Journal DOI: 10.36713/epra1013 | SJIF Impact Factor (2025): 8.619 ISSN: 2347-4378
EPRA International Journal of Economics, Business and Management Studies (EBMS)
Volume: 12 | Issue: 5 | May 2025 -Peer-Reviewed Journal

EXPLORING THE ROLE OF SUPPLY CHAIN AND LOGISTICS DIGITALIZATION IN ENHANCING CUSTOMER SATISFACTION IN E-COMMERCE

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ABSTRACT

In the rapidly evolving landscape of e-commerce, customer satisfaction has become a key competitive differentiator. This study investigates the role of supply chain and logistics digitalization in enhancing customer satisfaction within the e-commerce retail sector. With the growing demand for faster, transparent, and more reliable services, digital technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), blockchain, and big data analytics are transforming traditional supply chain operations. This paper explores how these technological advancements contribute to improved service quality, real-time tracking, efficient delivery, and seamless return processes all of which directly impact the end-user experience. Through a detailed review of existing literature and industry practices, the research identifies the drivers, benefits, and challenges associated with digitalization, while also highlighting best practices from leading e-commerce players. The findings underscore that effective implementation of digital logistics solutions not only streamlines operations but also significantly boosts customer trust, loyalty, and satisfaction in the competitive digital marketplace.

KEYWORDS: *Supply Chain Digitalization, E-commerce Logistics, Customer Satisfaction, AI and IoT in Supply Chain, Blockchain in Logistics*

INTRODUCTION

The rapid evolution of e-commerce has significantly reshaped the retail landscape, driven largely by shifting consumer behaviours and advancements in digital technologies. Today's customers expect faster deliveries, real-time order tracking, high order accuracy, and seamless return processes. In response, e-commerce companies are investing heavily in the digitalization of their supply chain and logistics operations to meet and exceed these expectations.

Supply chain digitalization refers to the integration of cutting-edge technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), blockchain, and cloud computing into traditional logistics systems. These technologies enhance operational efficiency, visibility, transparency, and responsiveness across the supply chain network. By leveraging digital tools, companies can streamline inventory management, optimize transportation, improve warehouse operations, and deliver a more personalized and reliable customer experience.

The role of digital transformation in supply chain and logistics has become increasingly strategic, not only in ensuring operational competitiveness but also in driving customer satisfaction and loyalty. This article examines the impact of digital technologies on e-commerce logistics, the key drivers behind their adoption, the relationship between digitalization and customer satisfaction metrics, and the benefits and challenges associated with implementing digital logistics systems. Furthermore, it provides strategic recommendations for optimizing digital supply chains to enhance customer satisfaction and achieve sustainable business growth.

REVIEW OF LITERATURE

1. **Author: Vaidya, V., & Patel, P. (2020) - "Technology-Driven Supply Chain Transformation in E-Commerce"**
   Vaidya and Patel focus on the technological innovations that have transformed supply chain operations, specifically in the e-commerce sector. Technologies like blockchain, artificial intelligence (AI), and the Internet of Things (IoT) have revolutionized logistics. These technologies provide greater transparency, traceability, and responsiveness, which result in better service delivery and higher customer satisfaction.

2. **Author: Zhang, Z., & Li, X. (2020) - "The Role of Logistics Service Quality in Customer Satisfaction"**
   This paper delves into the relationship between logistics service quality and customer satisfaction, emphasizing digital tools' role in service delivery. The authors argue that digital logistics solutions, such as automated warehouse systems, GPS tracking, and drone deliveries, enhance the efficiency and reliability of service. These improvements are directly linked to increased customer satisfaction and loyalty in e-commerce.
3. **Saberi, S., Kouhizadeh, M., & Sarkis, J. (2020) "Blockchain Technology in Supply Chain"**
   Saberi et al. (2020) investigate the integration of blockchain technology in the supply chain, particularly its ability to enhance transparency and security. Blockchain ensures traceability of products from origin to destination, building customer trust. As customers can track the authenticity and movement of their products, it increases their confidence in the e-commerce platform, leading to higher satisfaction levels.
4. **Author: Patel, S., & Sharma, R. (2021) - "Digitalization of Supply Chain for E-Commerce: A Review of the Impact on Customer Experience"**
   Patel and Sharma provide a comprehensive review of the digital tools used in e-commerce supply chains and their impact on customer satisfaction. Their research shows that the implementation of technologies like AI-driven demand forecasting and automated warehouses results in faster deliveries, fewer errors, and a more personalized customer experience, leading to greater satisfaction.
5. **Author: Lee, H.L., & Lim, J. (2021) - "Optimizing E-Commerce Supply Chains Using Big Data Analytics"**
   Lee and Lim discuss how big data analytics can optimize e-commerce supply chains, improving customer satisfaction. Big data analytics allows for better demand forecasting, more accurate inventory management, and efficient routing of deliveries. These advancements ensure that customers receive their orders on time and as expected, significantly enhancing their satisfaction.

