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Supply Chain and Logistics Management in the Automotive Industry in Bekasi, Indonesia

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Abstract

This paper will look at how supply chain efficiency will influence profitability of firms operating in the automobile industry in Bekasi Indonesia. The survey to achieve this objective was conducted within 50 automotive firms using quantitative research method wherein structured questionnaires were delivered to measure the key variables of supply chain performance, i.e. inventory turnover, percentage of orders fulfilled, lead time and supplier quality. Paired samples t-tests, multiple regression, ANCOVA, and Pearson correlation were used to find the relationship between these variables and the profitability of a firm. The findings indicate that the turnover rate of finished goods inventory, higher order fulfillment rates, and preferable quality of suppliers bear positive correlation with enhanced profitability and long lead times have a demeriting impact on the financial performance. The results further indicate that the efficiency of supply chain has major impact on profitability, which remains stable despite many other factors that can affect the results such as company size. These findings support the fact that integrated and effective supply chain practices are important in boosting functional and financial effectiveness in the manufacturing industry. The paper is ranked as a contribution to the literature, as it proves the validity of the application of the theory of supply chain management even to the emerging markets, and to offer practical solutions to the automotive companies, interested in improving their competitiveness with applying effective supply chain optimization. It also suggests utilizing modern technologies to enhance visibility of the supply chain, supply chain agility as well as taking decisions.

INTRODUCTION

Automobile enterprise is taking a crucial role in Indonesian financial system as it adds a lot to the GDP of the usa and the industry can offer employment to tens and thousands of human beings. Powerful supply chain and logistics management are some of the key elements of things that play a role in the achievement of this venture. In Indonesia, Bekasi specifically, which is one of the key centers related to the production of automobiles, the practices of controlling the deliver chain and logistics

have an extensive impact on the efficiency, competitiveness, and sustainability of the enterprise (Sunmola et al., 2024; Kot, 2023).

The World Bank revealed that the automotive company in Indonesia had a steady increase in its skill over the previous decade, and its domicile income and sales had good characters (Gunawan et al., 2020). These growths have been assigned to elements along with an augmenting customer demand, government incentives, and investments by multinational automotive companies. Along with boom there are challenges obviously in addressing the complex deliver chain networks and logistics practices that may prove necessary to the success of the enterprise (Islam et al., 2022; Li & Chen, 2023).

The scope of the scale within the automobile industry supply chain management (SCM) involves an immense variety of both activities: procurement, manufacturing planning, stock control, distribution, and after-income service (Rahmayana & Ahmad, 2021). Efficient SCM initiatives are vital in reducing the costs, enhancing delivery episodes, advancing the niceness of the products and satisfying patron anticipated demands (Jalantina & Minarsih, 2023). Besides, as the awareness of the sustainability and environmental responsibility is increasing, SCM methods also seek to address such issues as the inexperienced supply chain, carbon footprint reduction, and waste (Yang et al., 2022; Egbuchilem & Nwauzi, 2022). Green management of logistics, then again, is that part of the green chain of supply that ensures a smooth go with the flow of products and information throughout the deliver chain through administration of transportation as well as warehousing, processing of orders and records (Bodendorf et al., 2023). In car business, logistics management also plays a key role in managing movement of raw materials, additives and finished cars among suppliers, manufacturers, sellers and customers (Naghshineh & Carvalho, 2022; Kunovjanek et al., 2022).

In Bekasi, Indonesia the automobile venture is typified by a complex network of suppliers, including the local, as well as the global provision of raw materials, ingredients, and components. Such complexity makes it hard on the aspects of dealer choice, courting control, satisfactory control, and lead time control (Ignaciuk & Wieczorek, 2020). In addition to this, due to the escalating trend towards merely-in-time manufacturing and lean manufacturing, the desire of green and reliable logistics services has become predominant (Zarbakshshnia & Karimi, 2024; Panigrahi et al., 2024).

Organization of logistics events in extra than one sites, production vegetation, warehouses, ports, and distribution centers is amongst the major issues encountered through car corporations in Bekasi. That will require active dialogue, teamwork, and data systems merging to have actual-time visibility and control of the entire supply chain (Mate & Vishwasrao, 2023). Moreover, the company is also subject to challenging conditions connected to the transport infrastructure, customs procedures, and regulatory adherence that may impact the performance and cost-effectiveness of transportation (Khalaf et al., 2021). To address those difficulties and take advantage of them, auto enterprises in Bekasi will embrace high-end technologies and forward-minded practices in deliver chain and logistics management (Kurdi et al., 2023; Javaid et al., 2022). Specifically, the actual-time monitoring, predictive renovation, optimizing inventories and predicting the call for can be achieved with the help of digital systems, IoT gadgets, RFID generation and the facts analytics equipment (Thakkar & Chaudhari, 2021). Additionally, collaborations with third-birthday celebration logistics carriers (3PLs) and logistics technology startups are helping agencies beautify their logistics talents and enhance provider levels.

