing refers to the exchange of relevant demand-related information among organizations and partners participating in supply chain activities. Information may include customer orders, sales patterns, inventory requirements, forecasts, and other market-related data required for planning and coordination. Effective information flows support integrated supply chain management by improving visibility across

interconnected organizational activities (Liao & Widowati, 2021). This visibility enables supply chain participants to coordinate decisions based on shared information rather than relying exclusively on fragmented internal data. Demand information sharing can also strengthen planning quality because organizations gain access to broader information regarding changing customer and market requirements. Supply chain analytics increasingly depends on accessible and integrated data to generate insights that support operational decision-making (Turgut et al., 2022). Digital supply chain environments further facilitate information exchange by connecting organizations, suppliers, distributors, and customers through technology-based platforms (Rafi & Mubeena, 2022). Therefore, demand information sharing can serve as an important coordinating mechanism linking organizational capabilities with more responsive supply chain decisions.

Supply Chain Agility

Supply chain agility refers to the ability of a supply chain to rapidly recognize and respond to changes in customer demand, market conditions, and operational environments. Agility requires organizations to combine responsiveness, flexibility, coordination, and effective decision-making rather than depending solely on operational efficiency. Dynamic capability theory provides a relevant perspective because organizations operating in changing environments must continuously identify changes and reconfigure their resources and processes accordingly (Ahmed, 2024). Supply chain agility can therefore represent an organizational response capability under uncertainty.

The development of supply chain agility requires complementary operational and informational capabilities. Demand forecasting enables organizations to identify potential changes, while inventory flexibility facilitates rapid adjustment of available resources. Information sharing supports coordination by ensuring that relevant demand signals can be communicated across supply chain participants. The integration of technology, information, and organizational processes has become increasingly important for improving sustainable and responsive supply chain operations (Akhouri et al., 2024). Accordingly, this study conceptualizes supply chain agility as an outcome of demand forecasting capability and inventory flexibility, supported through demand information sharing.

3. METHOD

This study employed a quantitative explanatory research approach involving 300 respondents from distribution companies engaged in supply chain activities. Respondents consisted of managers, supervisors, and employees responsible for inventory, demand

planning, procurement, logistics, or distribution, selected through purposive sampling. Data were collected using a five-point Likert-scale questionnaire measuring demand forecasting capability, inventory flexibility, demand information sharing, and supply chain agility. Data analysis was conducted using PLS-SEM, including assessment of the outer model for validity and reliability and the inner model for structural relationships. Bootstrapping was subsequently applied to test direct and indirect effects and determine the mediating role of demand information sharing.

4. RESULTS AND DISCUSSION

Results

The analysis was conducted using PLS-SEM based on data from 300 respondents representing distribution companies. The evaluation was performed in two stages, namely the measurement model (outer model) and structural model (inner model). The measurement model assessment examined construct reliability, convergent validity, and discriminant validity, while the structural model evaluated explanatory power and hypothesized relationships among demand forecasting capability (DFC), inventory flexibility (IF), demand information sharing (DIS), and supply chain agility (SCA).

Table 1. Measurement Model Assessment.

Construct	Cronbach's Alpha	Composite Reliability	AVE	Result
Demand Forecasting Capability (DFC)	0.873	0.912	0.675	Valid and Reliable
Inventory Flexibility (IF)	0.846	0.897	0.686	Valid and Reliable
Demand Information Sharing (DIS)	0.884	0.919	0.694	Valid and Reliable
Supply Chain Agility (SCA)	0.891	0.924	0.708	Valid and Reliable

Table 1 shows that Cronbach's alpha values range from 0.846 to 0.891, while composite reliability values range from 0.897 to 0.924. All values exceed the recommended threshold of 0.70, demonstrating satisfactory internal consistency. Furthermore, AVE values range between 0.675 and 0.708 and exceed 0.50, indicating adequate convergent validity. Therefore, all four constructs demonstrate satisfactory reliability and convergent validity for further structural analysis.

Discriminant validity was subsequently assessed using the heterotrait-monotrait ratio (HTMT). This assessment determines whether each construct represents a concept that is empirically distinguishable from the other constructs included in the research model. The HTMT results are presented in Table 2.

Table 2. HTMT Discriminant Validity Assessment.

Construct	DFC	IF	DIS	SCA
DFC	—			
IF	0.624	—		
DIS	0.681	0.716	—	
SCA	0.653	0.702	0.748	—

All HTMT values are below 0.90, ranging from 0.624 to 0.748. These results indicate satisfactory discriminant validity because the four constructs can be empirically distinguished from one another. Combined with the reliability and convergent validity results, the measurement model therefore satisfies the requirements for proceeding to the structural model assessment.

