ISSN: 2338-8412 e-ISSN : 2716-4411

Ekombis Review – Jurnal Ilmiah Ekonomi dan Bisnis
Available online at : https://jurnal.unived.ac.id/index.php/er/index
DOI: https://doi.org/10.37676/ekombis.v13i2

The Impact Of Bullwhip Effect Inventory Level And Information Sharing On Retailer Operational Perfomance Mediated By Supply Chain Performance

Cindy [1], Immanuel Zai [2]
[1,2)] Universitas Internasional Batam
Email: [1)] 2141002.cindy@uib.edu ,[2)] Immanuel.zai@uib.edu

How to Cite :
Cindy, C., Zai, I. (2025). The Impact Of Bullwhip Effect Inventory Level And Information Sharing On Retailer Operational Perfomance Mediated By Supply Chain Performance. EKOMBIS REVIEW: Jurnal Ilmiah Ekonomi Dan Bisnis, 13(2). DOI: https://doi.org/10.37676/ekombis.v13i2

ARTICLE HISTORY
Received [05 November 2024]
Revised [22 February 2025]
Accepted [22 March 2025]

KEYWORDS
Bullwhip Effect, Inventory Level, Information Sharing, Retailer Operational Performance, Supply Chain Performance.

This is an open access article under the CC–BY-SA license

Abstract

This study aims to analyze the influence of bullwhip effect, inventory levels, and information sharing practices on the performance of supply chains and retailer operations in Batam City. The data was collected through a questionnaire and processed the data using a quantitative data method for 220 respondents who are retail supply chain staff in Batam. Data analysis shows that inventory levels and information-sharing practices have a positive and significant influence on supply chain performance and retailer operations, while the bullwhip effect does not show a significant impact on either aspect. The study emphasizes the need to focus on inventory management strategies and improve information collaboration in the supply chain to improve retailers' operational efficiency.

INTRODUCTION

In the business world, supply chain management plays a crucial role in meeting various human needs, from primary necessities like food and shelter to secondary and tertiary needs. The supply chain is a complex network connecting suppliers, manufacturers, distributors, and retailers to ensure that products reach consumers efficiently. However, issues often arise during this process, such as information distortion that leads to the bullwhip effect a phenomenon where errors in demand forecasting can cause increasingly larger fluctuations throughout the supply chain. This effect impacts inventory costs and the operational performance of companies (Yin, 2021) . This research aims to evaluate the impact of the bullwhip effect, inventory levels, and information sharing on supply chain performance in Batam. The bullwhip effect can lead companies to experience either overstock or stock shortages, negatively affecting cash flow and operational efficiency (Gebisaa et al., 2022). By understanding these factors, this study aims to find solutions that can enhance operational efficiency and integration within the supply chain in Batam.

Retailers commonly encountered in our surroundings include department stores and minimarkets like Hypermart, Indomaret, Alfamart, Top 100, Circle K, and others, which are

established to meet consumer needs. Additionally, retailers in sectors such as clothing, electronics, housewares, jewelry, and many more also play a crucial role in supplying consumers with their necessities. According to Septrarini (2022), retailers must manage inventory carefully and accurately anticipate demand to avoid problems like overstock or stock shortages. Mistakes in this m anagement can impact customer service and operational costs.

In Batam, the performance of the supply chain has become an important issue due to challenges in inventory management and distribution efficiency. This research aims to explore how factors such as inventory levels, the bullwhip effect, and information technology influence supply chain performance in Batam. Previous literature suggests that efficiency in supply chain performance can be improved by reducing the bullwhip effect and enhancing information sharing. By analyzing these aspects, it is hoped that solutions can be found to address existing problems and improve operational performance for retailers as well as overall supply chain efficiency in Batam.

LITERATURE REVIEW

Resource Based View (Rbv) Theory

The resource-based view (rbv) theory originated from penrose's (1959) perspective that a firm is an organization managing various productive resources. These resources can be both material and immaterial, tangible and intangible. Penrose also noted that both material resources and human resources can be combined differently across companies, depending on the underlying ideas guiding their use.

Retailer Operational Performance

Retailer performance refers to the achievement of targets or objectives within a specified period. It can determine a retailer's competitive advantage over others. According to Ltifi and Gharbi (2015), retailer performance can be assessed using indicators such as inventory availability, absence of stockouts, product information, ease of shopping or purchasing, and ease of product returns. Retailer performance measures competitiveness, traditionally determined by product pricing, quality, service provided, and the strategic location of the retailer (Petljak et al., 2017). Manufacturing companies must provide services to retailers to enhance their performance, which includes efficient ordering processes, order correction, promised delivery times, consistency in promised delivery, speed of shipment, consistency in promised quantities, order accuracy, and the ability to deliver undamaged products.

