International Journal of Research Publication and Reviews

Unlocking Efficiency: The Role of Internet of Things (IoT) in Revolutionizing Supply Chain Management

Swastik Tyagi

School of Business, Galgotias University, Greater Noida, India

ABSTRACT :

This paper explores the transformative potential of the Internet of Things (IoT) in revolutionizing supply chain management (SCM). Through empirical and theoretical analysis, the study investigates how IoT-driven solutions improve operational efficiency, visibility, and sustainability. Real-time data collection, automation, and predictive maintenance are examined for their role in minimizing delays, reducing costs, and enhancing customer satisfaction. A quantitative survey conducted among 65 SCM professionals validates the significant impact of IoT across multiple supply chain dimensions. The paper concludes with recommendations for businesses, policymakers, and technology developers to foster IoT adoption for a smarter, sustainable supply chain ecosystem.

Keywords: Internet of Things, Supply Chain Management, Real-Time Data, Efficiency, Predictive Maintenance, Sustainability, Logistics

1. Introduction

Supply chains today demand greater agility, cost-efficiency, and visibility. Traditional SCM models struggle to meet these demands due to limited responsiveness and real-time data flow. IoT, defined as interconnected devices that transmit real-time data, offers a significant upgrade in supply chain operations. This paper explores how IoT enhances transparency, automates processes, reduces human error, and contributes to sustainability in modern SCM.

2. Literature Review

The literature affirms IoT's role in enhancing operational transparency, predictive capabilities, and inventory accuracy. Studies by Mineraud et al. (2016) and Uckelmann et al. (2011) highlight IoT's potential in automating manual SCM tasks. Meanwhile, the integration of predictive analytics and AI with IoT is emerging as a future research frontier. Gaps remain in exploring cross-industry implementations and interoperability challenges.

3. Theoretical Framework

This study utilizes:
- Resource Dependence Theory (RDT) for analyzing transparency improvements.
- Transaction Cost Economics (TCE) to understand efficiency gains through automation.
- Theory of Constraints (TOC) for analyzing bottleneck identification.
- Sustainable Supply Chain Management (SSCM) as a lens for environmental impact.

4. Methodology

A mixed-methods approach was adopted. A survey was conducted among 65 professionals across logistics, IT, and manufacturing sectors. Quantitative data was analyzed using descriptive statistics and thematic analysis for qualitative feedback.
Data Collection: Google Forms
Sample: 65 respondents
Demographics: 74% aged 18–30; 52% female
Tools: SPSS for statistical analysis; charts and graphs for visualization

5. Results and Discussion

- Awareness: 94% of respondents were familiar with IoT.

- Adoption: 83% reported IoT implementation in SCM.
- Benefits Observed: Increased efficiency, better inventory management, improved customer satisfaction.
- Barriers: Integration complexity, lack of skilled personnel, data security concerns.
- Efficiency: 43% believe IoT is "somewhat effective"; 11% "highly effective."
- Sustainability: 55% believe IoT significantly reduces waste and optimizes logistics.
- Decision-making: 77% agree that real-time data improves SCM decisions.

6. Conclusion

IoT's integration into SCM yields substantial efficiency, cost-saving, and sustainability gains. It shifts supply chains from reactive to predictive systems. However, challenges like high initial costs, integration difficulties, and data privacy must be addressed.

7. Recommendations

- For Businesses: Pilot projects, training, and IoT strategy development.
- For Policymakers: Tax incentives and regulatory support.
- For Tech Providers: Industry-specific, scalable, secure IoT solutions.

REFERENCES

1. Ahn, J. et al. (2021). The Impact of IoT on Supply Chain Management. Sustainability, 13(21), 12225.
2. Mineraud, J. et al. (2016). IoT: A Review of Enabling Technologies. Elsevier.
3. Ghiani, G. et al. (2017). Logistics and Supply Chain Management. Springer.
4. Dutta, D. et al. (2018). Blockchain & IoT in SCM. Elsevier.