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Supplier Reliability and Inventory Management Performance in DP Manufacturing Company: Basis for Action Plan

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Abstract—This study explores the relationship between supplier reliability and inventory management performance at DP Manufacturing Company, a key player in the automotive parts sector. Using a descriptive-correlational research design, data were collected from 66 employees across various company departments using stratified random sampling in 2024. A three-part survey assessed supplier reliability, focusing on lead time, order accuracy, and defect rates, alongside inventory management performance, which was evaluated through planning and forecasting, stock level management, and inventory holding costs. The findings revealed a positive relationship between supplier reliability and inventory management performance, though the correlation was relatively weak. While supplier reliability was generally perceived as reliable, challenges were identified in defect prevention and lead time accuracy. Inventory management performed well in planning, forecasting, and cost efficiency but required improvements in stock-level management. The study found no significant impact of inventory management performance on supplier reliability. These results suggest that while enhancing supplier reliability can contribute positively to inventory management, other factors also play a critical role. The study proposes an action plan to address key areas of improvement, including enhanced forecasting, better supplier performance evaluations, and stronger supplier partnerships.

***Index Terms*—Supplier Reliability, Inventory Management Performance, Lead Time, Order Accuracy, Defects, Supply Chain Efficiency, Automotive Manufacturing.**

1. Introduction

In today's fast-paced and competitive manufacturing environment, supplier reliability plays a critical role in ensuring smooth operations and maintaining efficient inventory management. Supplier reliability becomes a cornerstone of effective supply chain management as companies face increasing pressures to deliver high-quality products on time and at competitive prices. This is especially true in the automotive industry, where the timely delivery of quality parts is essential for uninterrupted production cycles.

DP Manufacturing Company, a significant player in the automotive parts sector, serves both local and international markets, producing key automotive components integral to major vehicle manufacturers' production lines. As part of its global supply chain, DP Manufacturing faces unique challenges in managing supplier relationships and maintaining an efficient inventory system. The company operates within a just-in-time (JIT) environment, where the synchronization of parts deliveries and inventory levels is crucial for reducing waste and optimizing production.

This study investigates the relationship between supplier reliability and inventory management performance at DP Manufacturing Company. By exploring how different dimensions of supplier reliability—such as lead time consistency, order accuracy, and defect rates—affect inventory management practices, this research seeks to identify areas for improvement and propose actionable solutions. The findings from this study are expected to provide valuable insights into how DP Manufacturing can strengthen its supply chain and enhance operational efficiency by improving supplier performance and inventory management.

Through this research, the study will explore the impact of supplier reliability on inventory management performance, identifying the specific areas of supplier reliability that require improvement to optimize inventory management. Additionally, the study will propose strategies to strengthen supplier relationships and enhance inventory management practices at DP Manufacturing.

2. Literature Review

Supplier reliability is a critical factor in optimizing inventory management in manufacturing. Reliable suppliers ensure timely deliveries, accurate order fulfillment, and minimal defects, which directly impact inventory control and operational efficiency. Zhang et al. (2024) emphasize the importance of lead time reliability and other performance metrics like quality and responsiveness in minimizing stockouts and optimizing inventory allocation. The Dynamic Reliability-Driven Order Allocation and Inventory Management (DROAIM) model introduced by Zhang et al. (2024) integrates real-time data to improve internal operations and supplier dependability, particularly by assessing lead time performance. This approach reduces inventory imbalances and enhances supply chain responsiveness.

Order accuracy is another significant dimension of supplier

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reliability. Gergely (2024) explains that consistent order fulfillment contributes to more stable inventory levels and reduces the need for excess stock. Inconsistent deliveries, on the other hand, complicate inventory management, leading to inefficiencies like overstocking or stockouts. Additionally, Jiang (2023) discusses the cost-reliability tradeoff in supplier selection, where manufacturers must balance the cost benefits of unreliable suppliers with the stability offered by reliable, fast-response partners. This balance influences inventory management strategies, as unreliable suppliers increase the need for safety stock, raising holding costs.

Lead time variability is also a key concern in supplier reliability, with significant implications for inventory management. Forslund (2021) highlights that unpredictable lead times force companies to hold buffer stock, which increases holding costs and disrupts inventory control. Suppliers with consistent lead times enable manufacturers to operate with leaner inventories, reducing costs associated with excess stock and improving forecasting accuracy.

