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COST OPTIMIZATION AND PERFORMANCE OF PHARMACEUTICAL FIRMS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

Cost optimization is a critical component of logistics management, particularly in the pharmaceutical sector, where efficiency, timely delivery, and cost control directly influence firm performance. This study investigates the effect of cost optimization on the performance of pharmaceutical firms in Nairobi City County, Kenya. Firm performance was assessed through four key dimensions: operational efficiency, customer satisfaction, profitability, and competitive advantage. A cross-sectional research design was employed, enabling data collection at a single point in time to examine the relationships among variables. The study targeted all 154 pharmaceutical firms registered under the Kenya Association of Pharmaceutical Industry (KAPI) in Nairobi City County. The unit of analysis comprised logistics managers, supply chain officers, and operations managers, with a total population of 462 individuals. A stratified random sampling technique was used to ensure proportional representation of manufacturing and importing firms, resulting in a sample size of 210 respondents, determined using Krejcie and Morgan's formula. Primary data was gathered using a semi-structured questionnaire featuring both closed-ended items, rated on a 5-point Likert scale, and open-ended questions to capture in-depth insights. The instrument underwent a pilot test involving 21 respondents to ensure content validity and reliability. Expert reviews were used to assess content validity, while Cronbach's Alpha was applied to establish internal consistency, with a minimum acceptable value of 0.7. Data analysis was conducted using SPSS version 28. Descriptive statistics (frequencies, percentages, means) summarized the data, while inferential statistics (Pearson correlation and multiple regression analysis) tested the hypothesized relationships. The results indicated that cost optimization has a statistically significant and positive impact on firm performance ($B = 0.284$, $p < 0.05$). The study concludes that effective cost optimization strategies contribute to enhanced operational efficiency, customer satisfaction, and overall firm profitability. It recommends that pharmaceutical firms strengthen collaborative partnerships, streamline logistics processes, and adopt technology-driven cost-saving strategies to improve service quality and maintain competitive advantage.

Key Words: Cost Optimization, Firm Performance, Pharmaceutical Industry, Logistics Efficiency, Nairobi City County

Background of the Study

The pharmaceutical industry is critical to public health and economic development, especially in rapidly growing urban centers such as Nairobi City County, Kenya. Within this sector, cost optimization in logistics has become a strategic priority for enhancing firm performance. Cost optimization involves minimizing logistics-related expenditures while maintaining or improving service levels, which directly influences operational efficiency, customer satisfaction, and overall competitiveness (Luz et al., 2024).

In the pharmaceutical context, logistics systems are inherently complex due to stringent regulatory requirements, temperature-sensitive products, and the necessity for timely deliveries. Innovations in logistics management—such as predictive analytics, machine learning, and real-time tracking systems—are increasingly being leveraged to streamline supply chains, improve inventory accuracy, and reduce unnecessary costs (Fattahi Bafghi, 2024; Mbonyinshuti et al., 2024). These technological advancements are particularly valuable for pharmaceutical firms operating in competitive and resource-constrained environments like Kenya, where operational inefficiencies can lead to medication shortages, compliance issues, and increased overheads.

Globally, logistics disruptions such as those triggered by the COVID-19 pandemic exposed vulnerabilities in pharmaceutical supply chains. These disruptions have heightened the urgency for firms to adopt cost-effective and resilient logistics strategies that ensure product availability and service continuity (Sydorchuk & Gerasymchuk, 2024). In Kenya, firms also face unique logistical challenges, including poor infrastructure, regulatory fragmentation, and high costs of cold chain maintenance—further emphasizing the importance of cost-focused interventions.

Moreover, the adoption of green logistics and collaboration among supply chain partners has been shown to enhance both economic and environmental performance (Bakhshi Movahed et al., 2024). Building trust-based relationships between pharmaceutical firms and logistics providers enhances adaptability and cost-sharing opportunities, ultimately improving firm performance. The integration of technologies such as the Internet of Things (IoT), artificial intelligence (AI), and blockchain has enabled improved cost visibility, real-time data sharing, and decision-making precision (Xu et al., 2024).