Gandhi et al. (2017) suggested eight indicators for measuring supply chain performance in manufacturing companies: accurate material requirements forecasting and planning; timely product delivery; reliable suppliers with consistent delivery; effective cost control and supply chain knowledge; quick response times; and appropriate inventory levels.

Supply Chain Performance

Optimal performance in a supply chain network involves creating efficient information flows among different networks. Various supply chain partners work towards a common goal of maximizing customer satisfaction. An optimal and coordinated supply chain means that no disruptions occur in any company’s supply chain channels, preventing shortages or excess inventory.

The supply chain process encompasses the procurement of raw materials, manufacturing, distribution, retailing, and product disposal. Each supply chain seeks to enhance its performance to meet customer expectations (Zainurossalamia & Hidayati, 2020). Effective supply chain management aims to improve relationships between suppliers and buyers; strong, positive relationships enhance efficiency within the supply chain.

Bullwhip Effect

The bullwhip effect refers to the phenomenon in warehousing that identifies how demand for a product evolves through the supply chain. It occurs due to inaccuracies in determining the quantity of a product needed for future production. According to Paminto & Adhimursandi (2021), five factors contribute to the bullwhip effect:

1) Inaccurate demand forecasting and information sharing
2) Price fluctuations
3) Lead time
4) Excessive promotions and discounts
5) Ordering inventory in batch quantities

Information Sharing

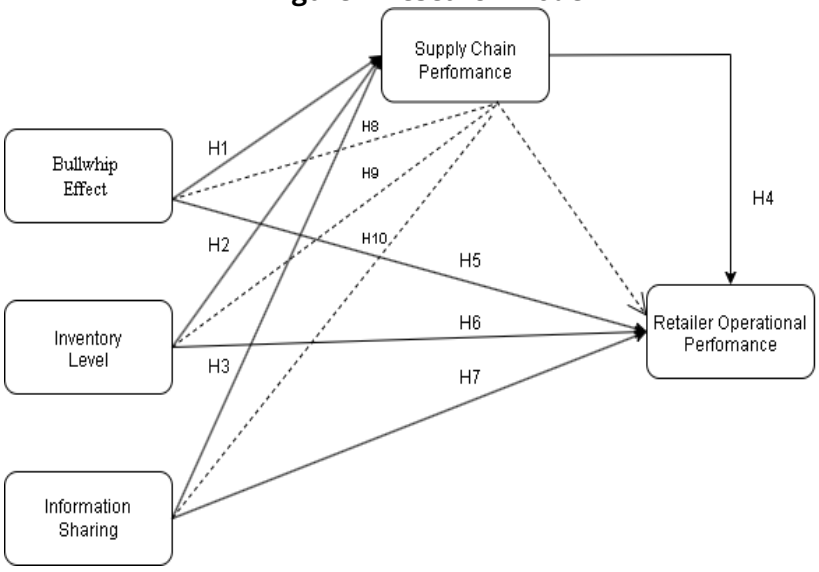
In supply chain practices, information sharing provides various benefits for organizations and customers alike. For example, effective information can reduce the incidence of incorrect or defective products being shipped to consumers, thereby directly lowering inventory holding costs, maintenance costs, and return shipping costs (Gebisaa, 2023). Flexible and accurate two-way communication can enhance business efficiency in supply chain practices, reduce stockouts, and ensure accurate demand fulfillment, which helps minimize the bullwhip effect in supply chain performance.

Inventory Level

According to Intan (2022), inventory levels in restocking depend on knowing the minimum stock quantity for each item, which serves as a benchmark for ensuring products reach consumers effectively. A well-maintained inventory level can stabilize a company's operations and maximize customer service in meeting their needs (Feby, 2020).

Relationship Between Variables

Figure 1 Research Model



The Impact Of The Bullwhip Effect On Supply Chain Performance

Based on the Resource-Based View (RBV) theory, internal capabilities such as good information technology and effective management can reduce the impact of the bullwhip effect. In other words, companies that can optimally utilize their internal resources will be better able to reduce demand variability and improve their supply chain performance. Zhang et al. (2019) state

that good collaboration can reduce demand variability and enhance supply chain performance. There is a negative and insignificant relationship between the bullwhip effect and supply chain performance (Aljumah et al., 2020). The bullwhip effect has a negative and insignificant impact (Alshurideh et al., 2020), which indicates that a lower bullwhip effect leads to more effective supply chain performance, while a higher bullwhip effect results in lower supply chain performance.

- H1: The bullwhip effect has a negative and insignificant impact on supply chain performance.

The Impact Of Inventory Level On Supply Chain Performance

There is a positive and significant relationship between inventory level and supply chain performance (Muhammad et al., 2023). The level of inventory positively affects supply chain performance (Tubagus et al., 2023). One of the key factors that can create an effective supply chain is knowing the appropriate inventory levels that align with consumer needs. With proper inventory management, companies can ensure timely fulfillment of consumer demand and reduce the risks associated with excess or insufficient stock, thereby enhancing the efficiency and effectiveness of the supply chain. The Resource-Based View (RBV) emphasizes that these capabilities are strategic resources that can provide a sustainable competitive advantage. Wang & Zhang (2021) state in their study that appropriate inventory levels play a crucial role in reducing lead times and improving customer service levels.

