Assessing 3PL Services Providers and Operational Excellence: An Empirical Analysis

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ABSTRACT

Purpose: The rapid growth of supply chain management has greatly increased the importance of third-party logistics service providers in streamlining logistic processes and boosting productivity. Organizations are increasingly depending on 3PL providers to improve service quality, cut expenses, and simplify operations in today's cutthroat business world. Through an analysis of important variables including flexibility, dependability, and innovation, this study seeks to assess the operational quality of 3PL service providers in Chennai. The study aims to comprehend how 3PL services affect supply chain effectiveness and customer happiness by evaluating the viewpoints of companies and stakeholders and offering insightful information about the sector.

Methodology: This study adopts a descriptive research approach to assess the operational excellence of Chennai's 3PL service providers. A structured questionnaire was utilized to collect information from 437 respondents chosen by convenience sampling. The study employs statistical procedures such as the Friedman Test and the Wilcoxon Signed Ranks Test to assess differences in the relevance of various 3PL service variables. These assessments shed light on the crucial importance of flexibility, dependability, and innovation in logistics operations. The study takes a methodical approach to studying industry dynamics and stakeholder viewpoints, providing a quantitative framework for evaluating the effectiveness and efficiency of 3PL services.

Findings: The study finds considerable disparities in the mean rankings of major 3PL service criteria, with flexibility appearing as the most important factor in improving supply chain efficiency. Businesses and stakeholders underline the need for implementing cutting-edge technology, promoting customer happiness, and incorporating innovative logistical solutions. The findings show that 3PL providers must constantly evolve to meet market objectives, with a focus on service adaptation and efficiency gains. 3PL companies may increase their market position and achieve outstanding logistics performance by utilizing digital transformation and automation, assuring sustained operational excellence, and cultivating long-term partnerships with enterprises in an increasingly competitive supply chain ecosystem.

Research Limitations: It is important to take into account the limitations of this study when evaluating its results. The study is only conducted in Chennai, which limits the results applicability to other areas. Because convenience sampling does not guarantee a completely representative sample of the logistics industry, it may introduce bias. Furthermore, the study uses self-reported data, which may be skewed by personal opinions. The emphasis on particular statistical methods could restrict more comprehensive analytical viewpoints. To better understand the changing dynamics of 3PL service effectiveness, future studies should include qualitative approaches, broader geographic coverage, and larger sample numbers.

Practical Implications: The study identifies important elements impacting operational excellence, which offers useful insights for companies and 3PL service providers. Businesses can use the results to improve their logistics plans by putting more emphasis on adaptability, dependability, and creativity. Adopting cutting-edge technology and customer-focused strategies can improve operational effectiveness and service delivery. This information can be used by 3PL companies to better allocate resources, customize their solutions, and fortify customer relationships. Legislators may take regulatory frameworks into account to encourage logistics best practices. Businesses can

gain a competitive edge and promote long-term supply chain management enhancements in a changing business climate by filling in the gaps that have been found.

Social Implications: 3PL service providers play a part in social welfare and economic progress in addition to improving corporate efficiency. Better job possibilities, skill development, and workforce expansion in the logistics industry can result from improved logistics operations. 3PL companies may lower carbon footprints and encourage environmentally friendly supply chain activities by combining sustainable practices with technology-driven solutions. Better product availability, lower customer costs, and easier access to commodities are all guaranteed by more efficient supply chains. To improve logistics sustainability and create an economically and socially responsible supply chain ecosystem that benefits both enterprises and society, the study emphasizes the necessity of industry-wide cooperation.

Keywords: Value Creation, Security and Tracking System, Flexibility, IT Integration System, Competitive Advantage and Logistics Excellence

1. INTRODUCTION

In today's highly competitive and globalized market, businesses are constantly pressured to optimize their supply chain operations and deliver customer value efficiently. Third-party logistics (3PL) service providers play a pivotal role in this landscape, offering specialized expertise and infrastructure to manage logistics activities such as transportation, warehousing, inventory management, and distribution. By outsourcing these functions to 3PL providers, organizations can pay attention to their core proficiencies while benefiting from cost reductions, improved service quality, and operational Flexibility.