Despite these developments, many pharmaceutical firms in Nairobi City County struggle with persistent cost inefficiencies, limited resource optimization, and inadequate logistics planning. These challenges hinder their performance and competitiveness in an increasingly regulated and dynamic market. Therefore, there is a critical need to investigate how cost optimization strategies can be leveraged to improve the performance of pharmaceutical firms in this region.

This study addresses this gap by examining the relationship between cost optimization practices and the performance of pharmaceutical firms operating within Nairobi City County, Kenya.

Statement of the Problem

The pharmaceutical sector in Nairobi City County, Kenya plays a vital role in safeguarding public health through the timely provision of essential medicines. However, many firms in this sector continue to grapple with logistics-related inefficiencies—notably high operational costs, delivery delays, and frequent stock-outs—which directly undermine their performance. A central contributor to these inefficiencies is the lack of effective cost optimization strategies within logistics operations. According to the Kenya Pharmaceutical Industry Survey (2022), approximately 40% of pharmaceutical firms in Nairobi report consistent delivery delays, largely attributed to inadequate route planning and fragmented supply chain coordination. Moreover, 35% of these firms experience financial losses from underutilized transport capacity and inefficient warehousing practices. The World Health Organization (2021) also reported that

logistical challenges contribute to stock-outs in 20% of public health facilities across Kenya, disrupting access to life-saving medications.

Cost-intensive elements such as inaccurate demand forecasting, poor inventory control, and underutilized transport infrastructure further strain firm resources. For instance, the Ministry of Health (2020) found that 30% of firms incur losses due to overstocking and expiry of drugs, stemming from poor demand estimation. Transportation alone accounts for up to 40% of operational expenses in Nairobi's pharmaceutical industry (Kenya Healthcare Federation, 2021), with inefficiencies such as traffic congestion, empty return hauls, and last-mile delivery failures compounding the cost burden. Despite the emergence of technologies such as predictive analytics, digital freight platforms (e.g., Lori Systems), and mobile payment systems (e.g., M-Pesa), their adoption in Nairobi's pharmaceutical logistics remains limited and fragmented. These innovations hold promise for reducing costs and improving efficiency, but empirical research on their impact within Nairobi's pharmaceutical context is scarce.

Existing studies often examine general logistics optimization in developing countries (Ekici et al., 2019) or focus on environmental sustainability (Tang et al., 2019), neglecting the cost dimension of logistics performance specific to urban pharmaceutical systems. Moreover, few studies quantify the relationship between cost optimization strategies and key performance metrics such as delivery speed, profitability, inventory accuracy, and customer satisfaction especially in resource-constrained environments like Nairobi. Given these gaps, this study aimed to investigate how cost optimization affects the performance of pharmaceutical firms operating in Nairobi City County, Kenya.

Objectives of the Study

i. To assess the effect of cost optimization on performance of pharmaceutical firms in Nairobi City County, Kenya.

Research Questions

i. How does cost optimization affect the performance of pharmaceutical firms in Nairobi City County, Kenya?

LITERATURE REVIEW

Theoretical Review

Transaction Cost Economics Theory

Transaction Cost Economics (TCE), developed by Oliver Williamson (1975), explores how firms minimize the costs associated with economic exchanges. TCE suggests that organizations evaluate whether to internalize processes or outsource them based on transaction costs, which include expenses related to coordination, monitoring, and enforcement. In logistics, TCE provides a framework for analyzing cost optimization strategies, such as outsourcing transportation or managing inventory internally.

The relevance of TCE in logistics optimization has been widely acknowledged. Lazzarini et al. (2001) highlighted the role of TCE in determining the cost-effectiveness of outsourcing logistics activities, emphasizing how firms balance transaction costs and operational efficiency. Similarly, Ghoshal and Moran (1996) demonstrated how TCE aids in optimizing warehousing decisions, allowing firms to allocate resources efficiently. Williamson (1985) further argued that TCE helps firms evaluate risks and uncertainties associated with external partnerships, ensuring that cost optimization strategies align with long-term goals.

