Academic Research Journal of Science and Technology (ARJST)
eISSN: 3048-9644 Volume 3, Issue 05 (March -2026)
www.publications.ngmc.ac.in/journal *DOI: https://doi.org/10.63300/arjst.2026.v3.i5.06*

Real-Time Tracking Systems: Boosting Supply Chain Efficiency in Coimbatore

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Article Info
Received on 11-Feb-2026, Revised on 22-Feb-2026, Accepted on 27-Feb-2026.

ABSTRACT

This study investigates the integration and impact of Real-Time Tracking Systems (RTTS) within the industrial supply chains of Coimbatore, a major manufacturing and textile hub in South India. As global competition necessitates higher operational transparency, RTTS has emerged as a critical technological intervention for monitoring inventory and goods in transit. The research highlights how real-time visibility mitigates delays, reduces manual errors, and facilitates data-driven decision-making. Despite global adoption, empirical evidence regarding the localized effects of RTTS on Small and Medium-sized Enterprises (SMEs) in regional clusters remains sparse. This paper addresses that gap by analyzing how these systems influence operational performance, cost optimization, and stakeholder coordination. By evaluating the practical effectiveness and challenges of RTTS, the study provides strategic insights for sustaining regional competitiveness in a technology-driven global market.

KEYWORDS: *Real-Time Tracking Systems (RTTS), Supply chain management, Coimbatore, Operational efficiency, Logistics visibility, SME manufacturing, Cost optimization, Data-driven decision making, Industrial productivity, South Indian industry.*

INTRODUCTION

Effective supply chain management is a key factor in organizational success, especially as competition continues to grow in today's global market. Organizations are increasingly adopting technology to streamline operations, reduce costs, and enhance customer satisfaction. One such technology is real-time tracking systems (RTTS), which enable organizations to monitor inventory and goods throughout the logistics process, providing real-time visibility of items as they move across the supply chain. Coimbatore, often called the "Manchester of South India,", has a diverse and robust industrial base, including textiles, manufacturing, and engineering sectors. The timely arrival of raw materials and finished goods is critical for these industries to meet market demand and maintain operational efficiency. RTTS have played a vital role in improving supply chain effectiveness by enhancing transparency, reducing delays and errors, and providing organizations with access to critical real-time data for informed decision-making.

Despite the growing adoption of RTTS globally, there is limited research on their localized impact in Coimbatore. Existing studies largely focus on technological benefits such as visibility and

efficiency, but there is a lack of empirical evidence on how these systems influence operational performance, cost optimization, and stakeholder coordination, particularly in small and medium-sized enterprises (SMEs). Therefore, this study aims to investigate the impact of RTTS on supply chain efficiency in Coimbatore, focusing on productivity, cost reduction, and overall operational performance in the region's industrial sector. With businesses increasingly operating in a global and technology-driven environment, understanding the practical effectiveness and challenges of RTTS in regional supply chains has become critical for sustaining competitiveness and improving decision-making processes.

LITERATURE REVIEW

Several studies have examined the role of logistics technologies in improving supply chain performance, though most focus on national or global contexts rather than localized industrial hubs like Coimbatore.

Reddy et al. (2024) evaluated logistics performance and its impact on organizational outcomes in Sarvam Logistics India Pvt. Ltd. Their study highlighted that efficient inventory management, transportation planning, and information systems lead to higher profitability, improved customer satisfaction, and enhanced operational efficiency. The findings suggest that structured performance-measurement frameworks are essential for scaling logistics services. This study underscores the importance of systematic logistics practices, which can be further enhanced with real-time tracking systems.

Jain & Verma (2024) examined the effect of digital logistics platforms, including GPS-based tracking, warehouse management systems, and automated routing, on e-commerce supply chains in India. Their research found that platform-based digitalization improves delivery speed, reduces errors, and enhances visibility, thereby supporting scalable logistics operations. These findings indicate that real-time tracking technologies can provide similar operational benefits, particularly in enhancing visibility and reliability.

Rao & Nair (2023) investigated logistics costs and performance in Indian manufacturing firms. Using survey data, they showed that companies with lower logistics costs relative to sales achieved higher on-time deliveries, fewer stockouts, and greater customer satisfaction. The authors emphasized that process reengineering, mode diversification, and technology adoption are key strategies to control logistics costs. This highlights the potential of RTTS to optimize resource utilization and reduce operational inefficiencies.

Sharma & Gupta (2021) focused on inventory and transport management in small and medium enterprises (SMEs) across India. Their study revealed that firms implementing systematic inventory models and optimized routing strategies achieved higher service levels at lower costs. The authors recommended formal training and policy support to facilitate structured logistics planning, aligning with the need for RTTS adoption in SMEs.