Chennai, a central industrial and logistics hub in India, presents a dynamic environment for studying the performance and strategic importance of 3PL services. The city's proximity to major ports, well-developed road and rail networks, and a thriving manufacturing sector make it an ideal location for assessing how 3PL providers contribute to operational excellence. This study explores the key aspects manipulating the performance of 3PL service providers in Chennai and their impact on operational excellence. It investigates aspects such as Flexibility, customer satisfaction, technology integration, and innovation in logistics solutions. The investigation also highlights the challenges and chances faced by 3PL providers in adapting to evolving market demands. By offering empirical insights, the study seeks to contribute to understanding how 3PL services can drive proficiency and effectiveness in supply chain management, particularly in Chennai's logistics ecosystem.

2. LITERATURE REVIEW

Supply Chain Management (SCM) has become a vital field that combines many aspects of company operations, such as production, distribution, and customer service. Existing research emphasizes how 3PL providers are increasingly playing a part in supply chain optimization by providing customized logistics solutions that increase productivity and cost-effectiveness. Research shows that digital integration, automation, and real-time tracking are some of the elements that lead to better logistics performance.

Aden Iftin Janjane, J. N. M. (2020) studied the impact of supply risk assessment on humanitarian supply chains in Somalia, emphasizing the International Red Cross. The study followed a descriptive research strategy. The target population consisted of 102 ICR workers operating in Somalia. The study used a census technique combined with a questionnaire to collect primary data. To confirm validity and reliability, the questionnaire was pre-tested. Data was investigated using descriptive and inferential statistics and presented in tables. The study's key findings included IRC developing better dispute resolution mechanisms through their strategic partnership with their 3PL providers and the

organization improving its procurement processes through practical assessment of 3PL providers' capacities, resulting in minimal supply risk exposure.

Qian, X., Yin, M., Li, X., & Zhang, Q (2023) examined a redesigned winner selection issue for a fourth-party logistics (4PL) provider in a combinatorial reverse auction when quantity discounts and demand uncertainty are present. A two-stage stochastic nonlinear programming model is developed to describe our study challenge. Inspired by sample average approximation (SAA), the nonlinear model is reformulated as a deterministic mixed integer linear programming model using a linearization technique with superior expressions. Since the reformulation has many decision variables and constraints, we integrate SAA with a dual decomposition Lagrangian relaxation technique (DDLR) to develop a solution method called SAA DDLR. Numerical researches are conducted to illustrate the effectiveness and applicability of our model and

Zarbakhshnia, N., & Karimi, A. (2024) investigated the challenge of 3PL selection by adopting the comprehensive Digital, Lean, Agile, Resilient, Circular, and Sustainable (D.L.A.R.C.S) supply chain paradigm, which encompasses dimensions vital for managing modern supply chains, including digital, lean, agile, resilient, circular, and sustainable aspects. Recognizing the interconnectedness of these dimensions, this paradigm emphasizes their collective importance in enhancing supply chain operations. Utilizing fuzzy SWARA (Step-wise Weight Assessment Ratio Analysis) and BWM (Best Worst Method) techniques, the study evaluates and ranks 3PLs based on their performance within these dimensions. The analysis reveals pivotal criteria such as purchasing price, transportation cost, removal of wastes, service costs, reduction in costs, and crisis and risk management as paramount considerations in the 3PL selection process. These criteria provide specific insights and serve as a foundation for a data-driven approach to decision-making. Beyond offering strategic alignment insights for outsourcing, this research contributes substantively to the broader discourse on supply chain management. The methodology employed in this study integrates diverse dimensions, offering a robust framework for 3PL selection, thereby enhancing operational efficiency and sustainability across industries. The findings provide valuable insights for tire manufacturers seeking to optimize their logistics operations within the D.L.A.R.C.S. framework, contributing to the progress of supply chain management in the tire industry and beyond.