- H2: Inventory level has a positive and significant impact on supply chain performance.

The Impact Of Information Sharing On Supply Chain Performance

According to Widjaja et al. (2022), there is a positive and significant impact of information sharing on supply chain performance. A significant relationship and positive impact between information sharing and supply chain performance is also noted by Dewi (2019). Information sharing can help minimize barriers in the supply network, enhance chain activities, and improve strategic integration within the supply chain. By sharing information effectively, companies can reduce obstacles in the supply network, improve operational efficiency, and enhance strategic integration throughout the supply chain.

This enables companies to be more responsive to changes in demand and market conditions, ultimately improving overall supply chain performance. Chen et al. (2020) demonstrate that information shared among supply chain members can reduce uncertainty and enhance collaboration, leading to improved overall performance. The results indicate that companies actively engaged in information sharing tend to respond better to changes in demand.

- H3: Information sharing has a positive and significant impact on supply chain performance.

The Impact Of Supply Chain Performance On Retailer Operational Performance

According to Heizer et al. (2020), there is a positive impact and significant relationship between supply chain performance and retailer operational performance. The positive relationship between a company and its suppliers can create effective distribution channels and provide benefits for both parties. Widjaja et al. (2022) confirm the positive impact and significant relationship between supply chain performance and retailer operational performance. Good relationships with suppliers and efficient distribution systems enable retailers to reduce operational costs, increase the speed and accuracy of order fulfillment, and enhance customer satisfaction. These capabilities are considered strategic resources that are difficult for competitors to imitate, providing sustainable competitive advantages in a competitive market. Zhao et al. (2023) found that good supply chain management practices not only enhance efficiency but also reduce risks in operational processes, positively impacting overall retailer performance.

- H4: Supply chain performance has a positive and significant impact on retailer operational performance.

The Impact Of The Bullwhip Effect On Retailer Operational Performance

The bullwhip effect has a negative and insignificant impact on retailer operational performance (Kurniawan, 2022). Studies show that the bullwhip effect negatively affects retailer operational performance (Aqdas et al., 2023) and has been found to cause inefficiencies, higher costs, and decreased customer satisfaction, all of which impact operational performance. A high bullwhip effect often reflects shortcomings in a company's internal capabilities, such as an inability to forecast demand accurately or manage inventory efficiently. As a result, the bullwhip effect can lead to inefficiencies, higher costs, and lower customer satisfaction, which negatively affects retailer operational performance. Sari & Nugroho (2023) state that companies with good managerial capabilities and information systems can mitigate these negative impacts, thereby maintaining stable and effective operational performance.

- H5: The bullwhip effect has a negative and insignificant impact on retailer operational performance.

The Impact Of Inventory Level On Retailer Operational Performance

There is a positive and significant relationship between inventory level and retailer operational performance (Laksamana et al., 2023), stating that effective inventory control creates optimal inventory levels that minimize the risks of overstocking or stockouts in operations. According to Tubagus et al. (2023), there is also a positive and significant relationship between supply chain performance and retailer operational performance. Kumar et al. (2022) found that efficient supply chain management can enhance visibility and coordination among involved parties, reduce costs, and improve operational efficiency. Lastly, Lee et al. (2021) confirmed that advanced inventory management capabilities contribute to reducing inefficiencies and enhancing overall operational performance.

- H6: Inventory level has a positive and significant impact on retailer operational performance.

The Impact of Information Sharing on Retailer Operational Performance

There is a positive and significant relationship between information sharing and retailer operational performance (Aqdas et al., 2023). Information sharing is an effective strategy for minimizing distortions by improving demand forecasting accuracy. Almeida et al. (2019) also state that there is a positive and significant relationship between information sharing and retailer operational performance. In practice, retailers that implement effective information-sharing strategies can experience significant improvements in operational performance. For example, companies using advanced information-sharing systems can reduce lead times, enhance stock accuracy, and improve supplier relationships. This enables them to offer products more timely, minimize inventory-related costs, and ultimately increase customer satisfaction and profitability (Zhao & Li, 2021).

- H7: Information sharing has a positive and significant impact on retailer operational performance.

The Impact Of The Bullwhip Effect On Retailer Operational Performance Mediated By Supply Chain Performance

According to the Resource-Based View (RBV), the bullwhip effect, which causes increasing demand fluctuations throughout the supply chain, can lead to inefficiencies in the supply chain system if not managed properly. Du & Jiang (2020) demonstrate that the bullwhip effect has an insignificant relationship with retailer operational performance when considering supply chain performance as a mediator. This suggests that the impact of the bullwhip effect on retailer operational performance can be minimized if supply chain performance is effectively managed.

