

IOT ENABLED SUPPLY CHAIN MANAGEMENT IN INDIA: A REVIEW OF THE BENEFITS, CHALLENGES, AND CRITICAL SUCCESS FACTORS

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Abstract

India, a hub for global manufacturing and supply chain management, holds immense potential for expansion. Evaluating the employment of digital technologies and IoT tools in the supply chain can provide deeper insights into their rate of adoption and potential for growth. Furthermore, the objective is to establish whether they can prompt successful sustainability initiatives among Indian enterprises operating within the supply chain. To learn how digital technologies are being used in the supply chain, we are reviewing the application of IoT in the supply chain. It also outlines what preparatory measures are being taken to leverage these technologies, and what scope for improved supply chain sustainability exists. Leveraging block chains would enable self-executing digital contracts. This in turn allows companies involved in goods distribution to automate the buying process. This will eliminate bureaucracy and commercial process inefficiencies related to human error, secure payment transactions and increase supply chain transparency. Drones, Big Data Analytics and IoT are the digital technologies expected to have the greatest future impact on Indian supply chains.

Keywords: Industry 4.0, Supply chain Digitization, Digitalization, Digital technologies, IoT.

Introduction

The IoT-based supply chain market in India is rapidly growing and transforming the way businesses manage their supply chain operations. IoT or the Internet of Things refers to a network of interconnected devices, sensors, and machines that can communicate with each other and transmit data over the internet. In the context of supply chain management, IoT can provide businesses with real-time visibility, control, and optimization of their supply chain operations.

India's supply chain market is particularly well-suited for IoT adoption due to its vast geography, complex logistics networks, and diverse customer base. With the adoption of IoT in supply chain management, businesses in India can overcome challenges such as limited visibility, lack of transparency, and manual processes that hinder the efficiency of the supply chain.

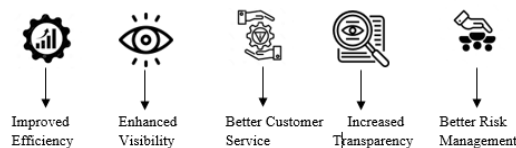
IoT-based applications such as asset tracking and monitoring, predictive maintenance, quality control, and supply chain visibility are increasingly being adopted by businesses in India to optimize their supply chain operations. The IoT-enabled logistics and supply chain market in India is expected to grow at a rapid pace, driven by factors such as the growth of e-commerce, increasing demand for real-time visibility, and the adoption of connected devices.

The Indian government is also playing an active role in promoting the adoption of IoT in supply chain management through initiatives such as the Digital India program and the Make in India campaign. These initiatives aim to promote digital transformation, innovation, and entrepreneurship in the country. Digitization of the supply chain in India is an important step towards improving supply chain efficiency, reducing costs, and enhancing customer satisfaction. Digitization involves the use of digital technologies to automate supply chain processes, enabling real-time tracking of goods, and streamlining communication between different supply chain stakeholders. Some of the benefits of digitization of the supply chain in India:

Improved Efficiency: Digitization of the supply chain can help reduce errors, delays, and manual processes, thereby improving efficiency and reducing costs.

Enhanced Visibility: Digitization can provide real-time visibility into the movement of goods, inventory levels, and delivery times, enabling better decision-making and coordination among supply chain partners.

The benefits of digitization of the supply chain



Better Customer Service: Digitization can enable faster and more accurate delivery of goods, leading to better customer service and increased customer satisfaction.

Increased Transparency: Digitization can improve transparency in the supply chain by providing real-time data on the movement of goods and inventory levels, enabling better tracking and monitoring.

Better Risk Management: Digitization can enable better risk management by providing real-time alerts on supply chain disruptions such as delays, quality issues, or inventory shortages.

However, digitization of the supply chain also poses some challenges, such as the cost of implementing digital technologies, the need for skilled personnel, and concerns around data security and privacy.

To successfully digitize the supply chain in India, the following steps can be taken:

1. Identify the key pain points and inefficiencies in the supply chain and prioritize areas for digitization.
2. Invest in the right digital technologies that can address the identified pain points and enable real-time tracking of goods and inventory.
3. Train and upskill the workforce to effectively use digital technologies and manage the data generated by them.
4. Establish clear communication channels and protocols among supply chain partners to ensure seamless integration and coordination.
5. Implement robust data security measures to protect sensitive supply chain data and prevent cyber threats.