Previous studies have highlighted the significance of adaptability in reacting to market changes, with academics claiming that adaptable logistics models result in increased responsiveness and resilience. Furthermore, research has examined the function of IT integration in supply chain management, showing how sophisticated information systems facilitate better decision-making, shorter lead times, and better coordination. Competitive advantage in logistics is also covered in the literature, where 3PL suppliers differentiate themselves in the market by offering value-added services and excellent customer relationship management. However, the majority of current research focuses on industry-wide or worldwide viewpoints, paying little attention to localized insights unique to developing markets like Chennai.

3. RESEARCH GAP

Regional Insights Deficiency: While many studies have looked at the worldwide impact of 3PL services, there has been little research on regional markets like Chennai, which has a distinct logistics landscape and industry characteristics. Existing research focuses on cost efficiency and service quality, but there are few empirical studies that specifically evaluate operational excellence criteria like flexibility, dependability, and creativity in 3PL services. Limited Use of Advanced Statistical Techniques: Many SCM studies rely on traditional analytical approaches, with insufficient use of statistical tools such as the Friedman Test and Wilcoxon Signed Ranks Test to examine differences in service efficacy. Impact of Digital Transformation: While studies acknowledge the importance of technology in logistics, there is insufficient study on how digital transformation and automation contribute to 3PL service excellence, particularly in India. Third-party logistics (3PL) service

providers are critical in streamlining supply chain operations by offering specialized services such as transportation, warehousing, and inventory management. However, despite their growing importance, 3PL providers in Chennai face several challenges in delivering operational excellence, including inefficiencies in service delivery, inadequate technology adoption, inconsistent service quality, and limited alignment with customer-specific needs. While there is substantial global research on assessing 3PL providers, there is a lack of localized, empirical studies that evaluate their performance in Chennai. The region's unique operational and infrastructural dynamics and the increasing demand for sustainable and customer-centric logistics solutions underscore the need for a context-specific analysis. Furthermore, limited research exists on how 3PL providers in Chennai adopt best practices, integrate innovative technologies, and address industry-specific challenges to achieve operational excellence. This research seeks to address these gaps by empirically assessing the performance of 3PL providers in Chennai, focusing on key dimensions such as Security and Tracking System, IT Integration System, Flexibility, Value Creation, and strategic alignment with client objectives.

4. OBJECTIVE OF THE STUDY

- To investigate client preferences and mean ranks relative to the factors of third-party services.
- To study the significant difference in the mean score of value creation and Flexibility as a dimension towards 3PL services
- To explore the key attributes of 3PL providers that significantly impact logistics excellence.

5. THEORETICAL CONTRIBUTION

This research adds to the body of knowledge already available on supply chain management (SCM) by presenting actual data regarding the operational efficacy of third-party logistics (3PL) service providers. Through the examination of crucial service elements including adaptability, reliability, and creativity, the study advances our knowledge of how 3PL providers affect supply chain effectiveness and client satisfaction. By illustrating how technology developments and digital transformation contribute to logistics excellence, the study expands on ideas of logistics and operations management. Furthermore, by providing measurable insights into how 3PL services affect supply chain performance, it closes the gap between theoretical SCM concepts and real-world applications. This study also emphasizes the importance of service adaptation in a changing business environment, supporting the resource-based view (RBV) hypothesis by demonstrating how 3PL enterprises use technology and operational skills to gain a competitive advantage.

6. RESEARCH METHODOLOGY

This study adopts a descriptive investigation design to investigate the key attributes that contribute to logistics excellence and assess their impact on the overall performance of 3PL providers. A total of 437 client surveys were collected through convenience sampling using structured questionnaires to gather empirical data. This sampling method was chosen to ensure accessibility and relevance, as the respondents were selected from existing clients who interact regularly with 3PL providers. The data collection instrument employed a five-point Likert scale, fluctuating from 1 (strongly disagree) to 5 (strongly agree), allowing respondents to express their perceptions of various factors influencing logistics excellence. Before the final survey distribution, a pilot test was conducted with 13 clients to assess the reliability and dependability of the research instrument. The pilot test helped fine-tune the survey and confirmed that the instrument was ready for broader application. The consistency of the instrument was assessed using Cronbach's Alpha, and the results indicated high internal consistency across all constructs, which suggests that the instrument's Overall Dimension was 0.895, suitable for data collection.

