

Supply Chain Activities and Challenges of Construction Hardware Enterprises

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Abstract. This research investigated the extent of supply chain activities and the challenges of construction hardware enterprises in Bacolod City, focusing on supplier management, procurement, inventory management, logistics, and transportation. Driven by a scarcity of local studies on supply chain activities in small to medium construction hardware enterprises, the study utilized a descriptive-correlational research design. The researcher developed a questionnaire that underwent validity and reliability tests and was distributed to two hundred twelve randomly selected participants. The data collected were examined using mean, standard deviation, Kruskal-Wallis U, Mann-Whitney U, ANOVA, t-test, and Spearman's rho. The findings indicated a high extent of supply chain activities. Conversely, the level of challenges was found to be low. Additionally, the results showed a significant difference in the extent of supply chain activities when grouped by form of organization and capitalization ($p < .05$). However, no significant difference was noted when grouped by length of operations ($p > .05$). On the level of challenges, the results demonstrated no significant difference when grouped by form of organization, capitalization, or length of operations ($p > .05$). Furthermore, the study found no significant relationship between the extent of supply chain activities and the level of challenges (Spearman's rho, $p > .05$). The results imply that supply chain activities are effectively implemented and challenges are generally manageable. Based on the study's findings, strategies for enhancing the supply chain processes were proposed, especially for those with limited capital or small companies. These strategies carry practical implications for improving operational efficiency, supplier coordination, and logistical planning in the sector.

Keywords: Construction hardware; Inventory management; Logistics; Procurement; Supplier management.

1.0 Introduction

Supply Chain Management seeks to reduce costs and enhance customer satisfaction. Efficient and effective supply chains can lower operating expenses while ensuring quicker, more accurate, and personalized product delivery (Stock & Manrodt, 2020). In the construction hardware sector, efficient Supply Chain Management is crucial for satisfying customer needs, controlling costs, and retaining a competitive advantage in a rapidly changing market (Wisner et al., 2019).

The supply chain includes several activities: supplier management, procurement, inventory management, logistics, and transportation. Supplier management ensures that suppliers meet or surpass the buyer's expectations regarding quality, delivery, and cost (Zycus, 2018). Additionally, Quijano (2023) stressed that when selecting suppliers, factors like quality, reliability, and pricing should be prioritized to ensure they deliver high-quality products that customers can depend on. Another critical activity in the supply chain is inventory

management, which plays an essential role in any business. It can determine whether a company can meet its customers' requirements on time or if it will experience delays due to stock shortages; logistics and transportation are crucial as they guarantee the timely and proper delivery of products to customers (Mendoza & Garcia, 2020).

Despite this, numerous supply chains challenge organizations striving to control costs, reduce risks, accommodate growing customer expectations, and keep up with technological advancements and globalization (Stock & Manrodt, 2020). They also highlight that successfully navigating these challenges can provide significant customer and stakeholder advantages. While extensive research on Supply Chain Management exists in the manufacturing and retail sectors, the findings often emphasize using advanced analytics, integrated digital systems, and flexible logistics models to optimize efficiency and responsiveness (Wisner et al., 2019; Stock & Manrodt, 2020). For instance, manufacturers commonly implement lean inventory systems and just-in-time procurement to reduce waste and improve supplier coordination. Similarly, retail businesses leverage real-time inventory tracking and data-driven customer demand forecasting to streamline supply and distribution. In contrast, tiny to medium-sized construction hardware enterprises frequently operate with limited technological integration, fragmented supplier relationships, and minimal data analytics capabilities. These differences highlight the inadequacy of applying generalized supply chain strategies to the hardware sector. Despite facing similar pressures such as cost control, customer satisfaction, and market responsiveness, construction hardware businesses confront unique structural and operational limitations that have received little scholarly attention. This underscores a significant research gap in the literature. There is a lack of in-depth, context-specific studies that address the construction hardware industry's distinctive supply chain practices and constraints.

Due to the nature of its products and services, the construction hardware industry, in particular, encounters distinct supply chain issues. In this sector, supply chain operations often demand a high degree of coordination in procurement, supplier relations, project management, and logistics. Despite broad recognition of these essential functions, construction hardware enterprises encounter distinct and often overlooked challenges in their supply chains. Unlike industries such as manufacturing or retail, construction hardware businesses generally manage bulk products, variable material prices, fragmented supplier networks, and minimal technological integration. For instance, while retail sectors benefit from up-to-the-minute analytics and flexible logistics networks, many hardware enterprises, tiny to medium-sized ones, struggle with manual inventory processes and unstable supply chains (Elajas et al., 2024). Additionally, regulatory compliance, inflation, and global supply chain interruptions exacerbate these challenges (Velasco & Potot, 2025; Ricadela, 2023).

Although considerable research examines Supply Chain Management in the manufacturing and retail fields, there remains a significant lack of academic attention directed towards construction hardware enterprises. This indicates a clear research gap, as construction hardware enterprises' specific structure and challenges necessitate tailored strategies that differ from those applicable in other sectors. Notably, topics such as supplier dependability, procurement limitations, and resistance to adopting digital tools are rarely analyzed in detail in the current literature.

This research investigated the supply chain activities and challenges of construction hardware enterprises in Bacolod City, focusing on supplier management, procurement, inventory management, and logistics and transportation. By addressing this sector's unique structural and operational constraints, such as limited technological integration and fragmented supply networks, the study sought to fill a gap in existing Supply Chain Management literature, which often overlooks the construction hardware industry. The findings are intended to generate actionable, context-specific strategies to help construction hardware business owners and managers enhance operational efficiency, reduce costs, and improve customer satisfaction. Ultimately, the study will offer practical solutions for overcoming supply chain challenges and strengthening construction hardware firms' competitive positioning in a dynamic market environment.

The researcher's experience working in a construction hardware store in Bacolod City is a key motivation for this study, providing firsthand insight into these enterprises' day-to-day operational challenges. While rooted locally, the research extends its relevance by addressing issues common among small to medium-sized construction hardware enterprises in similar urban settings. By examining these challenges through a localized

lens, the study aimed to produce findings and recommendations adaptable to comparable enterprises beyond Bacolod City, offering broader applicability and value to practitioners across the sector.

2.0 Methodology

2.1 Research Design

The study employed a descriptive-correlational research design to assess the extent of supply chain activities and the challenges of construction hardware enterprises regarding supplier management, procurement, inventory management, logistics, and transportation. The design was used because it allows for a comprehensive examination of current practices while determining the relationships between variables without the need for experimental manipulation. Additionally, the study aimed to identify significant differences in supply chain activities and challenges when grouped according to business profile, and to investigate the relationship between the extent of supply chain activities and the level of challenges. A descriptive research design describes the population, events, or conditions presented in a study. The researcher does not change anything about the variables but only describes their characteristics (Siedlecki, 2020).