OBJECTIVE

- **Analyse the role of digital technologies** (such as AI, IoT, blockchain, and cloud computing) in transforming supply chain and logistics operations.
- **Identify key factors** that drive the adoption of digitalization in e-commerce logistics.
- **Explore the relationship** between supply chain digitalization and customer satisfaction metrics such as delivery speed, transparency, order accuracy, and return management.
- **Assess the benefits and challenges** faced by e-commerce retailers in implementing digital logistics systems.
- **Provide strategic recommendations** for enhancing customer satisfaction through digital supply chain optimization.

EMERGING DIGITAL TECHNOLOGIES IN LOGISTICS

Emerging digital technologies in logistics refer to the advanced tools and innovations—such as Artificial Intelligence (AI), Internet of Things (IoT), blockchain, cloud computing, and robotics—that are transforming traditional supply chain operations. These technologies enable real-time tracking, predictive analytics, automated processes, and improved transparency across the logistics network. By integrating these digital solutions, logistics providers can enhance speed, accuracy, efficiency, and customer satisfaction, making supply chains smarter and more resilient in the fast-paced e-commerce environment.

DRIVERS OF DIGITALIZATION IN SUPPLY CHAINS

The digitalization of supply chains in e-commerce is driven by several key factors. Technological innovation, such as AI, IoT, and blockchain, enables real-time data processing and enhanced automation, improving efficiency. Rising customer expectations for faster, more reliable deliveries and seamless experiences push businesses to adopt digital solutions to remain competitive. Additionally, the pursuit of a competitive advantage motivates e-commerce companies to streamline operations and reduce costs through digital tools. Lastly, global supply chain disruptions—such as those caused by the COVID-19 pandemic—highlight the need for more resilient, flexible systems, driving the acceleration of digital transformation. These drivers collectively push e-commerce retailers to embrace digitalization for improved efficiency and customer satisfaction.

IMPACT ON CUSTOMER SATISFACTION

The digitalization of supply chains and logistics has a profound impact on customer satisfaction in e-commerce retailing. By leveraging digital technologies such as real-time tracking, AI, and predictive analytics, e-commerce retailers can offer faster, more reliable deliveries, which are highly valued by customers. Real-time tracking provides transparency, allowing customers to monitor their orders throughout the shipping process, reducing

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anxiety and improving their overall experience. The use of AI in route optimization leads to quicker deliveries, while automated systems and robotics in warehouses ensure accurate order fulfilment with fewer errors. Additionally, digitalization enhances the customer experience through more efficient return processes and better communication, including automated notifications and AI-powered customer support. Overall, digital supply chains enable e-commerce businesses to meet and exceed customer expectations, driving higher satisfaction, loyalty, and repeat business.

FUTURE TRENDS IN DIGITALIZATION IN LOGISTICS

The future of logistics is set to be shaped by advanced digital technologies such as hyper-automation, autonomous vehicles, predictive analytics, blockchain, and digital twin technology. Companies will increasingly focus on real-time decision-making, transparent supply chains, personalized delivery options, and sustainable logistics practices. As digitalization deepens, cybersecurity and data privacy will become critical priorities. Embracing these trends will enable logistics providers to enhance efficiency, reduce costs, and deliver superior customer experiences in the rapidly evolving e-commerce landscape.