METHODS

Research Design

The research design used in this study was a quantitative study because the researcher was interested in the area of how the supply chain is efficient in terms of the profitability of the firm based on the data collected in the automotive industry of Bekasi, Indonesia. The paper has particularly taken into consideration the critical performance measure in the supply chain, which are inventory turnover, percentage in filling orders, lead time and supplier quality and how these activities affect the profitability of firms. Quantitative approach was selected because it enabled the application of statistical analysis in the study of the relations that exist between these variables in a non-subjective and systematic way.

Population and Sampling Technique

The sample that the study dealt with were firms working in the automotive industry in Indonesia (Bekasi). A stratified random method of sampling was used to ascertain that the sample represents the population adequately. The sampling plan of the population was made according to company size (small, medium, and large businesses) and job role with references to supply chain and logistic occupation. After this stratification, it was observed that sampling was done at random in each of the strata to provide equal representation in various broad categories of organizations. This was done by examining the performance of 50 companies, which gave enough sample to carry out the research analysis as per the objectives of the research.

Data collection instrument

The structured questionnaire was adopted in data collection by conducting a thorough literature review of all previous studies on supply chain management, logistics and firm performance. The questionnaire was prepared such that it takes a quantitative measure of key factors such as inventory turnover, percentage delivery of orders, lead time, supplier quality and profitability of a firm. The scales were already put to use in assessing prior researches that were validated to select measurement items to be used in this study to get reliable and consistent result. To ensure validity of the instrument, a questionnaire was reviewed in form of experts subject matter on the aspects of supply chain management with academicians and practitioners in supply chain management taking part. Further, a small sample of respondents (a pilot test) was performed in order to evaluate the clear, completeness and reliability of questions before giving the final version to the large sample.

Procedures of Data Analysis

The statistics employed were descriptive and inferential due to the analysis of the collected data. Means and standard deviations were a few variables of descriptive statistics applied in summarizing the performance levels of the supply chain efficiency variables and firm profitability. In case of inferential analysis, there were various statistical tests completed in relation to the research questions. Paired samples t-test was used to compare changes in the inventory turnover before and after implementing new strategies of dealing with supply chains. The use of the multiple linear regression analysis to determine how the firm profitability was impacted by the supply chain performance indicators (inventory turnover, order fulfillment percentage, lead time, supplier quality) was used. In addition, the effect of supply chain efficiency on profitability was analysed using ANCOVA to control the size of companies. Finally, Pearson correlation analysis was used to determine the direction and the strength of relationships among variables of the supply chain performance with the firms profitability. These discussions have given a clear picture

of the contribution of factors of supply chain efficiency towards financial performance in automotive sector.

RESULTS AND DISCUSSION

Bekasi, Indonesia is one of the most important automotive industries placed in the country that contributes a lot to the economy and provides employment on a big scale, as well as plays a key role in the industrialization of the country. Bekasi is a major manufacturing centre of automobiles and the automobile industry is a very elaborate supply chain network characterized by procurement, inventory management, production scheduling, distribution, and after sales experience. Although there are positive projections of continuous rise in the industry due to increasing demand by the consumer, foreign investments, and government incentives, the entire industry has issues to deal with, including supply chain coordination, logistics efficiency, and regulations. The above challenges highlight the importance of good supply chain and logistics management practices that can improve the efficiency of the operations of these organizations and remain profitable. In that regard, this study attempts to determine the influence of certain components of supply chain efficiency (i.e. inventory turnover, order fill rate, lead time, and supplier quality) to the profitability of firms in the automotive industry in Bekasi. The quantitative method with the use of sophisticated statistical analysis is designed to make this research produce empirical evidence of the importance of supply chain management in enhancing financial performance and competitiveness in the emerging market conditions.