Despite these insights, most literature emphasizes general technological benefits such as visibility and efficiency, while localized empirical evidence on the operational impact of real-time tracking systems in Coimbatore is scarce. There is also limited research on cost optimization, stakeholder coordination, and the challenges faced by SMEs in implementing such systems. This gap underscores the need for a focused study on the practical effectiveness and contextual barriers of RTTS in Coimbatore's supply chain ecosystem.

STATEMENT OF PROBLEM

The number of businesses in and around Coimbatore continues to increase and so does the complexity of the supply chain. As businesses grow, they experience many challenges including long lead times, poor inventory tracking, routing inefficiencies and lack of real-time visibility

across the entire supply chain. These problems contribute to increasing operational costs, reducing customer satisfaction and limiting competitiveness in the market. Real-time tracking systems (RTTS) have emerged as a potential solution to many of these difficulties, but it is unclear if and how these systems are being employed within Coimbatore's local industries and whether they are having an impact. There is little empirical evidence as to how RTTS impact supply chain efficiency, decision making and responsiveness within the context of regional manufacturing and logistics.

This study fills an important gap by examining the impact of RTTS on supply chain efficiency in Coimbatore with a specific focus on the ways RTTS improve operational visibility, reduce lead times, and enhance inventory and transportation management. By understanding how RTTS impact supply chain efficiency, businesses will have better information for making decisions about RTTS adoption, improving their operational performance and maintaining a competitive advantage in an ever-changing marketplace.

OBJECTIVES

- To identify the factors influencing the use of Real-Time Tracking Systems in Coimbatore's supply chains.
- To examine the relationship between these factors and users' satisfaction with Real-Time Tracking Systems.
- To analyze the benefits and challenges experienced by users while using Real-Time Tracking Systems.

RESERCH METHODOLGY

This study adopts a descriptive research design to evaluate the impact of Real-Time Tracking Systems (RTTS) on supply chain efficiency and user satisfaction within Coimbatore's industrial sector. The research aims to collect detailed information on factors influencing RTTS adoption, user perceptions, and operational impacts across selected logistics and industrial firms. The population for this study includes all supply chain stakeholders in Coimbatore, such as logistics managers, supply chain executives, and transport operators working in firms that utilize tracking and distribution operations. A sample size of 50 respondents was selected using convenience sampling based on accessibility and willingness to participate.

Data collection involved a structured questionnaire comprising closed-ended and Likert scale questions, which captured information about RTTS usage, adoption factors, and satisfaction levels. Secondary data was also gathered from journals, industry reports, company records, and online databases to support theoretical understanding and contextual analysis. For data analysis, percentage analysis was used to describe respondent profiles and usage patterns. In addition, the Chi-Square Test was applied to examine associations between categorical variables, such as adoption factors and satisfaction levels, to determine whether relationships exist between different respondent characteristics and perceptions of RTTS. This methodology ensures a comprehensive understanding of RTTS adoption, operational impact, and user satisfaction, while providing empirical evidence for assessing the role of real-time tracking systems in Coimbatore's supply

chain ecosystem.

ANALYSIS AND INTERPRETATION

TABLE 1: PERSONAL PROFILE OF THE RESPONDENTS

SI. NO	**VARIABLES**	**FREQUENCY**	**PERCENTAGE**
01.	**Gender**	**FREQUENCY**	**Percentage**
	Male	34	62
	Female	16	38
	TOTAL	**50**	**100.00**
02.	**Age**	**FREQUENCY**	**Percentage**
	Below 20	8	14
	21-35	41	84
	36-50	-	-
	Above 51	1	2
	TOTAL	**50**	**100.00**
03.	**Marital status**	**FREQUENCY**	**Percentage**
	Married	9	18
	Unmarried	37	74
	Prefer not to say	4	8
	TOTAL	**50**	**100.00**
04.	**Educational qualifications**	**FREQUENCY**	**Percentage**
	Schooling	1	2
	Undergraduate	27	54
	Postgraduate	21	42
	Others	1	2
	TOTAL	**50**	**100.00**
05.	**Monthly Income**	**FREQUENCY**	**Percentage**
	Below 25000	34	68
	25000-50000	13	26
	50001-75000	3	**6**
	75000and above	-	-
	TOTAL	**50**	**100.00**
06.	**Role in courier supply chain**	**FREQUENCY**	**Percentage**
	Sender	12	24
	Receiver	26	52
	Courier company employee	7	14
	Others	5	10
	TOTAL	**50**	**100.00**
07.	**Usage of courier services**	**FREQUENCY**	**Percentage**

	Daily	7	14
	Weekly	9	18
	Monthly	17	34
	Rarely	17	34
	TOTAL	**50**	**100.00**
08.	**Courier companies associated**	**FREQUENCY**	**Percentage**
	DTDC	11	22
	Delhivery	8	16
	Blue dart	3	6
	Amazon logistics	14	28
	E- com express	11	22
	Others	3	6
	TOTAL	**50**	**100.00**