Heizer et al. (2020) also note that the bullwhip effect does not significantly affect retailer operational performance, emphasizing that this issue can be controlled through effective supply chain management (Chen et al., 2023).

- H8: The bullwhip effect has a positive and significant impact on retailer operational performance mediated by supply chain performance.

The Impact Of Inventory Level On Supply Chain Performance Mediated By Retailer Operational Performance

According to Feby (2020), there is a positive and significant relationship between inventory level and retailer operational performance mediated by supply chain performance. Maintaining optimal inventory levels through good inventory control can create a robust supply chain and ensure operational stability.

Prasetyawan (2020) also notes a positive and significant relationship between inventory level and retailer operational performance mediated by supply chain performance. Liu & Zhang (2023) affirm that companies with good inventory management tend to have better supply chain performance. The results indicate that effective inventory level management can improve retailer operational performance through enhanced supply chain efficiency.

- H9: Inventory level has an impact on supply chain performance mediated by retailer operational performance.

The Impact Of Information Sharing On Retailer Operational Performance Mediated By Supply Chain Performance

Almeida et al. (2020) find a positive and significant relationship between information sharing and retailer operational performance mediated by supply chain performance. Heizer et al. (2020) suggest that there is a positive and significant relationship between inventory level and retailer operational performance mediated by supply chain performance. Information sharing can enhance supply chain efficiency, reduce costs, and increase customer satisfaction. Operational performance plays a crucial role in information sharing as a mediator in creating effective supply chain performance. Nguyen et al. (2023) found that transparent and accurate information among supply chain members can reduce uncertainty and improve operational decision-making, which in turn enhances retailer operational performance.

- H10: Information sharing has a positive and significant impact on retailer operational performance mediated by supply chain performance.

METHODS

This research employs a cross-sectional quantitative approach and uses a structured questionnaire to collect data from supply chain employees/staff at retailers in Batam who are involved in the retail supply chain system. This method utilizes quantitative research to evaluate theories, establish relationships among pre-existing or adjusted variables, and provide statistically validated explanations, ultimately resulting in factual conclusions based on model testing results. Respondents were collected online by distributing the questionnaire through Google Forms.

Data to support the arguments were obtained from various sources, including websites, books, and scientific journals. The data were processed using the Partial Least Squares (PLS) algorithm due to the presence of mediation variables linking independent and dependent variables. Smart PLS SEM is well-suited for the complex model adopted in this study. A total of 220 retail businesses were needed, as determined by Hair et al. (2019), which is ten times the number of indicators used, resulting in 22 questions.

RESULTS

The total number of respondents is 220 types of retailers, which were distributed using Google Forms, and the results from the questionnaire will support this research.

Table 1 Types of Retailer Respondents

Types of Retailer	Frequency	Percent
Minimarket	18	8%
Deparmet Store Retailer	1	1%
Convenience Store Retailer	6	3%
Houseware Retailer	7	3%
Eletronic Retailer	22	10%
Specialty Retailer	166	76%
Total	220	100%

Source: Results of Primary Data Processing (2024)

From the data obtained from respondents, there are 18 (8%) from minimarkets, 1 (1%) from department stores, 6 (3%) from convenience stores, 7 (3%) from houseware retailers, 22 (10%) from electronic retailers, and 166 (76%) from specialty retailers.

Table 2 Results of Validity Test

Variabel	AVE	Description
Bullwhip Effect	0.814	Valid
Information Sharing	0.778	Valid
Inventory Level	0.800	Valid
Retailer Operational Perfomance	0.775	Valid
Supply Chain Perfomance	0.819	Valid

Source: Results of Primary Data Processing (2024)

In the validity test, convergent validity is assessed by checking values greater than 0.5. In Table 2 below, it can be seen that all variables along with their respective indicators successfully meet this criterion; therefore, all indicators are declared to pass the validity test.

Table 3 Results of Reliability Test

Variabel	Composite Reliability	Description
Bullwhip Effect	0.929	Reliable
Information Sharing	0.955	Reliable
Inventory Level	0.941	Reliable
Retailer Operational Perfomance	0.945	Reliable
Supply Chain Perfomance	0.948	Reliable

Source: Results of Primary Data Processing (2024)

The next test is the reliability test. In the reliability test, the results of composite reliability are evaluated, where the requirement is that the results must meet a minimum value of 0.6. In Table 3, it can be seen that the composite reliability results for each indicator exceed the 0.6 threshold. Therefore, the reliability test for all variables is deemed reliable and trustworthy.

