The Impact of Technology on Supply Chain Management and Logistics: An Analytical Study

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Abstract

The development of technology significantly affects the fields of supply chain management and logistics. These areas now operate more effectively, quickly, and economically because of the integration of technology. Businesses have been able to improve customer service, optimize inventory management, and streamline the supply chains by utilizing automation, artificial intelligence, blockchain technology. Furthermore, the development of digital platforms and software programs has made it possible to track and monitor shipments in real-time, improving visibility and transparency throughout the whole supply chain. As a result, there is a lower chance of mistakes and delays occurring, and businesses are better able to make data-driven decisions and react rapidly to shifting market demands. Additionally, technology has aided in the development of novel business models, such as e-commerce, which have completely altered the conventional supply chain and logistics industry. Companies now need to accommodate smaller, more frequent orders and offer quicker delivery dates due to the increase of internet purchasing. This prompted the creation of fresh strategies and the innovation of delivery drones and autonomous vehicles. In conclusion, technology has transformed logistics and supply chain management, creating new chances for businesses to enhance customer experience, improve operations, and gain a competitive edge.

Keywords: Technology, Artificial Intelligence, Globalization, Sustainability, Development.

Introduction:

The whole world is growing at a pace that was once an imagination. The major credit must be given to the technological advancements that impacts the life of every human being existing. No field is left untouched with the glory of these advancements. Technological improvements in recent years significantly impacts the modern logistics, supply of goods and services. Due to the growth of e-commerce and globalization, businesses are continuously looking for ways to streamline the supply chain operations and promptly and economically satisfy client needs. Many of these issues now have technological answers, allowing companies to optimize the supply chain networks, boost productivity, and improve consumer experiences. Visibility is the major portion where technology has made a huge difference. Businesses can now follow the products from the origin point to delivery point with the use of real-time tracking and monitoring technologies, giving more visibility and control over the supply chain. As a result, companies are now better able to control inventory levels, lower the possibility of stockouts, and enhance the performance of on-time deliveries **(Yu et al. 2016).**

The use of automation and robots is another area where technology has had a huge impact. Businesses may now optimize the supply chain processes, which lowers the demand for manual labor and boosts operational effectiveness. The introduction of automated storage and retrieval systems, autonomous guided trucks, and robotic picking systems has improved speed and accuracy in the fulfilment process, making robotics particularly beneficial in warehousing and distribution. The development of AI tools

and blockchain significantly impacts supply chain management and logistics. In order to give organizations useful insights into the supply chain operations, AI and ML technologies can be utilized to analyze enormous amounts of data. This can assist pinpoint problem regions, optimize inventory levels, and raise the precision of forecasts. Additionally, businesses can employ AI and ML to automate decision-making procedures, allowing these to make judgements more quickly and with greater knowledge **(Wang et al. 2016).**

Another emerging possibility for addressing issues with the logistics is by using blockchain technology. Blockchain improves visibility as well as accountability across the supply chain by establishing a decentralized and transparent ledger of transactions. This could increase compliance with rules, decrease fraud, and improve traceability. Last but not least, businesses are now able to connect with customers in fresh and creative ways because of the usage of digital platforms and e-commerce. Businesses may now sell the goods to customers anywhere in the world, regardless of where customers are physically located, because of the growth of online marketplaces and digital platforms. This has made it possible for organizations to generate revenue streams, enhance client experiences, and grow the consumer bases **(Hackius, N., & Petersen, M. 2017).**

In a nutshell, supply chain management and logistics has significantly impacted by technology recently. Businesses have been able to improve operational efficiency, optimize supply chain operations, and improve customer experiences because to the usage of real-time tracking and monitoring systems, automation and robotics, AI and ML, blockchain, and digital platforms. As technology develops further, it's conceivable that even more creative solutions to the problems associated with the industries and its operations will become available. The use of technology in has changed dramatically and has eventually affected the major industries to explore and develop the market.

Literature review:

Technology may improve management in different ways as well as increase corporate productivity. Although more effective inventory tracking along with distribution is one possibility, the real value of technology in this management comes in saving the cost, improved customer experiences, and better efficiency. Contrary to other industries, the logistics sector has been somewhat hesitant to adopt latest technical advancements, but recently, a continuous wave of technological advanced products and solutions for management and operations has developed. Technology integration may greatly increase the productivity and cost-effectiveness of logistics systems. Supply chain management and logistics have seen substantial changes because of the introduction of competitive technologies which has not only impacted the industry growth but also the nation's growth on a wider aspect. Figure 1 shows the various applications of AI in the SCM:
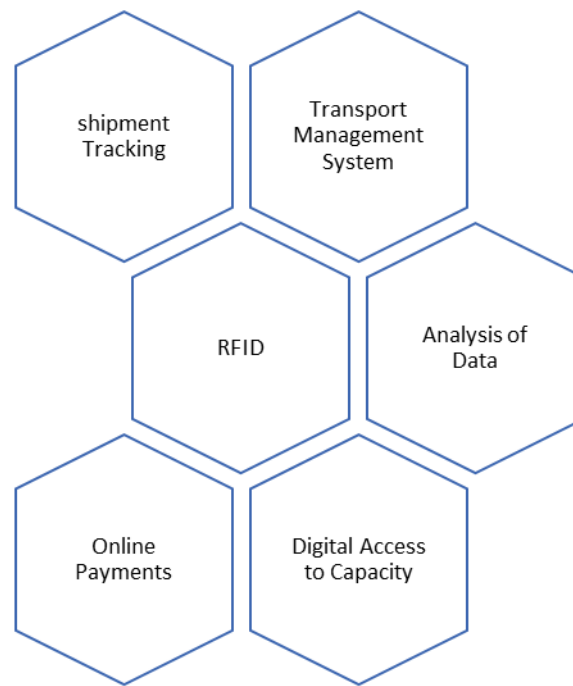
Figure 1 Applications of Artificial Intelligence in Supply Chain Management