7. DATA ANALYSIS AND RESULTS

Table 1. 3PL Services Client Profile

Clients Sample Size (n = 437)		
Characteristics	Category	Percent
Nature of the firm	Construction	(25.5)
	pharmacy	(21.9)
	Automotives	(21.9)
	Manufacturing	(30.7)
Turnover of the Firm	Less than 50 lakhs	(24.1)
	51 - 100 lakhs	(35.0)
	101 - 150 lakhs	(26.3)
	more than 150 lakhs	(14.6)
Frequency Of Placing Orders	Daily	(8.00)
	fortnightly	(17.5)
	Weekly	(43.8)
	Monthly	(30.7)

Table 1 indicates that the manufacturing industry has the largest share (30.7%), consistent with the understanding that manufacturers require extensive supply chain and logistics services to ensure timely production and delivery. 3PL providers in this sector must focus on managing raw materials, components, and finished goods effectively. Besides, most firms (35.0%) fall within the 51-100 Lakhs turnover range. This suggests that mid-sized companies increasingly rely on 3PL services to streamline their logistics, offering an opportunity for providers to focus on this growth segment. Moreover, the largest group (43.8%) places orders weekly, showing that many clients require regular logistics support. This highlights the demand for 3PL services that ensure smooth, timely deliveries, such as inventory management or regular supply chain deliveries.

Friedman Test
H_0: There is no significant difference among mean ranks towards the factors of third-party services

Table 2. Friedman Test Mean Ranks of 3PL Service Providers

Factors Of 3PL Services	Mean Rank	Chi-Square Value	P Value
Flexibility	(3.92)		
Value Creation	(3.24)		
Security And Tracking System	(3.34)	(25.380)	(.000)
It Integration System	(3.19)		
Customer Service	(3.42)		
Customer Accommodation	(3.89)		

The Friedman test has revealed a significant difference in how clients rank the importance of different 3PL service factors. Flexibility is the highest-ranked factor, followed by Customer Accommodation and Customer Service, as shown in Table 2. The Chi-Square value of 25.380 for the Flexibility factor indicates that the Flexibility of 3PL services significantly impacts the ranking of factors. Since the p-value is 0.000, we reject the null hypothesis and achieve that at least one factor (such as Flexibility) is significantly more important than the others in the eyes of the clients. A p-value of 0.000 is less than the commonly used threshold of 0.05, indicating a statistically significant difference in the ranks of the factors. This suggests that Flexibility is perceived as a highly important factor in logistics excellence among the surveyed clients, and providers of 3PL services should prioritize Flexibility in

their offerings to ensure they can adapt to the embryonic needs of their clients. Along with Flexibility, focusing on customer accommodation (personalized services) and customer service could further enhance the competitiveness and perceived value of 3PL services in the market.

Wilcoxon Signed Ranks Test

Ho: There is no significant difference in the mean score of value creation and Flexibility as a dimension towards 3PL services.

Table 3. Wilcoxon Signed Ranks Test Mean ranks of 3PL Service Providers

Dimensions	N		Mean Rank	Sum of Ranks	Z value	P value
Value Creation - Flexibility	Negative Ranks	(165)	(55.08)		(-3.692)	(0.000)
	Positive Ranks	(135)	(42.00)			
	Ties	(137)				
	Total	(437)				

The results of the Wilcoxon Signed Test exposed that the P-value is 0.000, which is less than 0.05, we reject the null hypothesis and accomplish that there is a significant difference between Value Creation and Flexibility in the eyes of the respondents, as presented in Table 3. Negative ranks (65) indicate that a more substantial number of respondents place higher importance on Value Creation over Flexibility, but the significant Z-value suggests that Flexibility still plays a crucial role in the logistics excellence provided by 3PL services. 3PL providers should consider enhancing their Value Creation strategies while ensuring that Flexibility remains a core attribute in their service offerings to meet client expectations.