Critics of TCE, however, argue that its focus on cost minimization often neglects other critical factors, such as strategic relationships and service quality. Barney (1990) contended that TCE

fails to consider the intangible benefits of long-term partnerships, such as trust and innovation, which may involve higher transaction costs but yield greater value. Additionally, Carter and Hodgson (2006) noted that TCE's assumptions of rationality and opportunism may not fully capture the complexities of modern supply chains.

Despite these critiques, TCE remains suitable for this study because of its robust framework for evaluating cost optimization decisions in logistics. Pharmaceutical firms, which often face high transportation and storage costs, can use TCE to determine whether outsourcing or internalizing logistics functions yields greater cost efficiency. The theory's emphasis on balancing costs with operational requirements aligns with the study's objective of examining cost optimization in the pharmaceutical supply chain.

In this study, TCE is linked to the variable of cost optimization. It provides a theoretical foundation for analyzing how pharmaceutical firms minimize logistics costs through strategic decisions, such as outsourcing transportation or investing in warehouse management systems.

Conceptual Framework

A conceptual framework provides a structured lens for examining the relationships between variables in a study and forms the basis for coherent research design and analysis (Adom et al., 2019). In this study, cost optimization serves as the independent variable, representing targeted strategies aimed at reducing logistics-related expenses without compromising service quality. These strategies include transportation cost reduction, efficient inventory management, streamlined demand forecasting, and elimination of resource redundancies. The dependent variable is the performance of pharmaceutical firms, conceptualized through key outcomes such as operational efficiency, customer satisfaction, and profitability.

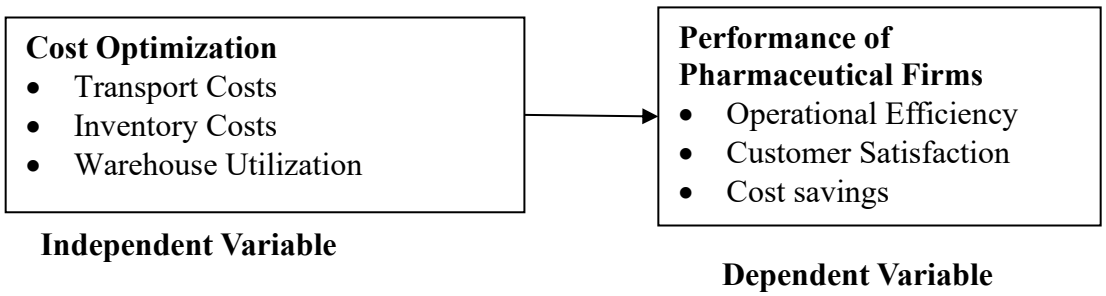

Figure 2.1: Conceptual Framework

Cost Optimization

Cost optimization refers to the strategic management of expenses to improve efficiency while maintaining or enhancing service quality. According to Christopher (2021), cost optimization in logistics involves identifying cost drivers and implementing measures to reduce unnecessary expenses, such as transportation and warehousing costs. This process is vital for maintaining competitiveness and profitability in supply chains.

Transport costs represent a significant component of logistics expenses. Kumar and Kumar (2020) emphasize that route optimization and efficient fleet management can substantially reduce fuel consumption and transit times, thereby lowering transport costs. Similarly, inventory costs, including storage and holding expenses, can be optimized through better demand forecasting and inventory turnover management (Waller & Fawcett, 2019). Efficient warehouse utilization, as highlighted by Shukla et al. (2021), is another key factor, with practices like cross-docking and automated storage systems contributing to cost reductions.

Critics argue that cost optimization should not come at the expense of service quality or sustainability. Carter and Easton (2020) highlight the risk of over-prioritizing cost reduction,

which can lead to supply chain disruptions and customer dissatisfaction. Despite these concerns, integrating advanced technologies and adopting lean logistics principles have enabled organizations to achieve cost optimization without compromising service delivery.

This study focuses on transport costs, inventory costs, and warehouse utilization as sub-variables of cost optimization. These factors are particularly relevant to pharmaceutical firms in Nairobi, where high logistics costs often affect the affordability and accessibility of medical supplies.