Meanwhile, correlational research is used to determine relationships between variables and explain how it differs from causal-comparative and experimental research due to the lack of manipulation of variables (Fraenkel et al., 2019). This design is especially relevant to supply chain studies because it supports investigating real-world practices and naturally occurring relationships, without interfering with business operations. It enables the researcher to describe, compare, and relate variables based on the data collected, thus generating practical and informative findings for improving supply chain performance in the construction hardware sector. Descriptive statistics, such as Mean and Standard Deviation, were employed for data analysis to determine the extent of supply chain activities and the level of challenges. Kruskal-Wallis U Test, Mann-Whitney U test, ANOVA, and t-test were used to detect significant differences among groups. In contrast, Spearman's rho was used to explore the relationships between supply chain activities and challenges.

2.2 Research Participants

The participants in the study were owners and managers of construction hardware enterprises in Bacolod City. They shall have sufficient knowledge of the supply chain activities of their stores to answer the survey questionnaire accurately. Their roles were considered critical because of their direct involvement in the decision-making related to supplier management, procurement, inventory management, logistics, and transportation. Their direct engagement with supply chain activities enhanced the validity and relevance of their responses. Based on the records from the Permits and Licensing Division of the City of Bacolod, 425 hardware businesses were operating in Bacolod City as of September 2024. A simple random sampling technique was employed. Yamane's formula was applied, resulting in a sample size of 212. Only hardware businesses with a length of operation of one year or above were involved in the study. Each eligible business was assigned a number from the list provided by the Permits and Licensing Division. Random numbers were then generated using Excel to select the sample, ensuring each business had an equal chance to be part of the study.

2.3 Research Instrument

This study utilized the researcher-made questionnaire, which was composed of three parts. The first part is concerned with the business profile of the respondents through open-ended questions. The second and third parts focused on supply chain activities and challenges using a 4-point Likert scale. The researcher used various references to construct the questionnaire's items. The instrument was subjected to validation using Lawshe's Content Validity Ratio (CVR). The evaluators comprised ten (10) research and business management experts. The CVR is 0.836 for ten validators, interpreted as valid. Therefore, the researcher-made questionnaire is valid. Recommendations and suggestions of the evaluators were incorporated to finalize the research instrument, and ideas and recommendations were accepted to ensure validity. The instrument is reliable and accurate if the participants' responses are consistent across all of the instrument's items. A test was conducted in Talisay and Silay City with 30 hardware owners, staff, and administrators. Their responses were encoded, and the information was statistically examined and evaluated using Cronbach's Alpha. The reliability test for supply chain activities scored 0.893 and 0.921 for supply chain challenges. The results passed the reliability test with a score of 0.890, demonstrating their reliability.

2.4 Data Gathering Procedure

The researcher obtained the list of hardware operating in Bacolod City from the Permits and Licensing Division. Upon approval of the request from the Permits and Licensing Division, the researcher personally administered the questionnaire to the randomly selected participants of the study. The construction hardware business must have operated in Bacolod City for at least a year. The researcher gave informed consent, and participants' consent was secured beforehand. Likewise, the researcher discussed the purpose of the study, its objectives and goals, and the voluntary nature of the study with each participant.

Furthermore, a confidentiality clause was emphasized, which stipulates that all data collected will remain confidential and will not be used in any way against them. The researcher then briefed the participant on the survey's instructions and sections. The data collection was carried out every weekend from February to March 2025. The researcher personally visited the selected construction hardware enterprises to conduct the survey. On average, respondents completed the questionnaire within 10 to 15 minutes. To ensure a high response rate, the researcher made follow-up visits to participants who were initially unavailable or requested to answer later. After the questionnaire was completed, the researcher reviewed the instrument to determine possible errors made by the participant in completing the survey. The researcher commended the participants for accommodating her request with their valuable time. Lastly, the responses were encoded, processed, and analyzed using statistical tools to derive a meaningful conclusion relevant to the study.

2.5 Ethical Considerations

Ethics was considered when conducting this study. The researcher asked the participants formally and politely and secured informed consent before the survey was administered. They were also informed that their participation was voluntary, and they had the right to withdraw if they felt uncomfortable in gathering data from them. Furthermore, participants' anonymity was ensured by not requiring them to provide their names on the questionnaire. The researcher also provided the participants with the study's details and objectives. Likewise, the data gathered was kept confidential, and only the researcher could access the data. The completed survey questionnaires and digital records were securely stored to safeguard the information. Physical copies were kept in a locked cabinet accessible only to the researcher, while the electronic data were stored on a password-protected device. All research-related records will be appropriately disposed of after the data has been analyzed and the study is published. Physical copies of the questionnaires will be shredded, and digital files will be permanently deleted to ensure that no traces of participants' responses remain.

This research focuses on the supply chain activities and challenges of construction hardware enterprises, and the data collected was solely related to organizational operations. All participants responded professionally, and no personal or sensitive information was gathered. Thus, this study had minimal risk, did not focus on vulnerable groups, and did not include private individual data. Following standard research ethics guidelines, it is deemed not required to have Institutional Review Board (IRB) oversight. However, ethical research practices were strictly observed throughout the study.

3.0 Results and Discussion

3.1 Business Profile

Table 1 illustrates the business profile of the participants based on their forms of organization, capitalization, and length of operations. The findings indicate that the predominant form of organization among construction hardware enterprises in Bacolod City is single proprietorship, accounting for 57.1%, while 21.7% were corporations and 21.2% were partnerships. Regarding capitalization, 50% of construction hardware enterprises reported 550,000.00 and below, while the other 50% exceeded 550,000.00. Additionally, 63.2% of these enterprises have been operating for 16 years or less.

The results indicate that the construction hardware enterprises in Bacolod City primarily consist of small, independently operated enterprises with varying levels of capital investment and demonstrate strong stability. This may reflect a well-established sector with seasoned participants who have effectively managed market obstacles.

Table 1. Business Profile

Profile Variables	Frequency	Percentage
A. Forms of Organization		
Single Proprietorship	121	57.1
Partnership	45	21.2
Corporation	46	21.7
B. Capitalization		
550,000 and below	106	50.0
Above 550,000	106	50.00
C. Length of Operations		
16 years and below	134	63.2
Above 16 years	78	36.8

3.2 Extent of Supply Chain Activities of Construction Hardware Enterprises

In terms of Supplier Management

Table 2 shows the mean scores and standard deviations (*SD*) that indicate the extent of supplier management activities of construction hardware enterprises. The data shows an overall rating of *High* ($M = 3.28$, $SD = 0.57$), showing that construction hardware enterprises frequently performed all supplier management activities and integrated them into their operations. From the results, the highest mean score was in item 3, *selecting and negotiating with suppliers* ($M = 3.47$, $SD = 0.65$), interpreted as *high*. It shows that construction hardware enterprises frequently make selections and negotiate with suppliers. However, the item with the lowest mean score was *conducting supplier performance evaluation* ($M = 2.83$, $SD = 0.91$), which is also interpreted as *high*, showing that some construction hardware enterprises lack a strong focus on conducting supplier performance evaluation.