Multiple regression analysis helps recognize the connection between a dependent variable and multiple independent variables. In this case, the dependent variable is Logistics Excellence (Y), and the independent variables are the factors that could potentially influence it, such as Flexibility (X1), Value Creation (X2), Security and Tracking System (X3), IT Integration System (X4), Customer Service (X5), and Customer Accommodation (X6). The Multiple R-values of 0.732 indicates a moderate to strong correlation between the independent variables (Flexibility, Value Creation, Security, Tracking System, etc.) and the dependent variable (Logistics Excellence). In this case, 0.732 suggests that these independent factors explain a noteworthy percentage of the variation in logistics excellence. Square (also called the coefficient of determination) is 0.535, meaning that the independent variables explain approximately 53.5% of the variation in Logistics Excellence. The remaining 46.5% of the variation is due to other aspects not included in the model. This indicates a good model fit. While other factors influence logistics excellence, the model explains an extensive portion of the variability in the dependent variable. The P-value of 0.000 is less than 0.05, which is statistically significant. This means that at least one of the independent variables has a substantial impact on Logistics Excellence. Thus, we reject the null hypothesis that all regression amounts are equal to zero, indicating that the independent variables collectively contribute to explaining logistics excellence.

Table 4. Variables In Multiple Regression Analysis

Variables	Unstandardized co-efficient (B)	SE of B	Standardized co-efficient (Beta)	t value	.sig
(Constant)	(4.357)	(1.465	-	(2.973)	(.004)
Flexibility (X1)	(-.067)	(.119	(-.050)	(-.558)	(.578)
Value Creation (X2)	(-.108)	(.115)	(-.089)	(-.937)	(.351)
Security and Tracking System (X3)	(-.016)	(.114)	(-.014)	(-.136)	(.892)
IT Integration System (X4)	(.301)	(.129)	(.258)	(2.323)	(.022)
Customer Service (X5)	(.288)	(.139)	(.241)	(2.068)	(.041)
Customer Accommodation(X6)	(.058)	(.119)	(.046)	(.486)	(.628)
Customer Service(X7)	(.504)	(.113)	(.388)	(4.447)	(.000)

The coefficient of Flexibility (X1) is -0.067, indicating that for every unit decrease in Flexibility, Logistics Excellence at Express Forwarders Private Limited would decrease by 0.067, assuming all other variables remain constant. The negative sign suggests an inverse relationship; the amount is statistically significant at 1%. Similarly, the coefficient of Value Creation (X2) is -0.108, signifying that a one-unit reduction in Value Creation would lead to a decrease of 0.108 in Logistics Excellence, with all other factors held constant. This effect is also significant at the 1% level. Furthermore, the coefficient of the Security and Tracking System (X3) is -0.016, implying that for every unit decline in the Security and Tracking System, Logistics Excellence would decrease by 0.016, again holding other variables constant. This negative impression is significant at the 1% level. Finally, the coefficient of Competitive Advantage (X7) is 0.504, meaning that for each unit increase in Competitive Advantage, Logistics Excellence would increase by 0.504, while the other variables remain unchanged. This positive effect is significant at the 1% level as well.

DISCUSSION AND CONCLUSIONS

This study explored the key factors influencing Logistics Excellence among 3PL service providers and their clients. The verdicts from the multiple regression analysis and statistical tests highlight significant relationships between the independent variables and Logistics Excellence. Specifically, Flexibility (X1), value creation (X2), and security and tracking systems (X3) have a negative impact on logistics performance, with decreases in these variables leading to a decline in logistics excellence. The significant negative coefficients suggest that maintaining and improving these aspects is crucial for optimizing logistics operations. On the other hand, IT Integration System and Competitive Advantage (X7) shows a strong positive effect on Logistics Excellence, indicating that enhancing competitive positioning directly contributes to improved logistics performance. The study also found that factors such as Flexibility and Value Creation are vital for improving operational efficiency and customer satisfaction. As 3PL service providers face increasing competition and complex logistics demands, these attributes should be prioritized. Furthermore, the role of Security and Tracking Systems underscores the importance of real-time tracking and secure logistics operations in enhancing overall service quality and trust. In conclusion, the results emphasize the need for third-party logistics service providers and similar firms to focus on strengthening Flexibility, value creation, security systems, and competitive advantages. Addressing these factors can significantly contribute to logistics excellence and provide a sustainable competitive edge in the 3PL industry. Future research may explore additional dimensions, such as environmental sustainability and innovation, to enhance logistics performance in the evolving market landscape.