Performance of Pharmaceutical Firms in Nairobi City County, Kenya

The performance of pharmaceutical firms is assessed through metrics such as operational efficiency, customer satisfaction, and cost savings. According to Christopher (2021), operational efficiency measures how effectively a firm utilizes its resources to meet customer demands while minimizing waste. In the pharmaceutical sector, efficiency is critical for ensuring the timely availability of medications.

Customer satisfaction, defined as the extent to which a firm meets or exceeds customer expectations, is a key indicator of logistics performance. Kumar and Kumar (2020) emphasize that timely deliveries, accurate orders, and responsive customer service are essential for fostering satisfaction and loyalty. Cost savings, another measure of performance, reflect the financial benefits of efficient logistics practices, including reduced transportation and inventory costs (Waller & Fawcett, 2019).

Despite its importance, performance measurement faces challenges such as the lack of standardized metrics and the dynamic nature of customer expectations. Shukla et al. (2021) argue that integrating real-time performance tracking tools can address these challenges, enabling firms to monitor and improve their operations continuously.

In this study, the performance of pharmaceutical firms is analyzed through operational efficiency, customer satisfaction, and cost savings. These metrics provide a comprehensive assessment of how logistics optimization impacts the overall effectiveness and competitiveness of pharmaceutical firms in Nairobi.

Empirical Review

Christopher (2021) studied the role of cost optimization in enhancing supply chain efficiency. Guided by Transaction Cost Economics, the research targeted 150 manufacturing firms in the United States. Using a stratified sampling technique, 50 firms were selected, and data was collected using structured questionnaires. Data analysis through cost-benefit analysis revealed that firms implementing route optimization achieved a 20% reduction in logistics costs. The study concluded that cost optimization strategies are critical for maintaining competitiveness and recommended further investments in route planning technologies.

Kumar and Kumar (2020) examined cost reduction strategies in the logistics sector of India. Using Systems Theory, the study targeted logistics service providers and utilized a mixed-methods approach. A sample of 60 firms was selected through random sampling, with data collected through interviews and surveys. Thematic analysis showed that firms employing digital warehousing systems reduced storage costs by 25%. The study concluded that digital tools are essential for cost savings and recommended wider adoption of warehouse automation.

Waller and Fawcett (2019) explored optimizing inventory costs in retail chains. The study, based on Transaction Cost Economics, focused on 100 retail chains in the United States. A sample of 40 firms was selected using purposive sampling, with data collected through surveys. Regression analysis revealed that firms using predictive inventory management reduced inventory costs by 15%. The study recommended the use of AI tools to optimize inventory levels.

Shukla et al. (2021) studied cost optimization in transportation through fleet management. Using Resource-Based View (RBV), the study targeted transportation firms in South Asia. A sample size of 50 firms was selected through cluster sampling, and data was collected using structured interviews. Findings revealed that firms with advanced fleet management systems reduced fuel costs by 18%. The study recommended investing in real-time fleet monitoring technologies.

Wang et al. (2020) analyzed cost optimization and supply chain sustainability in logistics firms. Guided by Systems Theory, the study focused on 80 logistics firms in China. Using a sample of 30 firms selected through stratified random sampling, data was collected through surveys. Correlation analysis showed that sustainable practices, such as route optimization, reduced operational costs by 20%. The study concluded that sustainability aligns with cost savings and recommended integrating sustainability into logistics planning.

RESEARCH METHODOLOGY

This study adopted a cross-sectional research design, which enables the collection of data at a single point in time. Cross-sectional designs are particularly useful for identifying correlations and causal relationships among variables (Mugenda, 2008).

The target population comprised all pharmaceutical firms in Nairobi City County listed by the Kenya Association of Pharmaceutical Industry (KAPI, 2024). The population included all 154 firms as the unit of analysis. Each firm had logistics manager, supply chain officer, and operations manager as unit of observation, resulting in a total of 462 respondents. These individuals were selected as they are directly involved in logistics operations, making them the most knowledgeable and relevant sources of data regarding logistics practices and performance metrics.