Table 2. Extent of Supply Chain Activities of Construction Hardware Enterprises in terms of Supplier Management

Indicators	Mean	Interpretation	SD
1. Qualifying suppliers.	3.35	High	0.80
2. Classifying and segmenting suppliers.	3.31	High	0.82
3. Selecting and negotiating with suppliers.	3.47	High	0.65
4. Collaborating with suppliers.	3.43	High	0.65
5. Conducting supplier performance evaluation.	2.83	High	0.91
Overall	3.28	High	0.57

Note: 3.50 – 4.00 (Very High), 2.50 – 3.49 (High), 1.50 – 2.49 (Low), 1.00 – 1.49 (Never)

This analysis highlights that all supplier management activities are carried out to a *high* extent and integrated into their operations. Supplier selection and negotiation were frequently performed and integrated into their operations, but lacked a strong focus on conducting supplier performance evaluations. This could mean that construction hardware enterprises gave less importance to suppliers' evaluation performance and more to suppliers' selection and negotiation. The results align with the findings by Tanase (2025), who emphasized that effective supplier management is essential to ensure smooth operations, cost savings, and sustainable business growth. Furthermore, Althaqafi (2023) stressed the importance of managerial observation in sustainable supplier selection, highlighting the significance of subjective ratings in improving awareness of suppliers' sustainability practices and minimizing risks associated with weak quantitative assessments. He further emphasized that supplier selection is a key process that entails selecting suppliers who provide high-quality, cost-effective products or services with predetermined schedules and quantities. Moreover, Kavota et al. (2024) underscored that supplier performance evaluation is important in improving and assisting suppliers in controlling their quality costs. Supplier selection and evaluation involve multiple phases and require well-established criteria to facilitate decision-making. Furthermore, performance management for the suppliers can reduce risks of misunderstandings or contractual conflicts, provide valuable feedback that can help improve their operations, and create opportunities for long-term partnerships or more significant contracts.

In terms of Procurement

Table 3 shows the mean scores and standard deviations (*SD*) that indicate the extent of construction hardware enterprise procurement activities. The data shows an overall rating of *Very High* ($M = 3.54$, $SD = 0.47$), showing that construction hardware enterprises consistently and effectively performed procurement activities. From the results, the highest mean score was in Item 3, *working out a price and contract with the vendor, and completing the purchase order* ($M = 3.57$, $SD = 0.61$), which is interpreted as *very high*. It shows that construction hardware enterprises consistently and effectively performed the price negotiation and contract with the suppliers and

finalized the purchase order. However, the item with the lowest mean score was *Choosing the goods and services required* ($M = 3.51$, $SD = 0.58$), which is also interpreted as *very high*, which shows that construction hardware enterprises also consistently and effectively performed choosing the goods and services required.

Table 3. Extent of Supply Chain Activities of Construction Hardware Enterprises in terms of Procurement

	Indicators	Mean	Interpretation	SD
1.	Choosing the goods and services required.	3.51	Very High	0.58
2.	Filling out a purchase request and request quotes from various suppliers.	3.55	Very High	0.63
3.	Working out a price and contract with the vendor, and complete the purchase order.	3.57	Very High	0.61
4.	Receiving the delivery and submit payment.	3.54	Very High	0.62
Overall		3.54	Very High	0.47

This analysis highlights that all procurement activities are consistently and effectively carried out to a *very high* extent. This proves that construction hardware enterprises have a well-organized and efficient procurement process. Among the procurement activities, working out a price and contract with the vendor and completing the purchase order were the top priorities of the construction hardware enterprises to ensure that purchases are done efficiently and effectively. This is because construction hardware enterprises prioritize cost-effectiveness and ensuring good terms from the suppliers, which could be significant for for-profit sustainability and operational consistency. Though choosing the goods and services required has the lowest mean score, it is still categorized as a very high extent, suggesting that construction hardware enterprises are diligent in their goods and services selection but may view this activity as slightly less important compared to price negotiations.

The research conducted by Boruchowitch and Fritz (2022) and Letunovska et al. (2023) supports the study's findings by highlighting the important role of procurement in creating value and sustainability. The literature indicates that procurement transcends being merely a transactional activity; it is a strategic endeavor that provides sustainable value to various stakeholders, such as suppliers, customers, investors, and communities. A very high extent of procurement activities, such as working out a price and contract with the vendor, completing the purchase order, and selecting goods and services, suggests that hardware businesses implement well-structured procurement processes. These structured procurement activities allow these hardware businesses to embed sustainability initiatives into their procurement activities. Letunovska et al. (2023) also stress that procurement choices must weigh financial, social, and environmental factors. Although the study mainly evaluates procurement efficiency, its results imply that hardware businesses can integrate ethical sourcing, social responsibility, and environmental sustainability into their procurement practices. By utilizing their current procurement frameworks, these organizations can strengthen their role in promoting sustainable supply chain management and align with contemporary sustainability values.

In terms of Inventory Management

Table 4 shows the mean scores and standard deviations (SD) that indicate the extent of inventory management activities of construction hardware enterprises. The data shows an overall rating of *High* ($M = 3.21$, $SD = 0.50$), showing that construction hardware enterprises frequently performed inventory management activities, which are well-integrated into operations. From the results, the highest mean score was in Item 4, *Reorder and restocking* ($M = 3.47$, $SD = 0.59$), interpreted as *high*. It shows that construction hardware enterprises frequently perform and are well-integrated in their operations in the reorder and restocking processes. However, the items with the lowest mean scores were item 1, *demand forecasting* ($M = 3.04$, $SD = 0.83$), and item 6, *storage inventory* ($M = 3.04$, $SD = 0.77$), also interpreted as *high*.

This analysis highlights that all inventory management activities are well-integrated into their operations, ensuring efficiency in managing stock levels and risk reduction of stockouts or overstocking. Among the inventory management activities, reorder and restocking were the highest-rated activities. This suggests that construction hardware enterprises prioritize ensuring that the stocks available are sufficient, likely due to the fast-moving nature of hardware materials. Demand forecasting and storage inventory have the lowest mean score while still being categorized as high extent. These activities may not be as well-developed as other inventory management activities.