Table 4 Direct Effect Test

Relationship between variabels	Sample Mean	P Values	Description
BE -> SCP	0.013	0.899	H1 = Insignificant
IL -> SCP	0.434	0.000	H2 = Significant
IS -> SCP	0.505	0.000	H3 = Significant
SCP -> ROP	0.663	0.000	H4 = Significant
BE -> ROP	-0.016	0.766	H5 = Insignificant
IL -> ROP	-0.069	0.395	H6 = Insignificant
IS -> ROP	0.327	0.003	H7 = Significant

Source: Results of Primary Data Processing (2024)

The first inner model test is the direct effects test to see the direct influence among variables. In Table 4, it can be detailed as follows:

The results of the first hypothesis test, found in Table 4, show that the impact of the bullwhip effect on supply chain performance has a sample mean of 0.013 and a p-value exceeding 0.05, specifically 0.899. This indicates that the effect of the bullwhip effect on supply chain performance is not significant, which is inconsistent with the research by Aljumah et al. (2020) and Alshurideh et al. (2020). Therefore, it can be concluded that there is no strong evidence that the bullwhip effect significantly impacts supply chain performance, as the data test results indicate a positive but insignificant effect.

The results of the second hypothesis test, regarding the influence of inventory level on supply chain performance, show a sample mean of 0.434 and a p-value of 0.000. Thus, this variable has a positive and significant effect, aligning with the research by Muhammad et al. (2023) and Tubagus et al. (2023). This result indicates that in the context of Batam City, effective inventory management strategies can enhance overall supply chain performance. This is consistent with theory and previous research findings that highlight the importance of proper inventory management to minimize the risk of the bullwhip effect and improve efficiency and responsiveness in the supply chain.

The results of the third hypothesis test regarding the influence of information sharing on supply chain performance are supported by a p-value of 0.000 and a sample mean of 0.505, indicating a significant and positive effect. This shows a positive tendency where higher levels of information sharing correlate with improved supply chain performance. Therefore, it can be concluded that in the context of this research in Batam City, effective information sharing practices have a positive and significant impact on overall supply chain performance, consistent with the studies by Widjaja et al. (2022) and Dewi (2019).

This result suggests that timely and accurate information among supply chain members can enhance coordination, visibility, and responsiveness, ultimately leading to improved overall supply chain performance. Thus, it is essential for organizations in Batam City to focus on and encourage effective information sharing practices as part of their supply chain management strategies.

The results of the fourth hypothesis test indicate that the influence of supply chain performance on retailer operational performance is supported by a p-value of 0.000 and a sample mean of 0.063, indicating a positive and significant effect. This result is consistent with the theory that good supply chain performance can benefit all chain members, including retailers. Good coordination, increased visibility, and better responsiveness from the supply chain can help retailers manage inventory, respond to customer demand more effectively, and improve their overall operational efficiency.

Therefore, it is important for retailers in Batam City to pay attention to their supply chain performance and strive to improve it to support better operational performance, aligning with the findings of Heizer et al. (2020) and Widjaja et al. (2022).

The results of the fifth hypothesis test show a negative but insignificant influence of the bullwhip effect on retailer operational performance, supported by a p-value of 0.766, which exceeds 0.05, and also a negative sample mean. This indicates a tendency that as the bullwhip effect increases, retailer operational performance worsens. However, since the p-value exceeds the significance level, this result cannot be considered strong evidence for a significant relationship between the two.

Thus, in the context of this study in Batam City, no evidence was found supporting a significant negative effect between the bullwhip effect and retailer operational performance. This suggests that the bullwhip effect may not directly influence retailer operational performance or that other factors may be more dominant in affecting retailer operational performance in the studied context, aligning with the research by Aqdas et al. (2023) and Kurniawan (2022).

The results of the sixth hypothesis test regarding the influence of inventory level on retailer operational performance have a sample mean of -0.069 and are deemed insignificant since the p-values exceed 0.05. This is concluded as a negative and insignificant influence, indicating that lower inventory levels tend to lead to poorer retailer operational performance. However, because the test results are not significant, we cannot conclude that in the context of this study, there is sufficient evidence to support a significant negative influence between inventory level and retailer operational performance in Batam City. This indicates that inventory level may not directly affect retailer operational performance, or there may be other factors more dominant in influencing retailer operational performance in the studied context, as suggested by Laksamana et al. (2023) and Tubagus et al. (2023).

The results of the seventh hypothesis test regarding the influence of information sharing on retailer operational performance are supported by a p-value of 0.003, which is less than 0.05, thus indicating a significant and positive effect. Therefore, it can be concluded that effective information sharing practices among supply chain members can enhance retailer operational performance. This can occur because timely and accurate information allows retailers to manage inventory more efficiently, respond to market demand changes more quickly, and improve their overall operational effectiveness, aligning with the research by Almeida et al. (2019) and Aqdas et al. (2023).

