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Impact of Supply Chain Digitization on Logistics Efficiency in Nikkans Textile

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Abstract: ***This study examines the impact of supply chain digitalization on logistics efficiency in Nikkans Textile, a leading manufacturer in the Indian textile sector. With globalization and technological advancement, digitalization has become essential to improve transparency, coordination, and operational efficiency. The study employs both quantitative and qualitative methods to explore how digital tools enhance supplier coordination, delivery reliability, inventory management, and cost optimization. Findings reveal that digital communication significantly improves supplier transparency and that order processing speed is the most critical factor contributing to cost reduction. However, challenges such as technical issues, poor IT support, and weak system integration persist. The research concludes that comprehensive digital strategies and strong organizational support are key to achieving sustainable logistics efficiency.***

Keywords: Supply Chain Digitalization, Logistics Efficiency, Textile Industry, ERP Systems, Nikkans Textile, Supplier Coordination, Cost Optimization

I. INTRODUCTION

In the competitive global market, supply chain management (SCM) is central to the success of manufacturing organizations. The textile industry, being labor-intensive and demand-driven, faces challenges in ensuring timely delivery, maintaining inventory, and optimizing costs. Digitalization integrates technologies such as IoT, AI, cloud computing, and big data analytics into supply chain operations, enabling real-time visibility and improved decision-making. At Nikkans Textile, digital transformation is adopted to improve logistics efficiency by reducing manual errors, enhancing supplier coordination, and increasing operational flexibility.

II. REVIEW OF LITERATURE

Existing studies emphasize the importance of digital tools in enhancing supply chain performance. Tariq Ali Malik (2024) highlighted that sustainable practices in textile SCM improve efficiency when supported by infrastructure and regulation. Mukta Sarker (2024) found that integrating ERP and automation enhances operational performance. Svitlana Smerichevska (2024) noted that IoT and AI improve inventory visibility and cost optimization. However, challenges such as skill shortages and high implementation costs (Dubey et al., 2019; Singh et al., 2025) remain significant barriers to digital adoption in developing economies.

III. OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

1) To study the influence of digitized supply chain practices on supplier coordination and delivery reliability.
2) To examine the role of supply chain digitalization in improving inventory management, order fulfillment speed, and cost optimization.
3) To assess the challenges and limitations faced by textile companies in adopting supply chain digitalization.

IV. RESEARCH METHODOLOGY

The research adopts a descriptive and analytical design using both primary and secondary data. Primary data were collected from 88 employees across logistics, procurement, warehouse, and IT departments using structured questionnaires and interviews. Statistical tools such as Chisquare and regression analyses were employed to test hypotheses using SPSS software.

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V. DATA ANALYSIS & RESULTS

The Chi-square test revealed a significant association (p = 0.027) between the frequency of digital communication and transparency in supplier transactions. Regression analysis indicated that order processing speed (p = 0.022) significantly affects cost reduction, though overall digitalization impact remains modest (R^2 = 0.064). Reliability analysis revealed recurring technical issues and insufficient IT support, highlighting areas for improvement.

1) Chi-Square Analysis: Digital Communication and Supplier Transparency

To test the relationship between digital communication frequency and transparency in supplier transactions, a Chi-square test was applied.

Test Value	df	Sig. (p-value)
Pearson Chi-Square = 23.114	12	0.027

Interpretation:

Since the p-value (0.027) < 0.05, there exists a significant relationship between the frequency of using digital tools and improvement in supplier transparency. Departments that frequently communicate via digital platforms such as ERP systems, SCM software, and digital dashboards reported higher transparency and accountability in transactions. This indicates that digital interaction positively affects supplier coordination and trust, fulfilling the first objective of the study.

2) Regression Analysis: Impact of Digitalization on Cost Reduction

Regression analysis was conducted to examine how three independent variables—inventory data update frequency, record accuracy after digitization, and order processing speed—affect logistics cost reduction.

Model Summary	R = 0.253	R^2 = 0.064	Adjusted R^2 = 0.030	Sig. F = 0.134

Variable	B	t-value	Sig. (p)
Constant	2.290	4.270	0.000
Inventory update frequency	0.044	0.410	0.683
Accuracy of inve records	0.010	0.125	0.901
Order processing speed	0.303	2.326	0.022*

Interpretation:

The model explains 6.4% of the variance in logistics cost reduction (R^2 = 0.064). Although overall model significance is weak (p = 0.134), order processing speed significantly influences cost reduction (p = 0.022). This suggests that enhancing order processing speed through automation directly contributes to lower lead times, fewer stockouts, and reduced logistics costs—thereby supporting the second research objective.

3) Reliability Analysis: Challenges in Digital Adoption

A reliability test using Cronbach's Alpha was conducted to assess internal consistency among items measuring barriers to digitalization.

Item	Mean	Std. Dev.
Technical issues with digital tools	4.23	0.854
Ease of employee training	3.56	1.081
System integration with suppliers/customers	2.55	0.909
Adequacy of IT support	2.75	0.887

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Interpretation:
Respondents reported frequent technical issues (mean = 4.23) and only moderate ease of training (3.56). IT support and system integration scored low, indicating poor technical alignment and limited interoperability among platforms. Cronbach's Alpha was low and negative, suggesting the need for improved survey structure in future studies, yet these results clearly highlight technological and human resource barriers in digital adoption.

4) Chi-Square Test: Department vs. Barriers to Digitalization
Another Chi-square test assessed whether the type of department influenced perceived barriers to adopting digitalization.