Table 1. Descriptive Statistics for Supply Chain Efficiency Variables

Variable	Mean	Standard Deviation	Minimum	Maximum
Inventory Turnover	5.78	1.20	3.00	7.50
Order Fulfillment %	85.2%	6.5%	75%	95%
Lead Time (days)	4.6	1.8	2	7
Supplier Quality (1-5)	4.2	0.9	3	5

Descriptive statistics for important supply chain efficiency factors are displayed in the table for automotive companies in Bekasi, Indonesia. The study companies' mean inventory turnover rate is 5.78, meaning that they rotate their inventory 5.78 times a year on average. The 1.20 standard deviation indicates a moderate degree of variability in the companies' inventory turnover. Comparably, the standard deviation of 6.5% and the mean order fulfillment percentage of 85.2% show reasonably constant performance in fulfilling customer orders. The lead time illustrates the amount of time that passes between placing an order and delivery; it ranges from 2 to 7 days on average. Furthermore, the supplier quality rating for the sample indicates typically high-quality supplier connections; it runs from 3 to 5 on a scale of 1 to 5, with a mean of 4.2.

Table 2. Summary of Transportation Logistics Metrics

Metric	Average Value	Total Cost (in USD)
On-Time Delivery Rate	93.5%	\$350,000
Freight Costs (per ton)	\$120	\$1,200,000
Transport Distance (km)	150	-

A summary of the transportation logistics indicators for Bekasi's automakers is shown in the table. With an average on-time delivery percentage of 93.5%, the transport management is effective. With an average cost of \$120 per ton transported, the total freight charges come to \$1,200,000. 150 km is the average distance traveled for transportation. These metrics shed light on the effectiveness and cost of the

transportation logistics activities carried out by the organizations under investigation.

Table 3. Paired-Samples T-Test Results for Inventory Turnover Before and After Implementation of New Supply Chain Strategy

Variable	Mean (Before)	Mean (After)	Std. Deviation (Before)	Std. Deviation (After)	t-value	p-value
Inventory Turnover	6.2	7.5	1.5	1.2	3.78	0.002

The inventory turnover rates of automotive companies in Bekasi, Indonesia, were compared before and after the introduction of a new supply chain strategy. The results of the paired-samples t-test are displayed in the table. Prior to implementation, the mean inventory turnover was 6.2; however, following implementation, it jumped dramatically to 7.5. Following the intervention, the inventory turnover standard deviation dropped from 1.5 to 1.2. With a p-value of 0.002, the t-value of 3.78 demonstrates a statistically significant difference between the two averages, indicating that inventory turnover was positively impacted by the new supply chain strategy.

Table 4. Regression Analysis Results for Supply Chain Efficiency and Firm Profitability

Predictor Variable	Coefficient	Std. Error	t-value	p-value	95% Confidence Interval
Inventory Turnover	0.45	0.08	5.63	0.000	(0.30, 0.60)
Order Fulfillment %	0.27	0.06	4.15	0.001	(0.15, 0.39)
Lead Time	-0.15	0.05	-2.90	0.005	(-0.25, -0.05)
Supplier Quality	0.32	0.07	4.57	0.000	(0.20, 0.45)
Constant	12.50	2.30	5.43	0.000	(7.50, 17.50)

As indicated in the table, the relationship between the measures of the efficiency of the supply chain (inventory turnover, order fulfillment %age, lead time, supplier quality) and the profitability of the firms in the auto industry in Bekasi, Indonesia is tested using multiple regressions analysis. The coefficients indicate the connection between each predictor variable and the dependent variable (firm profitability), as well as, indicate the strength and direction of that relationship.

The inventory turnover makes positive and significant contribution to the profitability of the business at a value of 0.45 ($p < 0.001$). The meaning of this is that the higher the inventory turnover the more profitability is associated with it. In the same way, the percentage of order fulfillment has a positive and significant relationship with business profitability with a correlation of 0.27 ($p = 0.001$). Lead time on the other hand, has a huge and negative impact on the profitability of the business as we can find the coefficient of lead time at -0.15 ($p = 0.005$). That means that longer lead times are associated with lower profitability. The suppliers quality also contributed to firm profitability positively and significant with a coefficient of 0.32 ($p < 0.001$) implying that, improved profitability due to better supplier quality.

The R-squared value of 0.75 shows that 75 percent of the business profitability variation is because of the supply chain efficiency variables contained in the model. The overall model is significant (F-value=18.72, $p < 0.001$). These results reiterate the importance of the effective supply chain management strategies and provide

valuable data about the variables that influence the profitability of companies in the automotive industry in Bekasi, Indonesia.

Table 5. ANCOVA Results for Supply Chain Efficiency and Firm Profitability, Controlling for Company Size

Source	SS	DF	MS	F-value	p-value
Model	832.45	4	208.11	12.78	0.000
Company Size	178.25	1	178.25	10.95	0.002
Error	354.70	45	7.88	-	-
Total	1365.40	50	-	-	-

The table 5 presents the results of ANCOVA conducted in all automotive companies in Bekasi, Indonesia, which studied the interrelation between the supply chain efficiency parameters (lead time, inventory turnover, order fulfillment percentage, supplier quality), and the firm profitability controlling the variable of company size (the number of employees).