Table 5 Results of Indirect Effect Test

Relationship between variabels	Sample Mean	P Values	Description
BE -> SCP -> ROP	0.010	0.900	H8 = Insignificant
IL -> SCP -> ROP	0.288	0.000	H9 = Significant
IS -> SCP -> ROP	0.334	0.000	H10 = Significant

The first inner model test is the indirect effects test to examine the direct influence among variables. In Table 5, it can be detailed as follows:

The results of the eighth hypothesis test, which examines the influence of the bullwhip effect on retailer operational performance mediated by supply chain performance, show a p-value of 0.900, which is greater than 0.05. This indicates a nonsignificant relationship. The test results suggest that while the bullwhip effect may influence supply chain performance, its impact does not significantly carry over to retailer operational performance. This could be due to other factors that more directly affect retailer operational performance or because supply chain performance does not have a sufficiently large impact on retailer operational performance in the studied context. Therefore, this research is inconsistent with the findings of Du & Jiang (2020) and Heizer et al. (2020).

The results of the ninth hypothesis test, regarding the influence of inventory level on retailer operational performance mediated by supply chain performance, show a p-value of 0.000 and a sample mean of 0.288, indicating a significant positive relationship. This result indicates a positive tendency where higher inventory levels lead to better retailer operational performance. It signifies that in the context of this research, inventory level has a positive and significant impact on retailer operational performance when mediated by supply chain performance. Thus, in the context of the study in Batam City, effective inventory management strategies can be an important factor in enhancing retailer operational performance through improved supply chain performance, aligning with the research by Prasetyawan (2020) and Feby (2020).

The results of the tenth hypothesis test, examining the influence of information sharing on retailer operational performance mediated by supply chain performance, show a p-value of 0.000 and a sample mean of 0.334, indicating a significant positive relationship. This result suggests a positive tendency that as information sharing practices improve, retailer operational performance also improves. It emphasizes that in the context of this research, information sharing practices have a positive and significant impact on retailer operational performance when mediated by supply chain performance. Therefore, this research aligns with the studies by Almeida et al. (2020) and Heizer et al*. (2020).*

DISCUSSION

This study investigates the impact of the bullwhip effect, inventory levels, and information sharing on supply chain performance and retailer operational performance in Batam City. The findings reveal that while the bullwhip effect shows a positive but insignificant relationship with supply chain performance, effective inventory management significantly enhances supply chain efficiency. This aligns with existing literature, which emphasizes that optimal inventory levels can reduce risks associated with demand fluctuations. Additionally, the study highlights the crucial role of information sharing, demonstrating a strong positive correlation with supply chain performance.

This suggests that transparent communication among supply chain partners is vital for improving coordination and responsiveness. Notably, supply chain performance significantly influences retailer operational performance, indicating that a robust supply chain leads to better operational outcomes for retailers.

Conversely, the negative relationship between the bullwhip effect and retailer performance, though not statistically significant, suggests that other mediating factors may be at play. The results underscore the importance for retailers in Batam to focus on effective inventory management and cultivate information-sharing practices, thereby enhancing their overall performance in a competitive market.

CONCLUSION

The conclusions from this study highlight several important findings regarding supply chain management and retailer operational performance in Batam City. Although the bullwhip effect can influence overall supply chain performance, there is no significant evidence that its impact directly carries over to retailer operational performance. This suggests that other factors may play a more dominant role in influencing retailer performance in the context examined. Effective inventory management strategies have a positive and significant impact on retailer operational performance when mediated by supply chain performance. This underscores the importance of proper inventory management in enhancing operational efficiency and responsiveness to market demand in Batam City. Furthermore, the practice of information sharing among supply chain members significantly benefits retailer operational performance when mediated by supply chain performance.

Timely and accurate information allows retailers to manage inventory more efficiently, respond to market changes more swiftly, and improve overall operational effectiveness. Therefore, it is recommended that organizations in Batam focus on promoting effective inventory management practices and encourage collaboration and information exchange among supply chain members.

This can help improve coordination, visibility, and responsiveness throughout the supply chain, ultimately supporting retailer operational performance. Additionally, this research emphasizes the need to consider other factors that may directly influence retailer performance in Batam City. This could serve as a focal point for further research and the development of more effective supply chain management strategies.

SUGGESTION

To enhance supply chain performance and retailer operational effectiveness in Batam City, organizations should consider implementing several key strategies. First, investing in advanced inventory management systems can help retailers optimize stock levels, reduce excess inventory, and minimize stockouts, thereby improving responsiveness to customer demand. Additionally, promoting collaborative information sharing among supply chain partners will facilitate better demand forecasting and enhance coordination.

Conducting training sessions for staff involved in supply chain management can further improve skills and awareness of best practices. Implementing performance metrics related to supply chain and operational performance will allow for regular evaluation and identification of areas for improvement.

Encouraging closer relationships with suppliers can also lead to better communication and alignment of inventory levels. By focusing on these strategies, retailers in Batam City can significantly improve their operational performance and enhance overall supply chain effectiveness, ultimately leading to greater customer satisfaction and a competitive advantage.