Current state and potential of IoT based supply chain in India:

Here are some statistical data points that illustrate the current state and potential of **IoT based** supply chain in India:

According to a report by MarketsandMarkets, the IoT in supply chain market in India is projected to grow from USD 0.968 billion in 2019 to USD 3.298 billion by 2024, at a CAGR of 27.3% during the forecast period. The same report states that the growth of e-commerce, the need for real-time supply chain visibility, and the increasing adoption of connected devices are the major factors driving the growth of the IoT in supply chain market in India.

Another report by ResearchAndMarkets forecasts that the IoT enabled logistics and supply chain market in India will grow at a CAGR of 48.2% from 2020 to 2025. The report also states that the adoption of IoT in the Indian logistics and supply chain market is primarily driven by the need to improve supply chain visibility, optimize operational costs, and enhance customer experience.

According to a survey by Deloitte, IoT-enabled supply chain solutions have the potential to reduce logistics costs by 5-10%, improve delivery times by 15-20%, and increase asset utilization by 20-25%. These statistics suggest that the IoT enabled digital supply chain market in India is growing rapidly and has significant potential for further growth in the coming years.

Preparing Today's Supply Chains

Preparing today's supply chains involves adapting to the ever-changing business environment, customer expectations, and technology advancements. Here are some key factors that businesses should consider when preparing their supply chains:

Digital Transformation: As the world becomes more digital, businesses need to transform their supply chains to keep up with the pace of technological advancements. This includes adopting digital technologies such as cloud computing, big data analytics, artificial intelligence (AI), and the Internet of Things (IoT) to optimize supply chain operations.

Resilience: Businesses should aim to build resilient supply chains that can withstand disruptions such as natural disasters, economic downturns, and pandemics. This involves diversifying suppliers, building safety stocks, and investing in contingency planning and risk management.

Sustainability: Consumers are increasingly concerned about sustainability and expect businesses to adopt sustainable practices in their supply chains. This includes reducing carbon emissions, reducing waste, and ensuring ethical sourcing of raw materials.

Collaboration: In today's interconnected business environment, collaboration between supply chain partners is crucial to ensure the smooth flow of goods and information. Businesses should focus on building strong partnerships and communication channels with their suppliers, customers, and logistics providers.

Agility: Supply chains need to be agile to respond to changing market demands and customer preferences. This involves adopting flexible production processes, optimizing inventory management, and enabling real-time tracking of goods.

Preparing today's supply chains requires businesses to be proactive, innovative, and adaptable. By embracing digital transformation, building resilience, focusing on sustainability, fostering collaboration, and promoting agility, businesses can create supply chains that are optimized for

success in the ever-evolving business landscape. For these best solution is supply chain management software.

What is supply chain management software?

Supply chain management software also called SCM software, is used in accomplishing the management of activities across the supply chain. It is utilized in every aspect of supply chain management, including logistics and distribution, control of quality, and management of vendors. It helps in improving productivity and helps the user to better handle disruptions.

This is done by providing better visibility and control of the rising complex supply chain. An added benefit on top of their ERP and related technologies is that they can be improved with low-code process applications that incorporated recent systems and add agility to operations.

The key players operating in the market are-

1. SAP SE (Germany)
2. Oracle (US)
3. The Descartes Systems Group (Canada)
4. Infor (US)
5. IBM (US)
6. Manhattan Associates (US)
7. Logility (US), Kinaxis (Canada)
8. Blue Yonder (US)
9. Korber (US)
10. Coupa Software (US)
11. Epicor (US)
12. BluJay Solutions (US)
13. Llamasoft (US).



Common IOT application:-

There are various IoT-based applications used in supply chain management. Here are some of the most commonly used ones:

Asset tracking and monitoring: IoT devices such as RFID tags, GPS trackers, and sensors can be used to track and monitor the movement and condition of assets such as goods, equipment, and vehicles in real-time. This helps businesses optimize their inventory management, improve asset utilization, and reduce the risk of theft or loss.

Predictive maintenance: IoT devices can be used to monitor the condition and performance of equipment and machinery in real-time, allowing businesses to predict and prevent equipment failures before they occur. This helps businesses reduce downtime, lower maintenance costs, and improve operational efficiency.

Quality control and compliance: IoT devices can be used to monitor and track the temperature, humidity, and other environmental conditions of goods during transit, ensuring that they meet quality and compliance standards. This is particularly important for industries such as pharmaceuticals and food, where strict regulations apply.