Table 4. *Extent of Supply Chain Activities of Construction Hardware Enterprises in terms of Inventory Management*

Indicators		Mean	Interpretation	SD
1.	Demand forecasting	3.04	High	0.83
2.	Establishing reorder points	3.24	High	0.61
3.	Inventory tracking	3.15	High	0.74
4.	Reorder and restocking	3.47	High	0.59
5.	Quality control	3.30	High	0.73
6.	Storage inventory	3.04	High	0.77
7.	Inventory analysis	3.23	High	0.71
Overall		3.21	High	0.50

The study results align with previous findings on the importance of inventory management in supply chain activities. The findings indicate that construction hardware enterprises perform inventory management activities and are well-integrated in their operations, highlighting their importance. This supports the claims made by Jing-Sheng et al. (2019) that effective inventory planning significantly reduces ordering, holding, and shortage costs, as inventory takes up space and ties up financial resources. Similarly, Amin and Kushwaha (2021) point out that the most successful inventory management approaches prioritize cost reduction while ensuring service quality, especially in delivery accuracy and lead times. Additionally, Ran (2021) and Mendoza and Garcia (2020) state that enhancing inventory management efficiency, particularly for spare parts and stock control, significantly lowers operational costs. The overall high extent indicates that construction hardware enterprises actively perform inventory management activities that could benefit from technological improvements. Furthermore, Tao et al. (2024) stress the necessity for adaptable inventory strategies to respond to evolving market conditions, which is crucial for economic sustainability.

In terms of Logistics and Transportation

Table 5 shows the mean scores and standard deviations (SD) that indicate the extent of logistics and transportation activities of hardware businesses. The data shows an overall rating of *High* ($M = 3.03$, $SD = 0.62$), showing that construction hardware enterprises frequently performed logistics and transportation activities and that these activities are well-integrated into operations. From the results, the highest mean score was in item 4, *ensuring that all paperwork required to complete a delivery is prepared correctly* ($M = 3.56$, $SD = 0.59$), which is interpreted as *very high*. It shows that construction hardware enterprises efficiently and effectively perform the processes by ensuring that all paperwork required to complete a delivery is prepared correctly. However, the item with the lowest mean score used *software and IT resources to proficiently handle related processes* in item 6 ($M = 2.41$, $SD = 1.06$), which is interpreted as *low*.

Table 5. *Extent of Supply Chain Activities of Construction Hardware Enterprises in terms of Logistics and Transportation*

Indicators		Mean	Interpretation	SD
1.	Selecting appropriate transportation facilities.	3.01	High	0.81
2.	Choosing the most effective routes for transportation.	2.97	High	0.84
3.	Discovering the most competent delivery method.	2.72	High	0.95
4.	Ensuring that all paperwork required to complete a delivery is prepared correctly.	3.56	Very High	0.59
5.	Preparing a safe, efficient load optimization programs on product dimensions, loading requirements, & equipment capacity.	3.52	Very High	0.70
6.	Using software and IT resources to proficiently handle related processes.	2.41	Low	1.06
Overall		3.03	High	0.62

This analysis highlights that construction hardware enterprises still perform the conventional logistics and transportation processes, specifically ensuring proper delivery documentation. The results suggest that construction hardware enterprises prioritize compliance and accuracy in documents, which is vital for smooth operations and avoiding delays or legal complications. However, the lowest mean score related to the use of software and IT resources reveals a gap in technological integration in construction hardware enterprises' logistics and transportation activities. This suggests that while construction hardware enterprises excel in conventional and manual logistics methods, they may still have challenges utilizing technological tools to enhance efficiency. Additionally, this item's high standard deviation ($SD = 1.06$) indicates variability among construction hardware enterprises, meaning some may have embraced technology while others struggle with its implementation.

The study's findings align with Yildiz's (2023) claims that logistics is vital for business operations, as it helps with cost-cutting and ensures prompt deliveries. This corresponds with the study's finding that construction hardware enterprises emphasize traditional logistics activities, especially maintaining accurate delivery documentation, which facilitates smoother operations and reduces delays. Moreover, enhancing material flow and removing superfluous steps in the supply chain can reduce costs. This supports the study's result that businesses prioritize precision and efficiency in documentation to improve their logistical functions. However, the results also indicated that construction hardware enterprises scored lower using software and IT resources for logistics and transportation activities, highlighting a technological deficiency. Zhao (2024) addresses the growing importance of IT in logistics management, noting that contemporary logistics frameworks incorporate digital tools to optimize resource distribution and streamline management tasks. This confirms the study's findings that construction hardware enterprises might face challenges with technological integration, as their dependence on traditional logistics practices reveals a delay in embracing advanced IT solutions. Furthermore, Su et al. (2024) underscore the risks of medium to high logistics practices, including costs, quality control, and operational issues. These risks correspond with the study's results, particularly regarding the inconsistency in technology adoption among hardware businesses, as reflected by the high standard deviation in IT-related logistics processes.

3.3 Level of Supply Chain Challenges Encountered by Construction Hardware Enterprises

In terms of Supplier Management

Table 6 shows the mean scores and standard deviations (*SD*) that indicate the supplier management challenges encountered by construction hardware enterprises. The data shows an overall rating of *low* ($M = 2.19$, $SD = 0.57$), showing that construction hardware enterprises occasionally experience these challenges and have a minor impact on their operations. From the results, the highest mean score was item 3, *damaged deliveries* ($M = 2.43$, $SD = 0.75$), which was interpreted as *low*. However, item 6, *Poor communication with suppliers* ($M = 1.75$, $SD = 0.77$), has the lowest mean score, which is also interpreted as *low*.

Table 6. *Level of Supply Chain Challenges Encountered by Construction Hardware Enterprises in terms of Supplier Management*

Indicators	Mean	Interpretation	SD
1. Conflict over contract	2.26	Low	0.93
2. Disharmony among buyer-supplier chain	2.30	Low	0.86
3. Damaged deliveries	2.43	Low	0.75
4. Misunderstanding between the buyer and supplier	2.30	Low	0.84
5. Limited source of the qualified suppliers	2.07	Low	0.82
6. Poor communication with suppliers	1.75	Low	0.77
Overall	2.19	Low	0.57

Note: 3.50 – 4.00 (Very High), 2.50 – 3.49 (High), 1.50 – 2.49 (Low), 1.00 – 1.49 (Never)

These findings highlight that construction hardware enterprises encounter all supplier management challenges at a low level, indicating that they occasionally encountered these challenges and had a minor impact on their operations. This could mean that these challenges are present but not considered as disruptive. Though supplier management challenges exist, these challenges do not pose significant risks to the supply chain operations of construction hardware enterprises. The study results support LeapSource's (2024) statement that successful management of supplier relationships is essential for reducing misunderstandings, delays, and conflicts. By promoting robust communication pathways and being aware of cultural differences, companies can lessen the occurrence and impact of problems such as damaged shipments and ineffective communication with suppliers. Furthermore, developments in tools for supply chain visibility, such as those powered by AI and machine learning, have allowed companies to track products in real time and foresee possible disruptions. This forward-thinking strategy enables hardware businesses to tackle supplier-related issues swiftly, reducing their effect on operations (Vanderford, 2024). Moreover, Jenkins (2024) stressed that maintaining open communication can be challenging, especially for businesses with complex supply chains and many involved parties. Communication and collaboration with suppliers can help alert businesses to any expected problems. Moreover, fostering open communication and transparency with key suppliers can encourage close collaboration and mutual growth (Tanase, 2025).