Table 1: Target Population

Category	Population
Logistics manager	154
Supply chain officer	154
Operations manager	154
Total	**462**

The overall sample size for this study was determined using a formula by Krejcie and Morgan (1970). Therefore, using the Krejcie and Morgan formula, the sample size for the study was 210 respondents. This study employed stratified random sampling, ideal for non-homogeneous populations (Babbie, 2017). The population was stratified by roles within pharmaceutical firms—logistics managers, supply chain officers, and operations managers. Simple random sampling within each stratum ensured every individual had an equal chance of selection, minimizing bias and enhancing precision (Cooper & Schindler, 2017).

This study utilized a semi-structured questionnaire for primary data collection. Semi-structured questionnaires are cost-effective and allow for the collection of both quantitative and qualitative data in a single instrument (Zikmond, 2013; Kothari, 2014). According to Lancaster, Dodd, and Williamson (2019) the sample size should be between 1% and 10% for high precision pilot studies. A pilot study was conducted with 21 respondents, representing 10% of the sample size. The pilot tested the reliability and validity of the research instrument. Results were analyzed to refine the questionnaire for clarity and coherence, ensuring the final instrument effectively captures relevant data.

Data was analysed using the Statistical Package for Social Sciences (SPSS) version 28 software. Qualitative data collected (through the open-ended section of the questionnaire) were coded, and repeated themes (responses) or concepts recorded until saturation is achieved

(Jennings, 2001). Quantitative data was analysed using descriptive statistics including frequency, percentages and means, summary graphs, pie charts and frequency distribution tables were employed to portray the sets of categories formed from the data. This study also conducted inferential statistics through correlation analysis. This study also conducted inferential statistics through multiple regression analysis

RESEARCH FINDING AND DISCUSSION

Out of 210 questionnaires distributed to the targeted respondents, 195 were completed and returned, resulting in a response rate of 92.9% as shown in Table 4.1. This high response rate reflects the effectiveness of the data collection approach, which included follow-ups and the use of a user-friendly questionnaire. According to Mugenda and Mugenda (2018), a response rate above 70% is considered excellent for analysis, making the study's data sufficiently representative of the target population. This high response rate enhances the reliability of the study findings and ensures that the conclusions drawn are robust and credible.

Descriptive Analysis

Descriptive analysis provides a summary of the collected data, highlighting key patterns, trends, and central tendencies within the responses. The results are categorized according to the Likert scale used in the study, with ratings interpreted as follows: 1–1.4 (Strongly Disagree), 1.5–2.4 (Disagree), 2.5–3.4 (Neutral), 3.5–4.4 (Agree), and 4.5–5.0 (Strongly Agree). This section serves to highlight the extent to which respondents agree with the statements related to the variables, providing insight into the logistics practices within Nairobi City County's pharmaceutical firms.

Descriptive Statistics for Cost Optimization

This subsection explores the descriptive statistics related to cost optimization practices within pharmaceutical firms in Nairobi City County. Cost optimization involves strategies aimed at minimizing logistics-related expenses while maintaining efficiency and effectiveness. The analysis examines respondents' perceptions of their firm's approaches to reducing transportation costs, managing inventory holding costs, optimizing warehouse operations, and employing cost-sharing partnerships. By presenting mean and standard deviation values, this section highlights the extent to which these practices are implemented and their variability across the firms, providing a clearer understanding of cost optimization efforts in the pharmaceutical logistics sector. Table 2 below summarizes the descriptive statistics for cost optimization practices among the surveyed pharmaceutical firms.

Table 2: Descriptive Statistics for Cost Optimization

Statement	Mean	Standard Deviation
The firm implements strategies to reduce transportation costs.	3.954	0.415
Inventory is managed to minimize holding costs without compromising supply.	3.876	0.398
Warehousing operations are optimized to lower operational expenses.	3.802	0.431
The firm invests in technology to reduce logistics costs.	4.123	0.390
Periodic reviews are conducted to identify and eliminate cost inefficiencies.	3.721	0.456
Cost-sharing logistics partnerships reduce transportation and storage costs.	3.543	0.502
Cost-saving initiatives have significantly improved the firm's profitability.	4.032	0.428
Aggregate score	**3.864**	

The findings on cost optimization practices in pharmaceutical firms indicate significant efforts to manage logistics costs effectively. The strategy to reduce transportation costs scored a mean of 3.954 (SD = 0.415), reflecting strong agreement among respondents, highlighting transportation as a primary focus for cost-saving. Managing inventory to minimize holding costs without compromising supply scored 3.876 (SD = 0.398), showing that firms actively balance inventory costs with supply reliability. Warehousing optimization scored 3.802 (SD = 0.431), indicating a moderate emphasis on reducing storage expenses.