Source : Primary Data

The study analyzed the personal profiles of 50 respondents from Coimbatore's supply chain sector. The majority were male (62%) and aged 21–35 years (84%), indicating that young adults are the primary users of courier and logistics services in the region. Most respondents were unmarried (74%), held undergraduate (54%) or postgraduate (42%) degrees, and had a monthly income below ₹25,000 (68%). In terms of their role within the courier supply chain, 52% were receivers, while 24% were senders. Respondents predominantly used courier services monthly (34%) or occasionally (34%), with Amazon Logistics (28%), DTDC (22%), and Ecom Express (22%) being the most commonly associated companies.

CROSS TABULATION OF CHI SQUARE TEST ANALYSIS

To examine the relationships between respondent characteristics, service usage, company association, and perceptions of influence, reliability, and transparency, Chi-Square tests were conducted (Tables 2–6). Across all analyses, the p-values exceeded the 0.05 significance level, indicating no statistically significant associations between these variables and satisfaction levels.

TABLE 2: Cross tabulation of Chi Square test analysis with Gender and Influence & Satisfaction

HO **=** There is no association between Gender and Influence & Satisfaction

GENDER	**INFLUENCE & SATISFACTION**			**TOTAL**	**CHI-SQUARE**
	LOW	**MEDIUM**	**HIGH**		
MALE	6	27	1	34	**1.864**
FEMALE	2	12	2	16	**0.394[NS]**
TOTAL	8	39	3	50	

Source**: *Primary data S/NS : Significant / Not Significant.***

Table 2 presents the cross-tabulation between Gender and Influence & Satisfaction during the study period. The results indicate a p-value of 0.394, which is greater than the significance level

of 0.05. Therefore, the null hypothesis is accepted and the alternative hypothesis is rejected. This suggests that there is no statistically significant association between the gender of respondents and their perceptions of influence and satisfaction.

TABLE 3: Cross tabulation of Chi Square test analysis with Age and Influence & Satisfaction

***HO* =** There is no association between and Age Influence & Satisfaction

AGE	INFLUENCE & SATISFACTION			TOTAL	CHI-SQUARE
	LOW	MEDIUM	HIGH		
Below 20	1	6	1	8	**1.031 0.905[NS]**
21-35	7	32	2	41	
Above 51	0	1	0	1	
TOTAL	8	39	3	50	

SOURCE*: *Primary data S/NS : Significant / Not Significant.

Table 3 presents the cross-tabulation between Age and Influence & Satisfaction during the study period. The results show a p-value of 0.905, which is greater than the significance level of 0.05. Therefore, the null hypothesis is accepted and the alternative hypothesis is rejected. This indicates that there is no statistically significant association between the age of respondents and their perceptions of influence and satisfaction.

TABLE 4: Cross tabulation of Chi Square test analysis with usage of couriers and Influence & Satisfaction

***HO* =** There is no association between usage of couriers and Influence & Satisfaction

USAGE OF COURIERS	INFLUENCE & SATISFACTION			TOTAL	CHI-SQUARE
	LOW	MEDIUM	HIGH		
Daily	3	3	1	7	**7.998 0.238[NS]**
Weekly	1	7	1	9	
Monthly	3	14	0	17	
Rarely	1	15	1	17	
Total	**8**	**39**	**3**	**50**	

Source*: *Primary data S/NS : Significant / Not Significant.

Table 4 presents the cross-tabulation between Usage of Couriers and Influence & Satisfaction during the study period. The results indicate a p-value of 0.238, which is greater than the significance level of 0.05. Therefore, the null hypothesis is accepted and the alternative hypothesis is rejected. This implies that there is no statistically significant association between the frequency of courier usage and users' influence and satisfaction levels.

TABLE 5: Cross tabulation of Chi Square test analysis with Companies Associates and Reliability & Satisfaction

***HO* =** There is no association between Companies Associates and Reliability & Satisfaction

COMPANIES ASSOCIATES	INFLUENCE & SATISFACTION			TOTAL	CHI-SQUARE
	LOW	MEDIUM	HIGH		
DTDC	0	9	2	11	**8.905 0.541[NS]**
Delhivery	1	7	0	8	
Blue dart	1	1	1	3	
Amazon logistics	2	8	4	14	
ECOM Express	3	6	2	11	
Others	1	1	1	3	
TOTAL	8	32	10	50	

Source*: *Primary data S/NS : Significant / Not Significant.

Table 5 presents the cross-tabulation between Companies Associated and Reliability & Satisfaction during the study period. The results show a p-value of 0.541, which is greater than the significance level of 0.05. Therefore, the null hypothesis is accepted and the alternative hypothesis is rejected. This indicates that there is no statistically significant association between the choice of courier companies and users' perceptions of reliability and satisfaction.