ANALYSIS

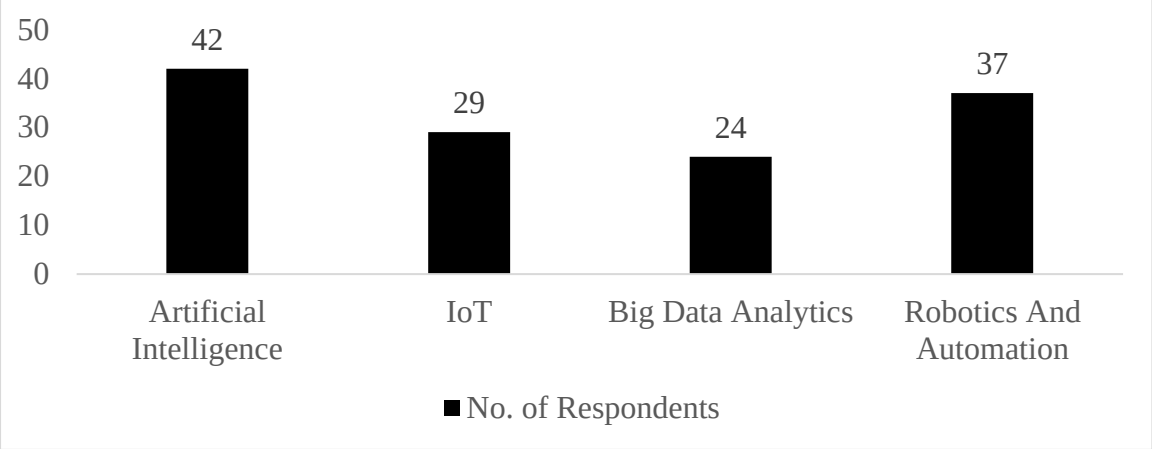
DESCRIPTIVE ANALYSIS

The digital technologies which play a major role in e-commerce

Roles	No. of Respondents	Percentage
Artificial Intelligence	42	36.6
IoT	29	28.7
Big Data Analytics	24	23.8
Robotics And Automation	37	10.9
Total	132	100.0

Out of 132 respondents, 101 valid responses showed that Artificial Intelligence (36.6%) is the most influential technology in e-commerce, followed by IoT (28.7%), Big Data Analytics (23.8%), and Robotics and Automation (10.9%). This highlights that AI, IoT, and Big Data are the key drivers of digital transformation in e-commerce, while robotics supports operational efficiency.

The benefits which observed due to Digitalization in e-commerce logistics



Benefits	Frequency	Percent
Faster Delivery Time	25	18.9
Lower Shipping Costs	20	15.2
More Accurate Tracking	45	34.1
Better Inventory Management	28	21.2
Reduced Order Errors	14	10.6
Total	132	100.0

The data shows that the most significant benefit of digitalization in e-commerce logistics is more accurate tracking (34.1%), followed by better inventory management (21.2%) and faster delivery times (18.9%). Lower shipping costs (15.2%) and reduced order errors (10.6%) were also observed but to a lesser extent. Overall, the findings highlight that digitalization greatly enhances operational efficiency and customer experience through improved tracking, stock management, and timely deliveries.

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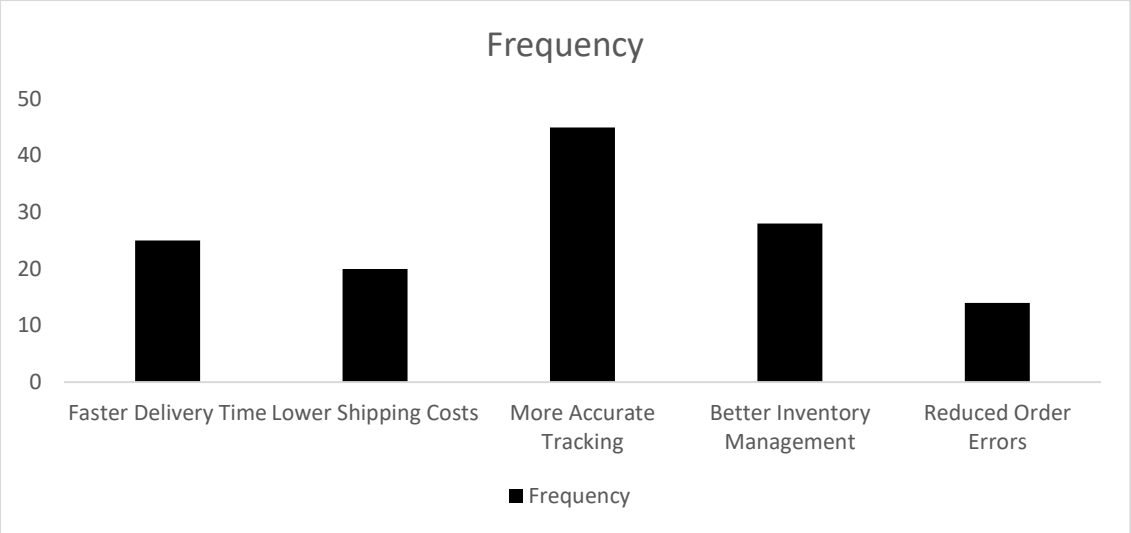

CHI-SQUARE TEST

Age

	Observed N	Expected N	Residual
Below 18	12	26.4	-14.4
18 – 25	60	26.4	33.6
26 – 45	33	26.4	6.6
46 – 60	21	26.4	- 5.4
Above 60	06	26.4	
Total	132		

How Do You Track Your Order?