In conclusion, supplier reliability, encompassing lead time, order accuracy, and defect rates, is crucial for effective inventory management. Reliable suppliers contribute to accurate forecasting, optimized stock levels, and reduced operational costs, while unreliable suppliers complicate inventory control, leading to higher costs and inefficiencies. By integrating supplier reliability metrics into inventory management systems, companies can enhance operational performance and minimize supply chain risks.

3. Methodology

This study uses a descriptive-correlational research design to examine the relationship between supplier reliability and inventory management performance at DP Manufacturing Company. The research focuses on how lead time, order accuracy, and defect rates influence inventory practices, including stock-level management and forecasting.

The study was conducted at DP Manufacturing Company in Calamba City, Laguna, Philippines, involving 66 employees from various departments, including procurement, logistics, and production. Stratified random sampling was used to ensure diverse departmental representation. The sample size was determined with a 90% confidence level and a 10% margin of error.

A self-constructed questionnaire, divided into sections on supplier reliability, inventory management performance, and demographic information, was used for data collection. The questionnaire was validated by experts and pre-tested for reliability, yielding high internal consistency.

Data was collected through an online survey distributed via Google Forms after obtaining formal permission from DP Manufacturing. Participants were assured of confidentiality, and the data was exported to Excel for analysis. Descriptive statistics and Pearson's correlation analysis were used to examine the relationships between variables, and the Kruskal-Wallis test was applied to assess the impact of inventory management performance on supplier reliability.

4. Results, Analysis and Discussion

A. The Level of Supplier Reliability

Table 1

Indicators	Weighted Mean	Verbal Interpretation	Rank
Lead time	2.78	Reliable	2
Order Accuracy	2.80	Reliable	1
Defects	2.70	Reliable	3
General Assessment	**2.760311448**	**Reliable**	

Table 1 summarizes the supplier reliability level based on three primary indicators: Lead Time, Order Accuracy, and Defects. The highest-rated indicator was Order Accuracy, with a weighted mean of 2.80, followed closely by Lead Time at 2.78 and Defects at 2.70. Despite slight variations, all indicators fall within the "Reliable" verbal interpretation range. Overall, the general assessment yielded 2.76, demonstrating that the suppliers are reliable across all three key areas: lead time, order accuracy, and defects.

The prioritization of order accuracy suggests that ensuring the right products, quantities, and specifications remains the most critical expectation from suppliers. Reliable lead times support operational scheduling, but the slightly lower rating for defects indicates that occasional quality concerns still surface. Although defect rates do not significantly impact operations, focusing on proactive defect prevention and improved replacement processes could further strengthen supplier reliability.

B. The Level of Inventory Management Performance

Table 2

Indicators	Weighted Mean	Verbal Interpretation	Rank
Planning and Forecasting	3.22	Good Performance	1
Stock Level	3.11	Good Performance	3
Inventory Holding Cost	3.17	Good Performance	2
General Assessment	**3.16**	**Good Performance**	

Table 2 summarizes the inventory management performance level in DP Manufacturing Company, focusing on three key indicators: Planning and Forecasting, Stock Level, and Inventory Holding Cost. Planning and Forecasting received the highest weighted mean score of 3.22, followed by Inventory Holding Cost at 3.17 and Stock Level at 3.11. Overall, the general assessment yielded 3.16, demonstrating that inventory management performs well across all three key areas: planning and forecasting, stock level, and inventory holding cost.

These findings emphasize the critical role of effective planning and forecasting in optimizing inventory management. Strong forecasting capabilities allow companies to anticipate demand better, avoid stockouts, and reduce overstocking, ultimately enhancing operational efficiency. The relatively lower score of Stock Level suggests that while performance is satisfactory, there may be issues in balancing inventory quantities, which affect service levels, operational continuity, or tie up capital in unnecessary stock.