In terms of Procurement

Table 7 shows the mean scores and standard deviations (*SD*) that indicate the procurement challenges encountered by construction hardware enterprises. The data revealed an overall rating of *Low* ($M = 2.02$, $SD =$

0.68), showing that construction hardware enterprises occasionally experienced these challenges and had a minor impact on their operations. From the results, the highest mean score was item 1, *lack of technical know-how* ($M = 2.16$, $SD = 0.95$), which was interpreted as *low*. However, the item with the lowest mean score was item 3, which is an *inconsistency of supply* ($M = 1.92$, $SD = 0.83$), which is also interpreted as *low*.

Table 7. *Level of Supply Chain Challenges Encountered by Construction Hardware Enterprises in terms of Procurement*

Indicators	Mean	Interpretation	SD
1. Lack of technical know-how.	2.16	Low	0.95
2. Not up-to-date with regulations and compliance.	1.99	Low	0.85
3. Inconsistency of supply.	1.92	Low	0.83
Overall	2.02	Low	0.68

These findings highlight that construction hardware enterprises encountered challenges in procurement at a low level, indicating that they occasionally encountered these challenges and had a minor impact on their operations. This means that these challenges do not hinder their daily operations. The low mean scores show that while these challenges cannot be avoided, they are not major concerns for hardware businesses. The lack of technical know-how among the procurement challenges had the highest mean score. This may mean that some construction hardware enterprises are struggling with technical expertise in procurement. Inconsistency of supply had the lowest mean score. Though there are fluctuations in supply, these challenges do not affect the construction hardware enterprise's supply chain activities. The findings contradict the claim of Bencheikroun et al. (2024) that a lack of training and skills among procurement teams is a significant operational barrier. However, in the discussions with Chandrasekaran (2024) on procurement challenges, he emphasized that these challenges can be effectively managed with appropriate strategies.

In terms of Inventory Management

Table 8 shows the mean scores and standard deviations (SD) that indicate the inventory management challenges encountered by construction hardware enterprises. The data shows an overall rating of *Low* ($M = 2.40$, $SD = 0.68$), showing that construction hardware enterprises occasionally experience these challenges and have a minor impact on their operations. From the results, the highest mean score was *Changing customer demand* ($M = 2.84$, $SD = 0.92$), interpreted as *high* in Item 2. However, *difficulty in getting accurate stock details* ($M = 2.25$, $SD = 0.86$) in item 1 and *inaccurate inventory reporting* ($M = 2.25$, $SD = 0.91$) in item 4 got the lowest mean score, interpreted as *low*.

Table 8. *Level of Supply Chain Challenges Encountered by Construction Hardware Enterprises in terms of Inventory Management*

Indicators	Mean	Interpretation	SD
1. Difficulty in getting accurate stock details	2.25	Low	0.86
2. Changing customer demand	2.84	High	0.92
3. Poor utilization of warehouse space	2.27	Low	0.92
4. Inaccurate inventory reporting	2.25	Low	0.91
Overall	2.40	Low	0.68

The results revealed that construction hardware enterprises generally encounter inventory management challenges at a low level, indicating that they occasionally encountered these challenges and had a minor impact on their operations. This means that these challenges do not hinder their daily operations. Among the inventory management challenges, changing customer demand had the highest mean score. This may mean some construction hardware enterprises have difficulty predicting and responding to evolving customer needs, resulting in inventory discrepancies. Difficulty in getting accurate stock details and inaccurate inventory reporting had the lowest mean scores. Though these challenges exist in construction hardware enterprises, they are not perceived as significant problems in their operations. This indicates that construction hardware enterprises have relatively effective inventory tracking and reporting systems.

The findings support Jenkins's (2022) claims that changing demand is a common challenge in inventory management, emphasizing the difficulty businesses face in accurately forecasting customer needs, leading to inventory imbalances such as overstocking or stockouts. Likewise, Maplesden (2024) highlights "rapidly changing customer demand" as a challenge, noting that unforeseen shifts, such as seasonal fluctuations or unexpected market changes, can disrupt inventory planning and affect a company's ability to meet customer expectations. Furthermore, Jenkins (2024) stressed that inventory management needs flexibility to meet

customer expectations. Businesses may overcome challenges by investing in more effective inventory allocation processes to ensure that goods are stocked and can be quickly delivered to fulfill orders.

In terms of Logistics and Transportation

Table 9 shows the mean scores and standard deviations (SD) that indicate the logistics and transportation challenges encountered by construction hardware enterprises. The data shows an overall rating of *low* ($M = 2.35$, $SD = 0.54$), showing that construction hardware enterprises occasionally experience these challenges and have a minor impact on their operations. From the results, three challenges were interpreted as *high*. These challenges include *rising fuel costs* ($M = 2.83$, $SD = 0.84$) in item 1, *rising fleet maintenance costs* ($M = 2.79$, $SD = 0.87$) in item 2, and *equipment malfunction* ($M = 2.59$, $SD = 0.89$) in item 7. However, *poor coordination for multiple deliveries* ($M = 1.90$, $SD = 0.83$) in item 4 got the lowest mean score, which is interpreted as *low*.

Table 9. Level of Supply Chain Challenges Encountered by Construction Hardware Enterprises in terms of Logistics and Transportation

Indicators	Mean	Interpretation	SD
1. Rising fuel costs	2.83	High	0.84
2. Rising fleet maintenance costs	2.79	High	0.87
3. Damaged goods during transit	2.36	Low	0.72
4. Poor coordination for multiple deliveries	1.90	Low	0.83
5. Supply chain interruption	2.17	Low	0.85
6. Capacity shortages	2.12	Low	0.82
7. Equipment malfunction	2.59	High	0.89
8. Late or incorrect deliveries	2.00	Low	0.80
Overall	2.35	Low	0.54

The results revealed that construction hardware enterprises generally encounter inventory management challenges at a low level, indicating that they occasionally encountered these challenges and had a minor impact on their operations. This means that these challenges do not hinder their daily operations. Among the logistics and transportation challenges, rising fuel costs, rising fleet maintenance costs, and equipment malfunction were considered high-level challenges. The three identified high-level challenges may be influenced by economic conditions, which are considered external factors. Construction hardware enterprises may need fuel-efficient strategies and preventive maintenance plans to mitigate the effects on their operations. Poor coordination for multiple deliveries may be the least challenging issue in hardware businesses. This may mean construction hardware enterprises have effective scheduling and route optimization, minimizing delays and inefficiencies.

The findings support the claim of Fleming (2024) that one of the biggest challenges in logistics is the ever-increasing fuel cost. This can make it difficult to maintain profitability and lead to some companies going out of business. He also pointed out that the cost of maintaining a fleet is rising, which puts pressure on logistics. Additionally, Luwjistik (2023) pointed out that outdated customs processes and severe traffic congestion in city regions are key factors in logistical delays and inefficiencies. The report also highlighted that businesses encounter considerable challenges in maintaining seamless transportation, especially in areas far from major economic hubs.