The structural model was evaluated by examining the coefficient of determination (R^2) for the endogenous constructs. R^2 indicates the proportion of variance in an endogenous variable that can be explained by its predictor variables. In this study, demand information sharing and supply chain agility represent the endogenous constructs.

Table 3. Coefficient of Determination (R^2).

Endogenous Construct	R^2	Adjusted R^2	Interpretation
Demand Information Sharing (DIS)	0.548	0.545	Moderate
Supply Chain Agility (SCA)	0.637	0.633	Moderate

Table 3 indicates that demand forecasting capability and inventory flexibility explain 54.8% of the variance in demand information sharing. Meanwhile, demand forecasting capability, inventory flexibility, and demand information sharing collectively explain 63.7% of the variance in supply chain agility. These findings demonstrate that the proposed structural model has meaningful explanatory power in explaining demand information sharing and supply chain agility among distribution companies.

Hypothesis testing was subsequently performed through bootstrapping to determine the significance of the direct relationships among the constructs. Path coefficients indicate the direction and magnitude of each relationship, while t-statistics and p-values determine statistical significance. The results of the direct effect analysis are presented in Table 4.

Table 4. Direct Effect Testing.

Relationship	β	*t*-Statistics	*p*-Values	Result
DFC → DIS	0.386	6.742	< 0.001	Significant
IF → DIS	0.451	7.863	< 0.001	Significant
DFC → SCA	0.218	3.927	< 0.001	Significant
IF → SCA	0.276	4.816	< 0.001	Significant
DIS → SCA	0.417	7.218	< 0.001	Significant

Table 4 demonstrates that all direct relationships are positive and statistically significant. Inventory flexibility has a stronger effect on demand information sharing (β = 0.451) than demand forecasting capability (β = 0.386). Demand information sharing has the strongest direct effect on supply chain agility (β = 0.417), followed by inventory flexibility (β

= 0.276) and demand forecasting capability (β = 0.218). Thus, improvements in forecasting, inventory flexibility, and demand information sharing are associated with higher supply chain agility. The indirect effects were examined to determine whether demand information sharing mediates the relationships between demand forecasting capability, inventory flexibility, and supply chain agility. The significance of these indirect relationships was assessed using the bootstrapping procedure. The mediation testing results are presented in Table 5.

Table 5. Indirect Effect and Mediation Testing.

Indirect Relationship	β	*t*-Statistics	*p*-Values	Mediation
DFC → DIS → SCA	0.161	5.126	< 0.001	Partial Mediation
IF → DIS → SCA	0.188	5.843	< 0.001	Partial Mediation

Table 5 shows that demand forecasting capability has a significant indirect effect on supply chain agility through demand information sharing (β = 0.161, p < 0.001). Inventory flexibility also generates a significant indirect effect through demand information sharing (β = 0.188, p < 0.001). Because both indirect effects and their corresponding direct effects remain significant, demand information sharing performs a partial mediating role in both relationships.

For a clearer comparison, Figure 1 presents the standardized path coefficients of the structural model. The visualization demonstrates the relative contribution of demand forecasting capability, inventory flexibility, and demand information sharing within the proposed model.

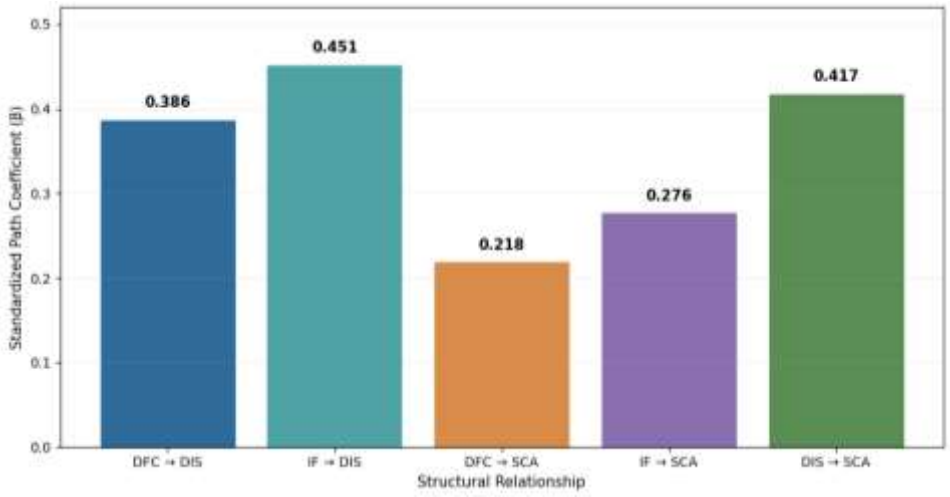


Figure 1. Standardized Path Coefficients of the Structural Model.