Supply chain visibility: IoT devices can be used to provide real-time visibility into the supply chain, allowing businesses to track the movement of goods and identify any bottlenecks or delays. This helps businesses optimize their supply chain operations, improve customer satisfaction, and reduce costs.

Automated warehousing: IoT devices can be used to automate warehousing operations such as inventory management, picking, and packing. This helps businesses improve efficiency, reduce errors, and lower labor costs.

IoT-based applications provide businesses with greater visibility, control, and efficiency in their supply chain operations, helping them improve customer satisfaction, reduce costs, and gain a competitive edge.

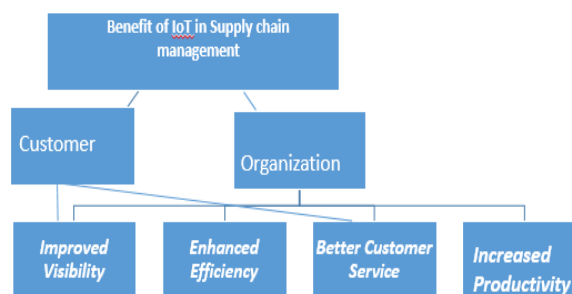
IoT-enabled supply chain management (SCM) is a promising approach to optimize supply chain processes by leveraging real-time data and analytics. In India, where supply chain inefficiencies are common, IoT-enabled SCM can bring significant benefits. In this review, we will discuss the benefits, challenges, and critical success factors of IoT-enabled SCM in India.

Benefits

Improved Visibility: IoT sensors can provide real-time data on inventory levels, shipment location, and condition. This improves visibility and allows for better decision-making.

Enhanced Efficiency: IoT-enabled SCM can reduce delays, optimize routes, and automate processes. This leads to enhanced efficiency and cost savings.

Better Customer Service: IoT-enabled SCM can provide real-time information on shipment status and estimated delivery times. This improves customer satisfaction and loyalty.



Increased Productivity: IoT-enabled SCM can automate routine tasks, freeing up employees to focus on more complex tasks. This leads to increased productivity.

Challenges

Data Security: IoT-enabled SCM generates a massive amount of data that must be securely stored and transmitted.

Interoperability: IoT devices from different manufacturers may not be compatible, which can create integration challenges.

Cost: The cost of implementing IoT-enabled SCM can be high, especially for small and medium-sized businesses.

Skill Gap: Implementing IoT-enabled SCM requires specialized skills that may not be readily available in the workforce.

Critical Success Factors

Clear Objectives: Having clear objectives and a well-defined plan is crucial for the successful implementation of IoT-enabled SCM.

Robust IT Infrastructure: A robust IT infrastructure is necessary to support the implementation of IoT-enabled SCM.

Skilled Workforce: A skilled workforce is essential for the successful implementation of IoT-enabled SCM.

Collaboration: Collaboration between different stakeholders is necessary for the successful implementation of IoT-enabled SCM.

Flexibility: IoT-enabled SCM should be designed to be flexible and adaptable to changing business needs.

Conclusion

IoT-enabled SCM has the potential to bring significant benefits to supply chain management in India. However, the challenges must be addressed, and critical success factors must be implemented to ensure successful implementation.

Recourse

- 1) Akbari, M., & Hopkins, J. L. (2022). Digital technologies as enablers of supply chain sustainability in an emerging economy. *Operations Management Research*, 15(3-4), 689-710.
- 2) Pimsakul, S., Samaranayake, P., & Laosirihongthong, T. (2021). Prioritizing enabling factors of IoT adoption for sustainability in supply chain management. *Sustainability*, 13(22), 12890.
- 3) <https://trucknet.digital/blog/2021/11/10/technology-adoption-in-supply-chain-and-logistics/>
- 4) <https://www.indianretailer.com/article/technology/digital-trends/supply-chain-technology-trends-that-will-impact-businesses-in-2022.a7724>
- 5) <https://www.manufacturingtodayindia.com/sectors/%EF%BF%BCadoption-of-digital-technologies-that-are-reforming-the-indian-logistics-space>
- 6) <https://zhenhub.com/blog/adopting-a-digital-supply-chain/>
- 7) <https://www.stratviewresearch.com/2759/supply-chain-management-software-market.html>
- 8) <https://www.kbvresearch.com/supply-chain-management-software-market/>