3.4 Difference in the Extent of Supply Chain Activities when grouped according to Business Profile

Tables 10-12 present the differences in the extent of supply chain activities of construction hardware enterprises when grouped according to business profile, such as form of organization, capitalization, and length of operations. Table 10 shows the H ratio of 9.873 with a p-value of 0.007 using the Kruskal-Wallis U Test to determine if there is a significant difference in the extent of supply chain activities among the different forms of organization, such as single proprietorship, partnership, and corporation. The findings revealed *a significant difference* in the extent of supply chain activities when grouped according to the form of organization.

The results affirm that the form of organization has a significant role in supply chain activities. Larger construction hardware enterprises, such as corporations, tend to have more organized and developed supply chain processes than partnerships and single proprietorships in the construction hardware sector. This is attributed to their larger-scale operations, greater resources, and better supply chain management. The result aligns with Yang and Wang (2023), who demonstrated that sustainable supply chain management practices have a positive impact on economic performance, with firm size moderating the relationship, an indication that larger firms benefit more significantly from these practices. Similarly, Li (2023) noted that large companies

generally have complex and integrated supply chains supported by advanced technologies, while small businesses operate with simpler, more agile supply chains and limited technological integration.

Table 10. *Kruskal-Wallis U Test for the Difference in the Extent of Supply Chain Activities when Grouped according to Form of Organization*

Grouping Variables		N	Mean Ranks	Kruskal-Wallis U Test		
				df	H-ratio	p
Form of organization	Single Proprietorship	121	97.05	2	9.87	.007
	Partnership	45	107.48			
	Corporation	46	130.39			

Table 11 presents the U-ratio of 4027.00 with a p-value of 0.000 obtained through the Mann-Whitney U Test to determine whether there is a significant difference in the extent of supply chain activities when grouped based on the amount of capitalization. The findings revealed a *significant difference* in the extent of supply chain activities when grouped according to the amount of capitalization, since the p-value is below 0.05.

Table 11. *Mann-Whitney U Test for the Significant Difference in the Extent of Supply Chain Activities when Grouped according to Capitalization*

Grouping Variables		n	Mean Ranks	Sum of Ranks	Mann-Whitney U Test			
					U-ratio	W	Z	p
Capitalization	550,000 and below	106	91.49	9698.00	4027.0	9698.0	-3.56	<.001
	Above 550,000	106	121.51	12880.00				

The results affirm that the amount of capitalization has a significant role in supply chain activities. It suggests that construction hardware enterprises with higher capitalization tend to engage in more extensive supply chain activities. This may be due to their greater financial resources, which enable them to invest more in improved supply chain activities. The research corroborates the assertion made by Wang et al. (2023) that both structural and relational capital significantly contributes to the complementary capabilities of suppliers, which subsequently improve a company's overall performance. This indicates that organizations with bigger financial assets are better positioned to invest in developing supply chain capital, potentially leading to improved performance. Furthermore, Ye et al. (2023) illustrated that social capital within the supply chain positively influences supply chain performance. This underscores the significance of financial investments in sustaining strong supply chain partnerships.

Table 12 presents the U-ratio of 4862.500 with a p-value of 0.398 obtained through the Mann-Whitney U Test to determine whether there is a significant difference in the extent of supply chain activities when grouped according to the length of operations. The findings revealed *no significant difference* in the extent of supply chain activities when grouped according to length of operations, given that the p-value exceeds 0.05.

Table 12. *Mann-Whitney U Test for the Significant Difference in the Extent of Supply Chain Activities when grouped according to Length of Operations*

Grouping Variables		n	Mean Ranks	Sum of Ranks	Mann-Whitney U Test			
					U-ratio	W	Z	p
Length of operations	16 years and below	134	103.79	13907.50	4862.5	13907.5	-0.84	.398
	Above 16 years	78	111.16	8670.50				

The results suggest that the length of operations does not influence the extent of supply chain activities among construction hardware enterprises. The number of years in operation is unimportant in determining the extent of supply chain activities among construction hardware enterprises. The study's findings correspond with the research conducted by Phan et al. (2019) regarding the influence of supply chain quality management practices on the operational performance of manufacturing companies in Vietnam. This research emphasized that internal, upstream, and downstream quality management significantly contribute to operational performance, highlighting the necessity of adopting quality management practices throughout the supply chain, regardless of the company's years in operation. Likewise, Lee et al. (2021) investigated how supply chain management strategies impact operational and financial performance in small and medium-sized enterprises (SMEs). This indicates that strategic Supply Chain Management practices are essential for improving performance, irrespective of the duration of the company's operations.

3.5 Difference in the Level of Supply Chain Challenges of Construction Hardware Enterprises when grouped according to Business Profile

Tables 13-15 present the differences in the supply chain challenges of construction hardware enterprises when grouped according to business profile, such as form of organization, capitalization, and length of operations. Table 13 shows the F-ratio of 0.293 with a p-value of 0.747 using ANOVA to determine if there is a significant difference in the level of supply chain challenges among the different forms of organization, such as single proprietorship, partnership, and corporation. The findings revealed *no significant difference* in the supply chain challenges of construction hardware enterprises when grouped according to forms of organization.

Table 13. ANOVA Results for the Difference in the Level of Supply Chain Challenges of Construction Hardware Enterprises When grouped according to Form of Organization

	Sum of Squares	Df	Mean Square	F-ratio	p
Between Groups	0.131	2	0.066		
Within Groups	46.800	209	0.224	0.29	.747
Total	46.931	211			

The results suggest that whether a construction hardware enterprise operates as a single proprietorship, partnership, or corporation, the supply chain challenges they encounter are similar. Furthermore, the forms of organization are not a determining factor in the supply chain challenges of construction hardware enterprises. The research findings are aligned with those of Pant et al. (2021), who explored how intangible supply chain complexity affects company performance across different organizational forms. Their research indicated that although organizational structure influences the management of supply chain complexities, the challenges are common across various forms of organization, suggesting that the kind of organizational structure does not significantly change the nature of supply chain challenges encountered by businesses. Furthermore, Loury-Okoumba and Mafini (2021) examined the factors influencing supply chain management in small to medium-sized enterprises (SMEs). Their results demonstrated that SMEs face similar supply chain challenges irrespective of their organizational form and that implementing specific supply chain management strategies can improve performance across these different organizational forms.

Table 14 presents the t-ratio of 0.073 with a p-value of 0.942 using a t-test to determine if there is a significant difference in supply chain challenges when construction hardware enterprises are grouped according to the capitalization amount. The findings indicate *no significant difference* in the supply chain challenges of construction hardware enterprises when grouped according to capitalization amount, given that the p-value is greater than 0.05.