Figure 1 demonstrates that all structural paths have positive coefficients. The strongest relationship occurs between inventory flexibility and demand information sharing (β = 0.451), followed by demand information sharing and supply chain agility (β = 0.417). These patterns indicate that inventory flexibility represents an important operational capability for facilitating

information exchange, while demand information sharing serves as a central mechanism for strengthening supply chain agility.

Discussion

The findings demonstrate that demand forecasting capability significantly enhances demand information sharing. Distribution companies with stronger forecasting capabilities can generate more systematic information about expected customer demand, enabling relevant information to be communicated across inventory, procurement, logistics, and distribution functions. Forecasting therefore extends beyond predicting future sales and becomes an informational resource for coordinating supply chain activities. This result is consistent with the role of supply chain analytics in transforming operational data into useful information for organizational decision-making (Turgut et al., 2022).

Inventory flexibility also positively influences demand information sharing and produces the strongest path toward this mediating construct. Flexible inventory management requires continuous information regarding demand fluctuations, stock availability, replenishment needs, and distribution conditions. Consequently, companies seeking to rapidly adjust inventory positions require effective demand information exchange. This relationship reflects the dynamic capability perspective, in which organizations need to continuously reconfigure operational resources in response to environmental changes (Ahmed, 2024).

Demand forecasting capability significantly improves supply chain agility, although its direct effect is relatively smaller than the effect of demand information sharing. Accurate forecasting enables distribution companies to anticipate changes in customer requirements and prepare appropriate operational responses. However, forecasts cannot independently create agility unless forecasting information is incorporated into procurement, inventory, logistics, and distribution decisions. Thus, forecasting capability provides an important foundation for agility, while its organizational value increases when forecasting information is effectively communicated and utilized.

Inventory flexibility has a significant positive effect on supply chain agility. Distribution companies capable of adjusting inventory quantities, allocation, and replenishment decisions can respond more rapidly to changing customer requirements. Such flexibility reduces the constraints associated with rigid inventory arrangements and facilitates faster order fulfillment during demand fluctuations. The finding therefore indicates that operational flexibility is an essential component of agile supply chains, particularly for distribution companies whose service performance depends strongly on product availability and delivery responsiveness.

Demand information sharing demonstrates the strongest direct effect on supply chain agility. Effective information exchange improves visibility of market conditions and enables supply chain participants to coordinate decisions more rapidly. Shared demand information supports adjustments in inventory, procurement, logistics, and distribution activities based on common market signals rather than isolated organizational information. This finding reinforces the importance of integrated information flows as a fundamental component of coordinated supply chain management (Liao & Widowati, 2021).

The mediation results further demonstrate that demand information sharing partially mediates the effects of both demand forecasting capability and inventory flexibility on supply chain agility. Forecasting capability generates information regarding future market requirements, while inventory flexibility provides the operational capacity to respond to those requirements. Demand information sharing connects these capabilities by facilitating the transmission and utilization of relevant demand signals across supply chain activities. Therefore, distribution companies can achieve greater agility when forecasting, flexible inventory management, and information sharing are developed as complementary rather than isolated capabilities.

Overall, the findings support the proposed research model by demonstrating that supply chain agility is shaped by the integration of analytical, operational, and informational capabilities. The R^2 value of 0.637 indicates that these capabilities collectively explain a substantial proportion of supply chain agility. From a managerial perspective, distribution companies should therefore strengthen forecasting systems, develop flexible inventory policies, and establish timely demand information-sharing mechanisms to improve their ability to respond to market uncertainty and demand volatility.

5. CONCLUSION AND RECOMMENDATIONS

Conclusions

This study concludes that demand forecasting capability and inventory flexibility significantly enhance supply chain agility in distribution companies, both directly and indirectly through demand information sharing. Inventory flexibility has the strongest influence on demand information sharing, while demand information sharing provides the strongest direct contribution to supply chain agility. The mediation results further demonstrate that demand information sharing partially mediates both relationships. These findings confirm that integrating forecasting, flexible inventory management, and effective information

exchange is essential for improving supply chain responsiveness under market uncertainty and demand volatility.

Recommendations

Distribution companies are recommended to strengthen demand forecasting systems, implement flexible inventory policies, and improve timely demand information sharing across supply chain functions and partners. Managers should integrate forecasting information with inventory, procurement, logistics, and distribution decisions to enable faster responses to market changes. Future studies may extend this model by examining additional capabilities, such as digital supply chain integration, supply chain resilience, or technological capability, and by involving broader industrial sectors or different geographical contexts to improve the generalizability of the findings.

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