These factors of the supply chain efficiency combined can also impact the profitability by showing a significant overall effect of the supply chain efficiency on the profitability of a particular company (F-value = 12.78, $p < 0.001$) according to the ANCOVA model. Supply chain efficiency considerably affects the profitability of businesses even after considering the size of firm.

Also, according to the ANCOVA, profitability of the firms is highly affected by the size of the firm (F-value = 10.95, $p = 0.002$), which will therefore denote that larger companies should have higher levels of profitability. The absence of remaining association between the characteristics of supply chain efficiency and the company size implies that there is no difference within the sample in connection between supply chain efficiency and profitability, depending on the size of an organization.

The results of this research can offer insight into the importance of business size and effectiveness of supply chains in firm profitability in the automobile industry in Bekasi, Indonesia. The results reiterate the importance of organizationally-specific supply chain management plans that consider both organizational variables outside of the supply chain and efficiency metrics within an organization.

Table 6. Pearson Correlation Coefficients between Supply Chain Efficiency Variables and Firm Profitability

Variable	Inventory Turnover	Order Fulfillment %	Lead Time	Supplier Quality	Firm Profitability
Inventory Turnover	1.00	0.65	-0.42	0.53	0.78
Order Fulfillment %	0.65	1.00	-0.35	0.48	0.72
Lead Time	-0.42	-0.35	1.00	-0.27	-0.55
Supplier Quality	0.53	0.48	-0.27	1.00	0.68
Firm Profitability	0.78	0.72	-0.55	0.68	1.00

As seen in the table together with their Pearson correlation coefficients, the supply chain efficiency indicators (inventory turnover, order fulfillment %; lead time, supplier quality) and firm profitability of automotive businesses in Bekasi, Indonesia are presented. There is a positive strong relationship between firm profitability and inventory turnover ($r = 0.78$, $p < 0.001$) and this means that increase in inventory turnover also translates to high profitability. Besides, the positive correlation between the percentage order fulfillment and the profitability of the company is also large ($r = 0.72$, $p < 0.001$), which shows that the level of profitability is a result of effective fulfillment of orders. Increased lead time relates with reduced profitability

and this is evident since there is a moderately negative relationship between lead time and company profitability ($r = -0.55$, $p < 0.001$). The importance of high-quality supplier relationship is evidenced by the relatively positive relationship ($r = 0.68$, $p < 0.001$) that exists between quality of suppliers and profitability of firms.

Efficiency of Supply Chain and its effect to profitability automotive industry

The research conclusions support the literature on the significance of supply chain efficiency in the role of determining performance of a business especially in the automotive sector. To a certain extent, the magnitude of relationships found between inventory turnover, the rate at which orders are fulfilled, the quality of the supplier, and firm profitability are consistent with what is found in the literature that underline the importance of supply chain performance in attaining better operational and financial performances of firms (Bodendorf et al., 2023; Ignaciuk & Wieczorek, 2020; Kurdi et al., 2023; Panigrahi et al., 2024; Rahmayana & Ahmad, 2021). This research confirms that firms that efficiently manage their supply chain operations are more likely to achieve higher profitability by optimizing resource utilization, reducing waste, and improving responsiveness to market demands. Inventory turnover, in particular, emerges as a critical driver of profitability, echoing previous studies that advocate for effective inventory management as a strategy to minimize holding costs, reduce risks of obsolescence, and enhance responsiveness (Zarbakhshnia & Karimi, 2024; Sehnem et al., 2019; Baryannis et al., 2019). The empirical evidence presented in this study reinforces the relevance of lean manufacturing principles and agile supply chain strategies within the automotive sector, where operational efficiency is closely tied to financial performance. These findings also align with Islam et al. (2022), who identified efficient inventory management as a core element of supply chain resilience, especially in complex industrial networks.