Table 14. T-test results for the Difference in the Level of Supply Chain Challenges of Construction Hardware Enterprises When grouped according to the Amount of Capitalization

Capitalization	Mean	SD	df	t	p
550,000 and below	2.27	0.48			
Above 550,000	2.26	0.47	210	0.07	.942

The results suggest that the amount of capitalization does not influence the supply chain challenges of construction hardware enterprises. There is no significant difference in the supply chain challenges between construction hardware enterprises with lower and higher capitalization. Furthermore, it suggests that construction hardware enterprises encounter challenges regardless of their financial status. Research on the risk factors associated with supply chains and the technological abilities of small to medium enterprises (SMEs) shows that while financial limitations are significant, they represent just one of many factors that influence a firm's performance. Other critical factors, such as skill availability, information security, and supplier dependability, also have a considerable impact (Kanyepe et al., 2025). This implies that the challenges within supply chains are complex and not solely reliant on the amount of capitalization. Moreover, a study examining supply chain management techniques and capital structures in the global information and communications technology sector reveals that companies, regardless of their financial resources, employ various strategies to maintain production stability and effectively manage their supply chains (Son & Kim, 2022). This further reinforces the idea that businesses face supply chain challenges irrespective of their financial capabilities.

Table 15 presents a t-ratio of -0.268 with a p-value of 0.789 using a t-test to determine if there is a significant difference in the level of supply chain challenges when construction hardware enterprises are grouped

according to length of operations. The findings indicate *no significant difference* in the level of supply chain challenges of construction hardware enterprises when grouped according to length of operations, given that the p-value is greater than 0.05.

Table 15. *T-test results for the Difference in the Level of Supply Chain Challenges of Construction Hardware Enterprises When grouped according to the Length of Operations*

Length of Operations	Mean	SD	df	t	p
16 years and below	2.26	0.45	210	-0.26	.789
Above 16 years	2.28	0.51			

The results suggest that the length of operations does not affect the supply chain challenges of construction hardware enterprises. There is no significant difference in the supply chain challenges between construction hardware enterprises that have been in operation for 16 years or less and those that have been operating for more than 16 years. Additionally, it suggests that construction hardware enterprises encounter challenges regardless of the duration of their operation. Research shows that the complexities of supply chains in the hardware manufacturing sector arise from complicated supplier networks, cost challenges, supplier risks, and the continuous digital transformation trend, rather than when a company has been in business. For example, organizations like Cisco Systems have utilized digital solutions like blockchain to enhance traceability in their supply chains, tackling the industry's inherent challenges regardless of operating duration (Kamani, 2023).

3.6 Relationship between the Extent of Supply Chain Activities and the Level of Challenges of Construction Hardware Enterprises

Table 16 presents a computed r-value of 0.055 with a p-value of 0.423 using Spearman rho to determine whether there is a significant relationship between the extent of supply chain activities and the level of challenges of construction hardware enterprises. The findings indicate that *no significant relationship* exists between the extent of supply chain activities and construction hardware enterprises' level of supply chain challenges, given that the p-value is greater than 0.05.

Table 16. *Spearman's Rho Result for the Relationship between the Extent of Supply Chain Activities and the Level of Challenges of Construction Hardware Enterprises*

Variables	r	p	Interpretation
Extent of Supply Chain Activities and Level of Challenges	.05	.423	No significant relationship

The computed r-value of 0.055 indicates a very weak positive correlation between the extent of supply chain activities and the level of challenges of construction hardware enterprises. However, the p-value indicates that the correlation is not statistically significant. The results suggest that the extent of supply chain activities does not influence the challenges construction hardware enterprises face. Since the findings revealed no significant relationship, other external factors may contribute to the challenges encountered by construction hardware enterprises. The research results show that the extent of supply chain activities does not significantly affect the challenges construction hardware enterprises face. This indicates that external factors may be more influential in determining these challenges. Likewise, Kissi et al. (2021) discovered that disruptions in the supply chain, whether related to demand or supply, adversely affect business performance. However, the research underlines that supply chain innovation can alleviate these disruptions, highlighting the importance of external factors in determining supply chain challenges. This aligns with the present study's findings that the challenges encountered by hardware businesses may originate from external factors rather than the extent of supply chain activities.

4.0 Conclusion

Based on the findings, the construction hardware enterprises in Bacolod City demonstrate a high level of engagement in supply chain activities, reflecting their strategic focus on efficient operations and well-structured supply chain processes. While these businesses face occasional challenges, their minimal impact on overall performance indicates the presence of effective mitigation strategies. The extent of supply chain activities differed significantly when grouped by form of organization and amount of capitalization, underscoring the influence of structural and financial capacity. However, supply chain challenges remain consistent regardless of business profile, suggesting that these challenges are industry-wide and not limited by organizational or operational characteristics. Moreover, the lack of a significant relationship between the

extent of supply chain activities and the level of challenges suggests that increased operational engagement does not necessarily lead to greater difficulties, likely due to adaptive strategies in place. These insights highlight the need for tailored support systems, targeted capacity-building initiatives, and policy interventions considering construction hardware enterprises' diverse organizational structures and resources. Future studies may explore the role of digital technologies and collaborative networks in further strengthening supply chain resilience.

5.0 Contributions of Authors

Author 1: conceptualization, data gathering, data analysis
 Author 2: reviewed and approved the final work

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The authors declare no conflicts of interest regarding the publication of this paper.