Reference

1. Akhter, M., Ahmed, A., Momen, M. A., Sultana, N., Sultana, S., & Ferdousi, F. (2024). Determinants of online merchants' satisfaction on third party logistics in a developing nation: a partial least square (PLS) approach. Cogent Business & Management, 11(1), 2382338.

2. Chen, Z. S., Zhang, X., Govindan, K., Wang, X. J., & Chin, K. S. (2021). Third-party reverse logistics provider selection: A computational semantic analysis-based multi-perspective multi-attribute decision-making approach. Expert Systems with Applications, 166, 114051.

3. Easton, P. D., Larocque, S. A., Mason, P., & Utke, S. (2024). Private Equity Fund Reporting Quality, External Monitors, and Third-Party Service Providers. The Accounting Review, 1-33.

4. Ejem, E. A., Uka, C. M., Dike, D. N., Ikeogu, C. C., Igboanusi, C. C., & Chukwu, O. E. (2021). Evaluation and selection of Nigerian third-party logistics service providers using multi-criteria decision models. LOGI–Scientific Journal on Transport and Logistics, 12(1), 135-146.

5. Gu, V. C., Cao, R. Q., Black, K., & Zeng, H. (2020). Managing collaborative relationships in third party logistics: An empirical study. In Supply Chain and Logistics Management: Concepts, Methodologies, Tools, and Applications (pp. 1783-1809). IGI Global Scientific Publishing.

6. Janjane, A.I., Muthini, J.N.(2020). Influence of Supply Risk Assessment of Third Party Logistics Providers on Performance of Humanitarian Supply Chains: A Case of International Red Cross, Somalia. IRA-International Journal of Management & Social Sciences,16(3), 105-112. doi: http://dx.doi.org/10.21013/jmss.v16.n3.p5

7. Keskin, O. F., Caramancion, K. M., Tatar, I., Raza, O., & Tatar, U. (2021). Cyber third-party risk management: A comparison of non-intrusive risk scoring reports. Electronics, 10(10), 1168.

8. Mut-Puigserver, M., Cabot-Nadal, M. A., & Payeras-Capellà, M. M. (2020). Removing the trusted third party in a confidential multiparty registered eDelivery protocol using blockchain. IEEE Access, 8, 106855-106871.

9. Pishdar, M., Danesh Shakib, M., Antucheviciene, J., & Vilkonis, A. (2021). Interval type-2 fuzzy super sbm network dea for assessing sustainability performance of third-party logistics service providers considering circular economy strategies in the era of industry 4.0. Sustainability, 13(11), 6497.

10. Qian, X., Yin, M., Li, X., & Zhang, Q. (2023). Two-stage stochastic nonlinear winner determination for logistics service procurement auctions under quantity discounts. Journal of Industrial & Management Optimization, 19(10).

11. Ren, S., Choi, T. M., Lee, K. M., & Lin, L. (2020). Intelligent service capacity allocation for cross-border-E-commerce related third-party-forwarding logistics operations: A deep learning approach. Transportation Research Part E: Logistics and Transportation Review, 134, 101834.

12. Ren, S., Choi, T. M., Lee, K. M., & Lin, L. (2020). Intelligent service capacity allocation for cross-border-E-commerce related third-party-forwarding logistics operations: A deep learning approach. Transportation Research Part E: Logistics and Transportation Review, 134, 101834.

13. Trakulsunti, Y., Antony, J., Garza-Reyes, J.A., Tortorella, G.L., Chuayjan, W. and Foster, M. (2024), "An exploration of operational excellence methodologies implementation in the logistics sectors: a global study", The TQM Journal, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/TQM-10-2023-0313

14. Vlachos, I., & Polichronidou, V. (2023). Multi-demand supply chain triads and the role of Third-Party Logistics Providers. The International Journal of Logistics Management, 35(1), 136-157.

15. Zarbakhshnia, N., & Karimi, A. (2024). Enhancing third-party logistics providers partnerships: An approach through the DLARCS supply chain paradigm. Resources, Conservation and Recycling, 202, 107406.