C. The Relationship Between the Level of Supplier Reliability and Inventory Management Performance in DP Manufacturing Company

Table 3

Supplier Reliability Dimension	Inventory Management Performance Dimension	r value	P value	Remarks	Decision
Lead Time	Planning and Forecasting	0.248**	0.04	significant	Reject Ho
	Stock Level	0.248**	0.04	significant	Reject Ho
	Inventory Holding Cost	0.248**	0.04	significant	Reject Ho
Order Accuracy	Planning and Forecasting	0.248**	0.04	significant	Reject Ho
	Stock Level	0.248**	0.04	significant	Reject Ho
	Inventory Holding Cost	0.248**	0.04	significant	Reject Ho
Defects	Planning and Forecasting	0.248**	0.04	significant	Reject Ho
	Stock Level	0.248**	0.04	significant	Reject Ho
	Inventory Holding Cost	0.248**	0.04	significant	Reject Ho

**significant level 0.05

Table 3 presents the relationship between the level of supplier reliability and inventory management performance at DP Manufacturing Company. The statistical tool used was Pearson's r correlation coefficient to measure the strength and direction of the relationships, and a p-value test to determine significance. An r value of 0.248 was consistently observed across all pairings, with a corresponding p value of 0.04, below the 0.05 significance level. This indicates that all relationships tested are statistically significant, leading to rejecting the null hypothesis. The r-interpretation of 0.248 indicates a positive low correlation, suggesting that while the relationship between variables exists, it is relatively weak in strength.

The results suggest that supplier reliability dimensions—lead time, order accuracy, and defect management—are positively associated with improvements in inventory planning performance: planning and forecasting, stock level, and inventory holding cost. Although the correlation coefficients are relatively weak, the consistency across all dimensions indicates a meaningful, albeit modest, relationship between supplier reliability and inventory management performance. It highlights that supplier reliability is not the sole determinant but is an important contributing factor to achieving higher inventory management efficiency. The consistent low positive correlation across all dimensions indicates that enhancing supplier reliability could positively affect inventory management outcomes.

The findings suggest that even incremental improvements in supplier practices—such as reducing lead times, improving order accuracy, and minimizing defects—can produce positive shifts in inventory planning, stock level optimization, and cost management. In the case of DP Manufacturing Company, these results underscore the strategic importance of supplier development programs and close coordination with suppliers to achieve greater stability and efficiency across inventory operations. Building stronger supplier relationships and investing in quality assurance and real-time communication can multiply benefits across multiple inventory dimensions.

D. Non-Parametric Analysis of the Impact of Inventory Management Performance on Supplier Reliability Using the Kruskal-Wallis Test

Table 4 presents the results of the Kruskal-Wallis test conducted to examine the impact of inventory management performance, specifically lead time, order accuracy, and defects, on the level of supplier reliability in DP Manufacturing Company. The test revealed that none of the inventory management performance indicators had a statistically significant effect on supplier reliability, with a consistent chi-square value of 2.2279, degrees of freedom (df) of 2, and a p-value of 0.328 across all variables. Since the p-value exceeded the conventional threshold of 0.05, the null hypothesis was not rejected, indicating no significant impact of inventory management on supplier reliability. This suggests that, within the scope of this study, supplier reliability remained relatively consistent regardless of differences in these inventory performance metrics.

Table 4

MODEL	χ^2	df	P-Value	Decision	Interpretation
Lead Time	2.2279	2	0.328	Failed to Reject Ho	There is no significance
Order Accuracy	2.2279	2	0.328	Failed to Reject Ho	There is no significance
Defects	2.2279	2	0.328	Failed to Reject Ho	There is no significance

This finding may imply that other factors, such as long-term supplier relationships, external logistics conditions, or organizational procurement policies, may play a more critical role in influencing supplier reliability. It also highlights the potential stability of supplier reliability even in the face of fluctuating inventory management performance.

5. Conclusion

This study explored the relationship between supplier reliability and inventory management performance at DP Manufacturing Company. The findings indicate that while supplier reliability positively impacts inventory management, there are significant areas for improvement. Specifically, although supplier reliability is generally seen as effective regarding lead time and order accuracy, defects prevention and the consistency of lead times were identified as key factors that hinder optimal inventory management.

Improved supplier reliability positively influenced inventory management performance, including planning, forecasting, and stock-level management. However, the study revealed that discrepancies in stock levels and occasional delivery delays continue to cause inefficiencies. These issues emphasize the need for stronger collaboration between DP Manufacturing and its suppliers to ensure consistent reliability.

In conclusion, while supplier reliability remains a critical factor in successful inventory management, addressing the challenges identified in this study will enable DP Manufacturing to improve its supply chain operations and better meet its production and customer demands.

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