Investment in technology for cost reduction scored the highest, with a mean of 4.123 (SD = 0.390), underscoring the pivotal role of technology in achieving cost efficiency. Periodic reviews of logistics costs had a mean of 3.721 (SD = 0.456), indicating consistent practices to identify inefficiencies. Cost-sharing partnerships scored 3.543 (SD = 0.502), reflecting room for improvement in leveraging collaborative approaches. Finally, cost-saving initiatives improving profitability scored 4.032 (SD = 0.428), showing that respondents strongly agree on their impact on financial performance.

The aggregate score of 3.864 indicates overall agreement with cost optimization practices. These findings align with Ivanov and Dolgui (2020), who emphasize the role of technology in achieving logistics cost efficiency, and Waller and Fawcett (2019), who highlight periodic reviews and cost-saving strategies as crucial for profitability. The results suggest that while firms are effectively utilizing technology and strategic reviews, there is potential to enhance collaborative practices such as cost-sharing partnerships to achieve greater optimization.

Descriptive Statistics for Performance of Pharmaceutical Firms in Nairobi City County, Kenya

This subsection evaluates descriptive statistics on the performance of pharmaceutical firms, as influenced by logistics optimization practices. Firm performance is assessed through indicators such as operational efficiency, profitability, customer satisfaction, and competitive advantage. The analysis captures respondents' perceptions of the contribution of logistics optimization to achieving these performance goals. Mean and standard deviation values are used to summarize the data. Table 3 below summarizes the descriptive statistics for firm performance.

Table 3: Descriptive Statistics for Performance of Pharmaceutical Firms

Statement	Mean	Standard Deviation
Logistics optimization has improved overall operational efficiency.	4.254	0.368
Customer satisfaction levels have improved due to effective logistics.	4.123	0.396
Profit margins have increased as a result of logistics improvements.	4.176	0.380
Logistics improvements give the firm a competitive advantage in the market.	4.054	0.398
Performance goals are achieved due to efficient logistics processes.	4.098	0.387
Employee productivity has increased due to streamlined logistics.	4.032	0.400
Performance tracking identifies areas of improvement effectively.	4.065	0.408
Aggregate score	**4.115**	

The findings reveal that logistics optimization has a significant positive impact on the performance of pharmaceutical firms in Nairobi City County. The highest-rated statement, with a mean score of 4.254 (SD = 0.368), indicates that logistics optimization strongly contributes to improved operational efficiency. Customer satisfaction, with a mean of 4.123 (SD = 0.396), reflects the importance of effective logistics in meeting customer needs and expectations. The increase in profit margins, scored at 4.176 (SD = 0.380), highlights the financial benefits derived from improved logistics practices.

Logistics improvements providing a competitive advantage scored 4.054 (SD = 0.398), showing that firms view efficient logistics as a strategic asset in the market. The achievement of performance goals through efficient logistics processes had a mean of 4.098 (SD = 0.387), underscoring the alignment between logistics and organizational objectives. Employee productivity, with a mean of 4.032 (SD = 0.400), reflects the impact of streamlined operations on workforce efficiency. Lastly, performance tracking, rated at 4.065 (SD = 0.408), demonstrates the value of monitoring systems in identifying areas for continuous improvement.

The aggregate score of 4.115 suggests strong agreement that logistics optimization positively influences various aspects of firm performance. These findings align with Kumar and Kumar (2020), who emphasize the role of logistics optimization in improving profitability and achieving competitive advantage. Similarly, Fildes et al. (2019) highlights the importance of performance tracking and efficiency improvements in aligning logistics strategies with organizational goals. These results affirm that pharmaceutical firms benefit significantly from logistics optimization, although continuous refinement in tracking and workforce alignment could further enhance outcomes.