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9.0 References

- Althaqafi, T. (2023). Environmental and social factors in supplier assessment: Fuzzy-based green supplier selection. *Sustainability*, 15(21), 15643. <https://doi.org/10.3390/su152115643>
- Amin, R., & Kushwaha, B. (2021). Increasing the efficiency and effectiveness of inventory management by optimizing the supply chain through enterprise resource planning technology. *Efflatounia*, 5(2), 1739-1756. <https://tinyurl.com/37rkxrv9>
- Benchekroun, H. T., Benmamoun, Z., & Hachimi, H. (2024). Sustainable public procurement for supply chain resilience and competitive advantage. *Acta Logistica*, 11(3), 349-360. <https://doi.org/10.22306/al.v11i13.519>
- Boruchowitch, F., & Fritz, M. M. C. (2022). Who in the firm can create sustainable value and for whom? A single case-study on sustainable procurement and supply chain stakeholders. *Journal of Cleaner Production*, 363, 132619. <https://doi.org/10.1016/j.jclepro.2022.132619>
- Chandrasekaran, Y. (2024). Overcoming the challenges of procurement process: strategies for success. Spend Edge. Retrieved from <https://tinyurl.com/mjb8vvec>
- Fleming, H. (2024). 10 most common problems in the logistics industry, and how to overcome them. Dropoff. Retrieved from <https://tinyurl.com/259necv7>
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). How to design and evaluate research in education (10th ed.). McGraw-Hill Education.
- Jenkins, A. (2024). 15 key supply chain challenges to overcome. NetSuite. Retrieved from <https://tinyurl.com/4hs8nbwa>
- Jenkins, A. (2022). Inventory management challenges and solutions for 2022 and beyond. NetSuite. Retrieved from <https://tinyurl.com/2u5ee6e9>
- Jing-Sheng, S., Houtum, G., & Miegheem, J. (2019). Capacity and inventory management: Review, trends, and projections. *Manufacturing & Service Operations Management*, 22(1), 36-46. <https://doi.org/10.1287/msom.2019.0798>
- Kamani, S. (2023). Procurement challenges in hardware manufacturing: Solutions and strategies. FactWise. Retrieved from <https://tinyurl.com/maa3zvcz>
- Kanyepe, J., Musasa, T., & Wilbert, M. (2025). Supply chain risk factors, technological capabilities, and firm performance of small to medium enterprises (SMEs). *Journal of Small Business Strategy*, 35(1), 115-128. <https://doi.org/10.53703/001c.125910>
- Kavota, J., Cassivi, L., & Léger, P. (2024). A systematic review of strategic supply chain challenges and teaching strategies. *Logistics*, 8(1), 19. <https://doi.org/10.3390/logistics8010019>
- Kissi, E., Agyekum, K., Musah, J., Owusu-Manu, D.-G., & Debrah, C. (2021). Linking supply chain disruptions with organisational performance of construction firms: The moderating role of innovation. *Journal of Financial Management of Property and Construction*, 26(1), 158-180. <https://doi.org/10.1108/JFMP-11-2019-0084>
- LeapSource. (2024). Top challenges in supplier management and how to overcome them. Retrieved from <https://tinyurl.com/4ddyrc35>
- Lee, S., Kim, S., & Lee, H. (2021). The effect of supply chain management strategy on operational and financial performance. *Sustainability*, 13(9), 5138. <https://doi.org/10.3390/su13095138>
- Letunovska, N., Offei, F. A., Junior, P. A., Lyulyov, O., Pimonenko, T., & Kwilinski, A. (2023). Green supply chain management: The effect of procurement sustainability on reverse logistics. *Logistics*, 7(3), 47. <https://doi.org/10.3390/logistics7030047>
- Li, T. (2023). Supply chain management: Contrasting approaches in big companies and small businesses. Retrieved from <https://tinyurl.com/5dbjvzh7>
- Loury-Okoumba, W. V., & Mafini, C. (2021). Supply chain management antecedents of performance in small to medium scale enterprises. *South African Journal of Economic and Management Sciences*, 24(1), a3661. <https://doi.org/10.4102/sajems.v24i1.3661>
- Luwjistik. (2023). Outlook, opportunities, and challenges of the logistics industry in the Philippines. Retrieved from <https://tinyurl.com/2fka37c9>
- Maplesden, P. (2024). 20 common problems with inventory management. Teach Target. Retrieved from <https://tinyurl.com/4ssb6ywp>
- Mendoza, E., & Garcia, L. (2020). Supply chain and logistics management: Enhancing competitive edge & customer satisfaction. Unlimited Books Library Services & Publishing, Inc.
- Pant, P., Dutta, S., & Sarmah, S. P. (2021). Intangible supply chain complexity, organizational structure and firm performance. *The International Journal of Logistics Management*, 32(4), 1214-1241. <https://doi.org/10.1108/IJLM-06-2020-0239>
- Phan, A. C., Nguyen, H. A., Trieu, P. D., Nguyen, H. T., & Matsui, Y. (2019). Impact of supply chain quality management practices on operational performance: Empirical evidence from manufacturing companies in Vietnam. *Supply Chain Management*, 24(6), 855-871. <https://doi.org/10.1108/SCM-12-2018-0445>
- Quijano, Y. (2023). How to start a hardware business in the Philippines: A guide for first-time hardware store owners. Trailblazer. Retrieved from <https://tinyurl.com/2dcnpa68>
- Ran, H. (2021). Construction and optimization of inventory management system via cloud-edge collaborative computing in supply chain environment in the Internet of Things era. *PLoS One*, 16(11). <https://doi.org/10.1371/journal.pone.0259284>
- Siedlecki, S. (2020). Understanding descriptive research designs and methods. *Clinical Nurse Specialist*, 34 (1). <https://tinyurl.com/vc8y5uc8>
- Son, I., & Kim, S. (2022). Supply chain management strategy and capital structure of Global Information and Communications Technology Companies. *Sustainability*, 14(3), 1844. <https://doi.org/10.3390/su14031844>
- Stock, J. R., & Manrodt, K. B. (2020). Supply chain management. McGraw-Hill.
- Su, Q., Shi, Y., Gao, Y., Arthanari, T., & Wang, M. (2024). The improvement of logistics management in China: A study of the risk perspective. *Sustainability*, 16(15), 6688. <https://doi.org/10.3390/su16156688>
- Tanase, A. (2025). Top supplier management challenges and how to solve them. Veridion. Retrieved from <https://tinyurl.com/4zvhhc2s>
- Tao, S., Liu, S., Zhou, H., & Mao, X. (2024). Research on inventory sustainable development strategy for maximizing cost-effectiveness in supply chain. *Sustainability*, 16(11), 4442. <https://doi.org/10.3390/su16114442>
- Vanderford, R. (2024). Supply chain woes carry high risks, big rewards for some companies. The Wall Street Journal. Retrieved from <https://tinyurl.com/33uudhmm>
- Wang, C., Chin, T., & Ting, C.-T. (2023). Supply chain capital and firm performance: The role of complementary capabilities. *Journal of Intellectual Capital*, 24(2), 560-579. <https://doi.org/10.1108/JIC-06-2021-0148>
- Wisner, J. D., Leong, G. K., & Tan, K.-C. (2019). Principles of supply chain management : A balanced approach. Cengage.

- Yang, X., & Wang, J. (2023). The relationship between sustainable supply chain management and enterprise economic performance: Does firm size matter? *Journal of Business & Industrial Marketing*, 38(3), 553-567. <https://doi.org/10.1108/JBIM-04-2021-0193>
- Ye, Y., Yang, L., Huo, B., & Zhao, X. (2023). The impact of supply chain social capital on supply chain performance: A longitudinal analysis. *Journal of Business & Industrial Marketing*, 38(5), 1176-1190. <https://doi.org/10.1108/JBIM-09-2021-0423>
- Yildiz, T. (2023). Logistics and supply chain management: Fundamentals and strategies. Retrieved from <https://tinyurl.com/taar8auv>
- Zhao, C. (2024). Construction of logistics information management of small and medium-sized enterprises relying on recursive algorithm. *Journal of Electrical Systems*, 20(6), 745-758. Retrieved from <https://tinyurl.com/39fu9j68>
- Zycus. (2018). Supplier Management: benefits, process, & best practices. Retrieved from <https://tinyurl.com/v2w82zby>