Benefits Of Technology On Supply Chain Management:

Shipment Tracking: Shippers can now simply and quickly confirm the location of the cargo while also keeping an eye on delivery dates and potential delays because of the growing affordability of GPS devices. As a result, the tracking of shipments has been enhanced. Despite this, many shippers still rely on contacting carriers or drivers for tracking information to modify delivery timetables. Given the present accessibility of a software that can track information and can notify with automatic emails, consigners must deliberately demand that the contracted consignees provide either an automatic tracking alert system or an online web-based cargo tracking portal **(Stadtler, H. 2014).**

Transportation Management Systems (TMS): TMS systems allow shippers to efficiently combine and streamline inventory levels. Goods Movements is an easy-to-use computer system even though there are several TMS systems which provide shipping document management and management options. Less than 30% of shippers, on the other hand, use TMS systems to coordinate inventories and consignments in comparison to using excel, dispersed document, stats, which frequently necessitates several emails and phone calls for freight management **(Sukati et al 2012).**

Analysis of Data: In the supply chain industry, the collection of consignment data has improved along with the adoption of new technology to the point that even small shippers may now benefit from data-driven decision-making in a comparable fashion to big shippers. Data collection and examination of every data and mode choice throughout the period of the year might yield considerable information about the best affordable and dependable service options currently offered. It is possible to significantly improve supply chain efficiency and reduce costs by merging consignment data with required inventory levels and monitoring all this through technologies **(Stadtler, H. 2014).**

Digital Access to Capacity: Historically, to reserve cargo inside the carrier network, shippers have frequently turned to emails or phone conversations. Executing the cargo plan in this manner, however, can be laborious and slow. The good news is that more recent logistics firms that have embraced digital technology are rewriting the rules by offering a

fully digital platform. With the help of this platform, shippers can easily reserve cargoes and get access to comprehensive shipment analytics and tracking data. Shippers may now concentrate more on supply chain optimisation using the easily available data thanks to the automation of regular activities. **(Sukati et al 2012).**

Online Payments: It is simple to control expenditure in the supply chain via shipment routes and to keep track of the stock-keeping unit (SKU) by the integration of accounts and supply chain cost recording into a digital provider like TMS. Additionally, cloud-based invoice management tools and a user-friendly payment interface makes it simple for consumers to make payments and expedites accounts payable. Online bill payment for transformation services can save a lot of time for small businesses. **(Stadtler, H. 2014).**

RFID- Supply chain management and logistics has completely transformed by radio frequency identification technology. Small devices called RFID tags can be affixed to goods, pallets, and other supply-chain components. Companies are able to follow the location and movement of the products in real-time because of the RFID scanners that can read the distinctive signal sent by these tags. By enhancing supply chain visibility and effectiveness, this technology has helped businesses better control inventory levels, cut waste, and speed up order fulfilment. **(Sarac et al. 2010).**

Challenges And Opportunities:

There are various potential and obstacles associated with the technology's incorporation into supply chain management and logistics. Data security is the biggest obstacles. Companies must make sure that this data is safeguarded from cyber-attacks as more data is transmitted throughout the supply chain. The demand for new abilities and knowledge presents another difficulty. Companies must spend in the education and training of the staff as new technologies are implemented in order to guarantee that people have the technical

know-how required to use and maintain these technologies.

Major Technological advancements: Real-time tracking of products and shipments is now possible because of the growing technologies. IoT sensors that are linked to products can give real-time updates on their position as well as other crucial conditions like temperature and humidity. Additionally, organizations can benefit from artificial intelligence (AI) by better controlling inventory levels, forecasting demand trends, and enhancing supply chain visibility. Predictive analytics enabled by AI allows businesses to identify possible supply chain disruptions early and take precautions to reduce risks. Businesses may identify the origins of raw materials and assure ethical sourcing practices by using blockchain technology, which is another helpful tool that improves supply chain transparency and traceability. Robots are used for picking, packaging, and shipping jobs in order to automate warehouse and distribution center operations. Robots can operate continually without making mistakes or being tired, making this technology more efficient than human labor. Robotics also increases worker safety by decreasing the likelihood of mishaps and injuries. Supply chain managers are better equipped to make choices with real-time access to crucial information like inventory levels, shipping statuses, and delivery timetables. The visibility and efficiency of the supply chain are further increased through the use of cloud computing, which promotes communication between retailers, distributors, and suppliers **(Prajogo, D., & Olhager, J. 2012).**

Conclusion:

Organizations have strategic potential to acquire a competitive edge by implementing new technologies across a range of management tasks, including supply chain management and logistics. However, based on variables like application, accessibility to the pertinent organizational infrastructure, culture, and management principles, the choice of the

right technology is vital in determining the degree of success as one must remember that everything comes at a cost. Adoption of information, communication, and automation technologies has greatly sped up the rate at which data is identified, gathered, processed, analyzed, and transmitted in logistics while maintaining high standards of accuracy and dependability. Technology can improve the general efficacy and efficiency of logistics systems, which will help the supply chain succeed. India is relatively sluggish to adopt new logistical technologies, despite wealthy countries generally doing so.

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