Test Value	df	Sig. (p-value)
Pearson Chi-Square = 19.875	16	0.226

Interpretation:
Since the p-value (0.226) > 0.05, there is no significant association between department and digitalization barriers. Employees across IT, Logistics, Procurement, and Warehouse share similar challenges—particularly poor infrastructure, high implementation costs, and lack of skilled staff. This reveals that digitalization issues are organizational rather than departmental, requiring unified management strategies.

VI. FINDINGS & DISCUSSION

The study found that digital communication tools such as ERP and SCM software enhance supplier coordination and visibility. Employees acknowledge improvements in transparency and decision-making speed. However, inconsistent IT infrastructure and limited integration between supplier and customer systems hinder full efficiency. Order processing speed emerged as the most influential factor in cost optimization, emphasizing the need for automation and workflow redesign.

VII. SUGGESTIONS

1) Enhance order processing speed through automation and AI-based scheduling systems.
2) Establish a dedicated IT helpdesk and preventive maintenance programs to minimize system downtime.
3) Improve digital integration across departments and external partners using cloud-based platforms.
4) Implement company-wide digital transformation strategies with regular employee training.
5) Reassess survey instruments to improve the reliability of future research findings.

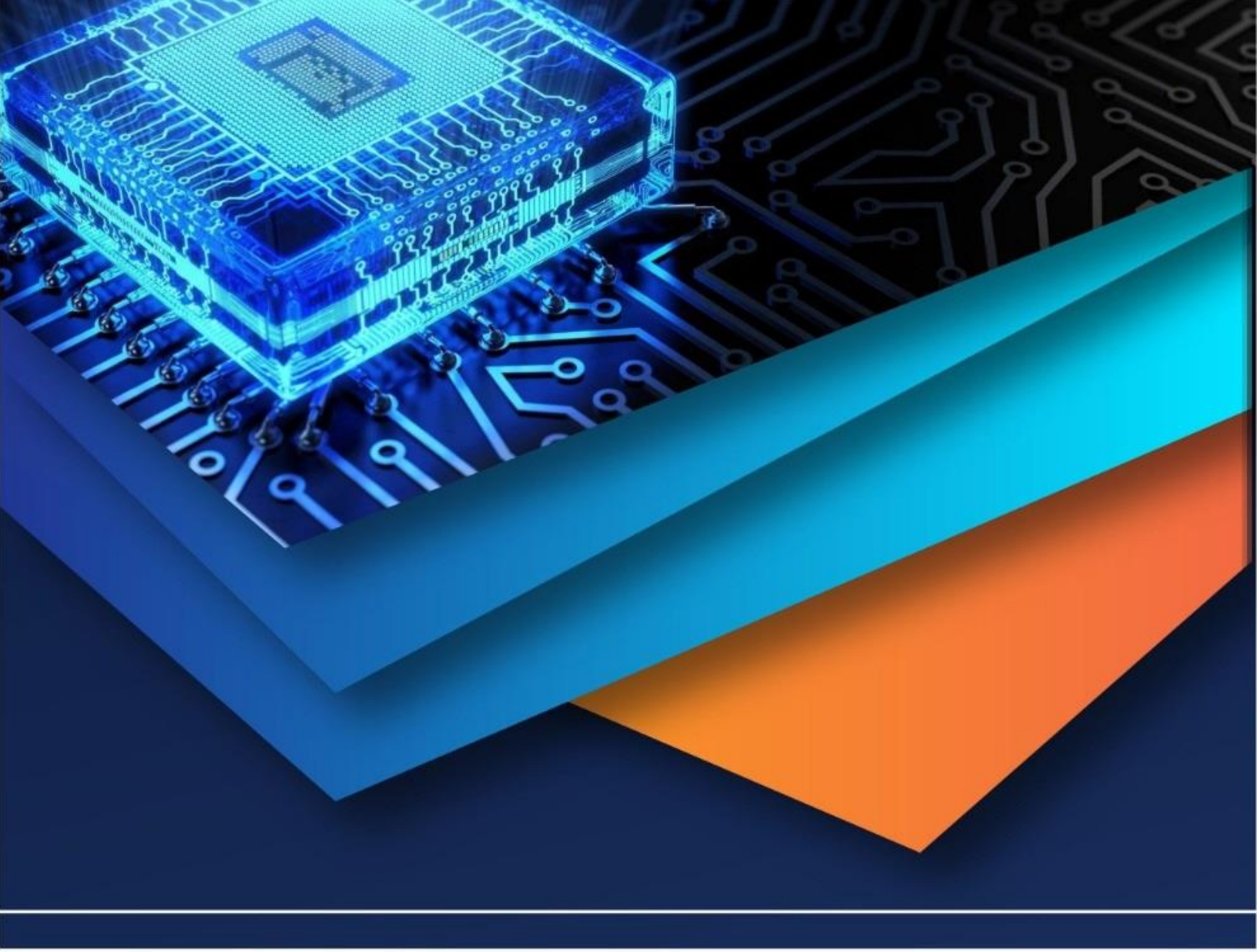
VIII. CONCLUSION

The research concludes that supply chain digitalization significantly contributes to logistics efficiency by improving supplier coordination, transparency, and order processing. While technological and cultural challenges persist, Nikkans Textile can achieve sustainable efficiency through continuous investment in digital tools, staff training, and system integration. A unified digital-first culture is essential to enhance competitiveness and operational performance in the textile sector.

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