	Observed N	Expected N	Residual
Through the E-Commerce Websites or Apps	50	33.0	17.0
SMS or Email Updates	43	33.0	10.0
Third Party Tracking Apps	28	33.0	-5.0
I Don't Track My Orders	11	33.0	-22.0
Total	132		

Test Statistics

	Chi-Square	df	Asymp. Sig.
Age	69.136[a]	4	.000
How Do You Track Your Order?	27.212[b]	3	.000

The Chi-Square analysis conducted on the variables "Age" and "How Do You Track Your Order?" reveals significant deviations from the expected distributions, indicating notable patterns in the data. For the Age variable, the test yielded a Chi-Square value of 69.136 with a significance level (p-value) of .000, signifying that the age distribution of respondents is not uniform. The 18–25 age group is highly overrepresented compared to other groups, suggesting that these demographic forms the majority of the e-commerce users in the sample. Conversely, the age groups Below 18 and Above 60 are underrepresented, highlighting a potential digital divide or lack of engagement with e-commerce platforms among the very young and the elderly.

Similarly, the Chi-Square value of 27.212 for the variable "How Do You Track Your Order?", with a p-value of .000, indicates a statistically significant variation in the methods respondents use to track their orders. The majority of respondents prefer tracking through e-commerce websites or apps, followed by SMS or email updates, while very few rely on third-party tracking apps or choose not to track their orders at all. These results reflect a strong inclination toward integrated tracking solutions provided by e-commerce platforms, emphasizing the importance of user-friendly and direct order tracking features in enhancing customer satisfaction.

FINDINGS

1. Artificial Intelligence (36.6%) is the most impactful technology in e-commerce, followed by IoT (28.7%) and Big Data Analytics (23.8%).
2. The most cited benefit of logistics digitalization is more accurate tracking (34.1%), enhancing customer trust and transparency.
3. Inventory management (21.2%) and faster delivery (18.9%) are also key operational improvements from digitalization.
4. The 18–25 age group dominates e-commerce usage, indicating strong digital adoption among young adults.
5. Majority of users track orders via e-commerce websites or apps (37.9%), showing a preference for integrated tracking tools.

SUGGESTIONS

1. Invest in AI, IoT, and Big Data to drive personalized, efficient, and data-driven e-commerce operations.
2. Enhance order tracking systems on websites and apps to meet customer expectations for real-time visibility.
3. Focus on youth-centric marketing strategies, as 18–25-year-olds are the most active e-commerce users.
4. Develop user-friendly platforms for elderly and underrepresented groups to reduce the digital divide.
5. Optimize logistics for inventory control and delivery accuracy to improve customer satisfaction and reduce operational errors.

CONCLUSION

The digitalization of supply chain and logistics in e-commerce retailing has proven to be a transformative force, significantly influencing customer satisfaction. As consumer expectations for fast, accurate, and seamless deliveries grow, digital technologies like automation, data analytics, AI, and blockchain have played pivotal roles in enhancing the efficiency and responsiveness of supply chains.

From improving inventory management and streamlining operations to offering personalized delivery options, the impact of digitalization is profound. Real-time tracking, predictive analytics, and automated warehousing have resulted in reduced delays, optimized routes, and improved customer communication, all contributing to higher levels of satisfaction. Additionally, these technologies enable companies to respond quickly to disruptions, ensuring that customer needs are met even during challenging circumstances.

However, the journey toward complete digital transformation requires overcoming challenges like the need for investment in new technologies, integration complexities, and the management of data security and privacy concerns. Despite these challenges, businesses that prioritize the digitalization of their supply chains and logistics can gain a competitive edge by offering superior customer experiences.

In conclusion, the intersection of technology and logistics is a critical factor in the future of e-commerce retail. Companies that leverage digitalization effectively not only boost their operational efficiency but also drive customer loyalty by meeting the evolving demands of the modern consumer.

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