REFERENCES

(Alshurideh et al., 2023; Aqdas et al., 2023; Atika Ayu Derari et al., 2022; Baah et al., 2022; Dimitrova et al., 2021; Galkin et al., 2022; Hakim et al., 2023; Hanggara & Anthony, 2023; Hartati & Hasan, 2023; Hery et al., 2022; International, 2021; Kiong et al., 2022; Lalmi et al., 2021; Ma et al., 2022; Mera & Ernawati, 2023; Mochammad et al., n.d.; Nicholas et al., 2017; Nita Kusumawati & Wigati, 2023; Oubrahim et al., 2023; Pataropura et al., 2020; Puspitaningtyas et al., 2023; Ramdani & Harefa, 2023; Rashed et al., 2023; Sudiantini et al., 2023; Sulaiman et al., 2022; Sutanto et al., 2023; Trade, 2023; Yin, 2021; Yuan et al.,

2022)Alshurideh, M. T., Al-Hadrami, A., Alquqa, E. K., Alzoubi, H. M., Hamadneh, S., & Al Kurdi, B. (2023). The effect of lean and agile operations strategy on improving order-winners: Empirical evidence from the UAE food service industry. *Uncertain Supply Chain Management*, *11*(1), 87–94. https://doi.org/10.5267/j.uscm.2022.11.007

Aqdas, A. bin, Shakeel, M., Munir, S., & Waheed, K. Z. (2023). The Impact of Bullwhip Effect on the Supply Chain Performance With the Mediating Effect of Information Sharing Among an Enterprise and Suppliers. *Review of Applied Management and Social Sciences*, *6*(2), 189–200. https://doi.org/10.47067/ramss.v6i2.312

Atika Ayu Derari, Andhika Mayasari, Nur Muflihah, & Sumarsono. (2022). Pengurangan Bullwhip Effect Dalam Rantai Pasok Dengan Metode Collaborative Planning, Forecasting and Replenishment (Cpfr. *Jurnal Penelitian Bidang Inovasi & Pengelolaan Industri*, *2*(1), 48–55. https://doi.org/10.33752/invantri.v2i1.3324

Baah, C., Opoku Agyeman, D., Acquah, I. S. K., Agyabeng-Mensah, Y., Afum, E., Issau, K., Ofori, D., & Faibil, D. (2022). Effect of information sharing in supply chains: understanding the roles of supply chain visibility, agility, collaboration on supply chain performance. *Benchmarking*, *29*(2), 434–455. https://doi.org/10.1108/BIJ-08-2020-0453

Dimitrova, B. V., Kim, S., Smith, B., & Kim, J. (2021). Store Format Diversification, Customer Orientation and the Performance of Foreign Retailers. *Multidisciplinary Business Review*, *14*(2), 60–74. https://doi.org/10.35692/07183992.14.2.7

Galkin, A., Yemchenko, I., Lysa, S., Tarasiuk, M., Chortok, Y., & Khvesyk, Y. (2022). Exploring the Relationships Between Demand Attitudes and the Supply Amount in Consumer-Driven Supply Chain for Fmcg. *Acta Logistica*, *9*(1), 1–12. https://doi.org/10.22306/al.v9i1.260

Hakim, E. A., Munthe, K. A., Keysa, S., & Hananta, R. (2023). *Selection of the Best Forecasting Method for Newspaper Demand Based on Special Event (Case Study: PT. XYZ)*. 2941–2952. https://doi.org/10.46254/an12.20220535

Hanggara, A. T., & Anthony, K. (2023). *The Influence of Supplier Integration, Internal Integration, and Customer Integration on Supply Chain Performance Modified by Demand Uncertainty*. *2014*, 2244–2252. https://doi.org/10.46254/na07.20220487

Hartati, S., & Hasan, M. (2023). Manajemen Strategi Menggunakan Tqm Dan Swot Dalam Menganalisis Maju Mundurnya Sebuah Organisasi. *AN NAJAH (Jurnal Pendidikan Dan Sosial Keagamaan)*, *02*(02), 14–23. https://journal.nabest.id/index.php/annajah

Hery, H., Wiratama, J., & Jayamangala, W. R. (2022). Analisis Perancangan Fitur Pada Sistem Erp Untuk Inventory Module Di Pt Xyz Untuk Mengurangi Bullwhip Effect. *Jurnal Ilmiah Matrik*, *24*(2), 196–205. https://doi.org/10.33557/jurnalmatrik.v24i2.1840

International, V. (2021). *ELIMINATING THE BULLWHIP EFFECT IN COMPETITIVE*. *12*(June), 672–675.