Inferential Statistics

Correlation Analysis

The Pearson correlation coefficient was used to assess the strength and significance of the relationships between the study variables. The results are summarized in Table 4, and each variable's relationship with firm performance is interpreted below.

Table 4.: Correlation Coefficients

Variable		Performance	Cost Optimization
Performance	Pearson Correlation	1	
	Sig. (2-tailed)	.000	
	N	195	
Cost Optimization	Pearson Correlation	0.642**	1
	Sig. (2-tailed)	.000	
	N	195	195

**. Correlation is significant at the 0.05 level (2-tailed).

Cost optimization was also positively and significantly correlated with firm performance ($r=0.642$, $p<0.05$). This indicates that effective cost-saving strategies, such as reducing transportation expenses and optimizing warehouse operations, contribute to improved performance. Waller and Fawcett (2019) argue that cost optimization not only enhances profitability but also increases resource efficiency, enabling firms to reinvest savings into value-adding activities. The findings support the view that cost optimization is an essential component of logistics strategies aimed at achieving financial sustainability.

Regression Analysis

Regression analysis was conducted to evaluate the predictive influence of the independent variables on the dependent variable. The coefficients indicate the strength and direction of the relationship between each independent variable and the dependent variable. The findings are summarized in Table 5.

Table 5: Regression Coefficients

Variable	Unstandardized Coefficients	Standardized Coefficients		t	Sig.
	B	Std. Error	Beta		
(Constant)	0.564	0.122		4.623	
Cost Optimization	0.284	0.069	0.319	4.116	

The regression equation derived from the coefficients table is:

$$Y= 0.564 + 0.284X_1$$

The coefficient for cost optimization was B=0.284 ($p<0.05$), showing that a unit increase in cost optimization improves firm performance by 28.4%. Cost-saving measures, such as transportation cost reduction and inventory holding cost minimization, have a direct impact on profitability and resource efficiency. This finding is consistent with Waller and Fawcett (2019), who identified cost optimization as a key factor in achieving financial sustainability in logistics operations. The results suggest that cost management strategies are pivotal for pharmaceutical firms in reducing operational expenses and reinvesting savings into value-adding activities, such as technology upgrades and customer service improvements.

Conclusions

Cost optimization practices are essential for achieving financial sustainability and operational efficiency. Investments in technology and systematic cost reviews enable firms to reduce logistics expenses and reinvest savings into strategic areas. The findings highlight the importance of cost-sharing partnerships and other collaborative approaches in achieving comprehensive cost management. Firms that adopt these practices can achieve higher profitability and resource efficiency.

Recommendations

To optimize costs more effectively, pharmaceutical firms should expand their investment in automation and digitalization. Automated systems for inventory management, order processing, and warehousing can significantly reduce operational costs by improving accuracy and efficiency. Firms should also leverage cloud-based logistics platforms that integrate cost management tools, enabling real-time tracking of expenses and identifying inefficiencies.

Exploring collaborative logistics partnerships can enhance cost-sharing opportunities, particularly for transportation and warehousing. For example, firms operating in the same geographic region could pool resources to optimize delivery routes, reduce transportation expenses, and share storage facilities. Such partnerships can lead to economies of scale and greater cost efficiency.

Regular cost reviews and audits are essential for identifying areas of inefficiency and ensuring that cost-saving measures are aligned with overall business goals. These reviews should be supplemented with benchmarking exercises to compare performance against industry standards. Firms should also invest in training programs to equip employees with cost-management skills and promote a culture of continuous improvement in cost-efficiency practices.

Suggestions for Further Research

This study accounted for 66.1% of the variance in firm performance, leaving 33.9% unexplained. Future research should explore additional factors such as the impact of digital transformation, blockchain technology, and the role of employee training in logistics optimization. Investigating emerging trends, such as autonomous vehicles and drone deliveries, could provide valuable insights into the future of pharmaceutical supply chains.

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