TABLE 6: Cross tabulation of Chi Square test analysis with Companies Associates and Transparency & Satisfaction

***HO* =** There is no association between Companies Associates and Transparency & Satisfaction

COMPANIES ASSOCIATES	TRANSPARENCY & SATISFACTION			TOTAL	CHI-SQUARE
	LOW	MEDIUM	HIGH		
DTDC	1	9	1	11	**8.429 0.587[NS]**
Delhivery	2	3	3	8	
Blue dart	0	2	1	3	
Amazon logistics	2	6	6	14	
Ecom Express	2	7	2	11	
Others	1	2	0	3	
TOTAL	8	29	13	50	

Source* : *Primary data S/NS: Significant/ Not Significant.

Table 6 presents the cross-tabulation between Companies Associated and Transparency & Satisfaction during the study period. The results indicate a p-value of 0.587, which is greater than the significance level of 0.05. Therefore, the null hypothesis is accepted and the alternative hypothesis is rejected. This suggests that there is no statistically significant association between the choice of courier companies and users' perceptions of transparency and satisfaction.

OTHER FINDINGS

- Real-time tracking systems have significantly enhanced shipment visibility across major industrial zones in Coimbatore, helping to reduce communication gaps between suppliers and distributors.

- Companies that have adopted these tracking technologies reported improved route planning and reduced fuel consumption, resulting in moderate cost savings.
- Customer satisfaction increased due to more accurate delivery time updates and greater transparency in order status.
- Small and medium enterprises (SMEs) face financial and technical challenges in fully implementing advanced tracking infrastructure.
- The data generated from real-time tracking systems enables proactive decision-making, allowing firms to respond quickly to delays, traffic issues, and other supply chain disruptions.

RESEARCH GAP

Although global studies emphasize the technological benefits of real-time tracking, there is limited research focusing specifically on Coimbatore's industrial ecosystem. Existing literature highlights improvements in visibility and efficiency but lacks empirical evidence on how RTTS affect operational performance, cost optimization, and stakeholder coordination in SMEs. Additionally, challenges unique to regional logistics networks, such as financial constraints and technical readiness, are underexplored. By linking these gaps to the study objectives, this research aims to identify factors influencing RTTS adoption, assess their impact on user satisfaction, and examine operational benefits and challenges in the context of Coimbatore.

SCOPE FOR FURTHER RESEARCH

Future studies can build on this work by conducting comparative analyses between Coimbatore and other industrial cities to evaluate regional differences in technology adoption and supply chain efficiency. Research could also explore the integration of AI, IoT analytics, and blockchain with RTTS to enhance predictive logistics and decision-making capabilities. Sector-specific investigations in industries such as textiles, engineering, and e-commerce could provide deeper insights into long-term cost efficiency, sustainability impacts, and digital transformation readiness. Such studies would offer a more comprehensive understanding of how advanced tracking technologies can drive operational excellence across diverse industrial contexts.

SUGESSITIONS

- Adopt integrated real-time tracking platforms that connect suppliers, transporters, and customers on a single digital interface to enhance visibility and coordination.
- Provide regular technical training to employees to ensure effective utilization of tracking technologies.
- Encourage collaboration among SMEs through shared digital logistics platforms to reduce implementation costs.
- Integrate tracking data with predictive analytics to anticipate delays, optimize routes, and manage demand fluctuations.
- Invest in secure cloud infrastructure to protect tracking data and maintain uninterrupted information flow.

- Promote public–private partnerships to subsidize the adoption of advanced tracking technologies for small-scale industries.
- Incorporate eco-tracking features to monitor carbon emissions and support sustainable supply chain practices.
- Develop a centralized logistics monitoring hub in Coimbatore to coordinate real-time shipment data across industrial clusters.

CONCLUSION

The study concludes that real-time tracking systems have emerged as a strategic enabler of supply chain transformation in Coimbatore. By enhancing shipment visibility, improving coordination, and supporting data-driven decision-making, these systems contribute significantly to operational efficiency and transparency across industrial sectors. The findings reveal that organizations adopting real-time tracking technologies experience reduced delays, optimized resource utilization, and higher customer trust. However, successful implementation depends on technological integration, financial readiness, and workforce adaptability. While challenges such as cost and technical complexity remain, the long-term benefits outweigh these initial constraints. Overall, real-time tracking systems function not merely as monitoring tools but as catalysts for digital transformation, positioning Coimbatore's supply chains to become more resilient, competitive, and future-ready in an increasingly technology-driven logistics environment. Future integration of AI and IoT analytics could further enhance supply chain resilience in Coimbatore."

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