The added value of the supplier quality on profitability of the firm also confirms previous knowledge that strategic supplier relationships play a vital role in the consistent quality delivery, supply chain stability and innovation (Abdallah et al., 2021; Alghababsheh & Gallear, 2021; Liu et al., 2021). A good relationship with trustworthy suppliers reduces the risk of disruption and can also be used to help collaborate on product development as well as improve the process, which are similar to what was established in the studies of Ahmad et al. (2022) and Khalaf et al. (2021). Supplier quality, as part of the tightly connected supply chains in the automotive industry, is a source of competitive differentiation and the basis of operational excellence. The correlation between profitability and order fulfillment is a confirmation of the existing fact that operational performance is one of the determinants of customer satisfaction and business prosperity. Firms that record a high rate of fulfillment are likely to create firm customer loyalty, foster recurrent business as well as boost their reputation in the market, which subsequently gives way to better financial returns. This finding correlates with the existing studies that support the importance of the efficiency of logistics, and reliable service delivery in the performance of firms (Ochego & Wycliffe, 2020; Moh'd Anwer, 2022; Mumtaz & Smith, 2020). In a highly competitive industry like the automotive manufacturing industry, order fulfillment ability does not only translate to the operations but it is a strategic tool of retaining the market share.

However, the decreasing effect of lead times on profit on the other hand agrees with earlier research authors who show that inefficiencies of the supply chain affect the rise in operational costs and customer satisfaction as well (Naghshineh & Carvalho, 2022; Kunovjanek et al., 2022). Lead time management is still very important in the automotive industry where a company is able to deliver fast and reliable, then it is said to be more competitive. These results also confirm the observations of Khalaf et al. (2021) and Kurdi et al. (2023) stating that key elements of supply chain

practices associated with improving resiliency and profitability of firms are agility and shorter lead time.

The conclusions of the carried out research can be contributing to the advancement of theory as they once again confirm the relevance of such theories of supply chains as the Resource-Based View (RBV), supply chain integration models to the context of the emerging economies. According to these theories, internal capabilities, including the capacity of the supply chain among others, should be regarded as the strategic assets of business organizations that facilitate them in gaining and maintaining a competitive advantage (Paulraj, 2011; Wook Kim, 2006). The evidence presented on this study, which relates to the Bekasi automotive industry, demonstrates how these frameworks are relevant in bringing out the vision of how the supply chain excellence is a direct path leading to financial performance.

This research has some value to industry practitioners, who will find this knowledge beneficial to practice in this area. Those in charge of doing businesses are advised to continually advance the roles of supply chain in terms of streamlining the inventory, improve influence of suppliers and also better logistics performance. Additionally, advanced technologies (IoT, RFID, data analytics) ought to be recommended instead of improving supply chain visibility, agility, and decision making as findings in Bodendorf et al. (2023), Javaid et al. (2022), and Yang et al. (2022) claim. These technologies can be utilized to perform predictive maintenance, forecasting demand, and monitor performances, which promote the excellence of the supply chain.

In as much as it has made contributions to it, there are some limitations to this study. It paid special attention to the Bekasi automotive industry, which can limit this research to be generalized to other industries or a different geographic location with a non-standard supply chain structure. Furthermore, the cross-sectional design freezes relationships at one time which is limiting of how the relationships may change over time or with a shift of various market circumstances. Future research could employ longitudinal designs to track the impact of supply chain efficiency over time or expand the scope to include other industries and regions. Incorporating qualitative methods could also offer deeper insights into managerial decision-making processes, challenges, and strategies in implementing supply chain optimization.

CONCLUSION

This paper has been able to present empirical statistics as to the importance of supply chain efficacy in determining the profitability of firms in the automotive industry of Bekasi, Indonesia. By using quantitative measurement of some important supply chain variables, including the inventory turnover, percentage of orders filled, lead time, and quality of suppliers, it has been revealed that all companies having more efficient and integrated processes in terms of supply chains experience better financial results. In particular, an increase in inventory turnover, order fulfillment, and supplier quality are positively correlated with the profitability whereas a longer lead time has proven to adversely affect the overall business performance.

The results contribute to current theories of supply chain management, especially the ones that focus on the criticality of internal capabilities of operations as elements of competitive advantage. The present research also testifies to the utility of supply chain efficiency in enhancing the operation performance besides contributing to the financial performance in the manufacturing industries, especially in the emerging markets like Indonesia. In practical terms, the findings presuppose that automotive enterprises are likely to focus on constant enhancement of their inventory and relationships with their suppliers, as well as their logistics effectiveness in order to remain profitable and competitive in nature. Technology investments (IoT, RFID and advanced analytics) are also suggested to enhance supply chain responsiveness and supply chain visibility.

Although this work will be helpful, it admits some limitations. The location is restricted to the Bekasi area and the automotive industry, which makes the research geographically narrow with the limited application of the findings. Focus of future research can be extended to other geography, industries or have longitudinal approach on its ability to influence the impact of the supply chain strategies over time. Moreover, it may be prudent to include qualitative methods that will give fertile explanations on the managerial decision-making of the supply chain improvements.

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