Kiong, T. T., Rusly, N. S. M., Hamid, R. I. A., Singh, C. K. S., & Hanapi, Z. (2022). Inventive Problem-Solving in Project-Based Learning on Design and Technology: A Needs Analysis for Module Development. *Asian Journal of University Education*, *18*(1), 271–278. https://doi.org/10.24191/ajue.v18i1.17196

Lalmi, A., Fernandes, G., & Souad, S. B. (2021). A conceptual hybrid project management model for construction projects. *Procedia Computer Science*, *181*(2019), 921–930. https://doi.org/10.1016/j.procs.2021.01.248

Ma, J., Lou, W., & Wang, Z. (2022). Pricing strategy and product substitution of bullwhip effect in

dual parallel supply chain: aggravation or mitigation? *RAIRO - Operations Research*, *56*(4), 2093–2114. https://doi.org/10.1051/ro/2021180

Mera, D. S., & Ernawati, D. (2023). Penerapan Metode Distribution Requirement Planning Sebagai Upaya untuk Meminimumkan Bullwhip Effect pada Distributor Minyak Goreng (Studi kasus PT. Surya Mandiri Distribusi). *JURMATIS (Jurnal Manajemen Teknologi Dan Teknik Industri)*, *5*(1), 22. https://doi.org/10.30737/jurmatis.v5i1.2530

Mochammad, T., Antarariq, D., & Fitria, L. (n.d.). *Usulan Pengurangan Bullwhip Effect Menggunakan Metode Vendor Managed Inventory pada Distributor PT EWINDO*. *Vmi*, 1–13.

Nicholas, J., Steyn, H., & Indb, N. (2017). *PhD, is a Professor in the Graduate School of Technology Management*.

Nita Kusumawati, A., & Wigati, A. (2023). Strategi Meminimalisasi Bullwhip Effect Menggunakan Metode Cpfr Di Minimarket Abc. *Jurnal Teknologi Dan Manajemen Industri*, *4*(2), 55–64.

Oubrahim, I., Sefiani, N., & Happonen, A. (2023). The Influence of Digital Transformation and Supply Chain Integration on Overall Sustainable Supply Chain Performance: An Empirical Analysis from Manufacturing Companies in Morocco. *Energies*, *16*(2). https://doi.org/10.3390/en16021004

Pataropura, A., Sabatino, I. D., & Riki, R. (2020). Inventory Management with Forecasting Method: Single Moving Average and Trend Projection. *Bit-Tech*, *2*(3), 110–121. https://doi.org/10.32877/bt.v2i3.162

Puspitaningtyas, A., Abdulrahim, M., & Teknik, F. (2023). *Penerapan metode peramalan sebagai upaya mengurangi bullwhip effect pada umkm pentol x 1,2*. 761–766.

Ramdani, D., & Harefa, K. (2023). Analisis Bullwhip Effect Dan Usulan Perbaikan Dengan Information Sharing System di PT. Fatahillah Anugerah Nibras. *Jurnal Ilmu Komputer Dan Pendidikan*, *1*(ISSN 2985-4172), 881–890. https://journal.mediapublikasi.id/index.php/logic

Rashed, C. A. A., Bagum, M. N., & Noshin, R. A. (2023). Causes and consequences of bullwhip effect on the boutique industry of Dhaka city. *Accounting*, *9*(4), 203–214. https://doi.org/10.5267/j.ac.2023.8.001

Sudiantini, D., Untoro, W., & Artikel, R. (2023). Manajemen Operasional Bagi Umkm: Peningkatan Efisiensi Dan Produktivitas. *Neraca Manajemen, Akuntansi Ekonomi*, *1*, 24–28.

Sulaiman, E., Andita Pratiwi, V., & Ningsih, C. (2022). Enrichment: Journal of Management Analysis of supply chain management in overcoming the bullwhip effect of mineral water. *Enrichment: Journal of Management*, *12*(5).

Sutanto, J. E., Krisprimandoyo, D. A., & Imron, M. A. (2023). Integration of trust supplier with supply chain capability and application towards supply chain performance: Minimarket competition during the Covid-19 pandemic. *Uncertain Supply Chain Management*, *11*(3), 1031–1040. https://doi.org/10.5267/j.uscm.2023.4.019

Trade, I. (2023). *THE EFFECT OF SUPPLY CHAIN RESPONSIVENESS , FLEXIBILITY , & QUALITY ON CUSTOMER DEVELOPMENT Arum Widya Laksmi PARAMITHA Wahyuningsih SANTOSA Triwulandari SD Keywords : 9*, 77–87.

Yin, X. (2021). Measuring the bullwhip effect with market competition among retailers: A simulation study. *Computers and Operations Research*, *132*(July 2020), 105341.

https://doi.org/10.1016/j.cor.2021.105341

Yuan, X., Zhang, X., Wang, M., & Zhang, D. (2022). Quantifying the Bullwhip Effect in a Reverse Supply Chain: The Impact of Different Forecasting Methods. *Mathematical Problems in Engineering*, *2022*. https://doi.org/10.1155/2022/2701530