Evaluation of Information Technology's Impact on Global Supply Chain and Logistics

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ABSTRACT

This paper evaluates the impact of Information Technology (IT) on the global supply chain and logistics industry. With the increasing complexity and globalization of supply chains, IT plays a vital role in enhancing efficiency, visibility, and collaboration among supply chain stakeholders. This evaluation explores various IT solutions and technologies, such as supply chain management systems, advanced analytics, Internet of Things (IoT), and blockchain, and their effects on different aspects of the supply chain, including procurement, production, inventory management, transportation, and customer service. The evaluation also discusses the challenges and opportunities associated with IT implementation in the global supply chain and highlights the potential benefits, such as reduced costs, improved responsiveness, enhanced sustainability, and better risk management. By analyzing current trends and case studies, this evaluation provides insights into the transformative impact of IT on the global supply chain and logistics industry and highlights the importance of IT adoption for businesses to stay competitive in today's interconnected world.

Keyword: Information Technology; IT; global supply chain; supply chain

INTRODUCTION

The global supply chain and logistics sector has been severely impacted by the pervasive presence of information technology in today's industries. Due to the fast development of technology, businesses have adapted their supply chain operations by using new tools and processes. Examining vital areas including inventory management, transportation, storage, and overall supply chain resilience, this analysis seeks to examine the complex influence of information technology on the world's supply chain and logistics.

It is impossible to overestimate the influence that information technology has had on the global supply chain and logistics business. Artificial intelligence, big data analytics, the Internet of Things (IoT), and cloud computing are just some of the cutting-edge technologies that have revolutionised global supply chain management. As a result of these technology developments, the supply chain network has become more streamlined, transparent, efficient, and collaborative. In this analysis, we'll look into the far-reaching consequences of IT on the worldwide supply chain and logistics sector, considering how these developments have affected crucial facets of the business including inventory management, transportation, storage, and continuity as a whole. By delving into these facets, we can get a full picture of how information technology has modified the contemporary state of the global supply chain.[1]

"That part of the supply chain process that plans, implements, and controls the efficient, effective, forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customer requirement" is how the council of logistic management defines logistics. Right product, right location, right time, right condition all mean the same thing in everyday English. However, the supply chain includes all processes necessary to fulfil the order. The process begins with the supplier and continues via the manufacturer, distributor, retailer, and on to the end user. Management of the flow of resources, data, and money from a supplier to a manufacturer to a wholesaler to a retailer to a consumer is the purview of supply chain management. Organisations may gain strategic benefits in logistics and supply chain management, among other

management functions, as a result of the emergence of new technology. However, the degree of success is dependent on factors such as the availability of enough organisational infrastructure, culture, and management policies, and the selection of the appropriate technology for the application. The logistics industry has benefited greatly from the rapid and accurate identification, data collection, processing, analysis, and transfer made possible by information, communication, and automation technology. Businesses may increase their efficiency and competitiveness with the help of technology. By improving the logistics system as a whole, it contributes significantly to the success of the supply chain. While many advanced countries utilise cutting-edge logistics technology, India's pace of adoption is painfully sluggish. The liberalisation of the Indian economy has increased competitiveness, and the only way to survive is to adopt technology-enabled business practises.[2]

AUTOMATIC IDENTIFICATION TECHNOLOGY

The phrase "Automatic Identification" (Auto ID) refers to the practise of entering data or information into a computer system, PLC, or other microprocessor-controlled device without using a keyboard. Bar codes, RFID tags, and voice recognition are all examples of such systems. Auto ID may be used to monitor the location of a truck or other vehicle transporting products for on-time delivery to clients. Accuracy, cost savings, speed, and ease of data storage and processing are just few of the many advantages of automatic identification technology.[3]

Inventory Management: Information technology has revolutionized inventory management practices by enabling real-time tracking and visibility of inventory levels. Automated systems, powered by technologies like RFID (Radio Frequency Identification) and barcode scanning, provide accurate and up-to-date inventory data, minimizing stockouts and overstocks. Additionally, advanced analytics tools allow businesses to forecast demand, optimize inventory levels, and automate replenishment processes, improving overall supply chain efficiency.

Transportation: Technology has transformed transportation logistics by enhancing route optimization, delivery tracking, and fleet management. Global positioning systems (GPS) enable real-time tracking of shipments, providing visibility into their status and facilitating proactive decision-making. Furthermore, digital platforms and mobile applications have emerged, connecting shippers, carriers, and customers, enabling efficient collaboration and communication across the supply chain.[4]

Warehousing: Information technology has revolutionized warehousing operations through the implementation of automated systems and robotics. Warehouse management systems (WMS) streamline processes, from receiving to order fulfillment, improving inventory accuracy, and reducing errors. Additionally, technologies like automated guided vehicles (AGVs) and robotic picking systems enhance operational efficiency by automating tasks, increasing throughput, and reducing labor costs.

Supply Chain Resilience: Technology plays a vital role in enhancing supply chain resilience. Cloud computing and data analytics enable real-time data sharing and analysis, facilitating proactive risk management and decision-making. Furthermore, technologies like blockchain provide transparency and traceability, ensuring the authenticity and integrity of supply chain transactions. In times of disruptions, such as natural disasters or global crises, technology enables agile responses, alternate sourcing strategies, and dynamic rerouting, ensuring continuity and minimizing the impact on the supply chain.[5]

LITERATURE REVIEW

Abror Hoshimova Mahsa Mahdavi Sharifa, Anna C. Caglianoa (2021) Industry 4.0 and related digital technologies provide real-time data access and information sharing. Supply Chain Management (SCM) has to look into this potential so that we can learn more about how various digital technologies are influencing the habits of SC participants as a whole. In this study, we focus on the implications of Cloud Computing, the Internet of Things, and Big Data Analytics on real-time information sharing across many SC echelons rather than inside a single echelon. It also takes a lot of money to put these technologies into actual SC. In addition, the added complexity of the SC after implementing these technologies calls for a thorough analysis of how they affect SC behaviour and

performance. This research suggests simulation as a practical and thorough approach to studying the impact of digital technology on SC performance. Using System Dynamics (SD) modelling, we simulated a three-tiered manufacturing SC in both analogue and digital SCM settings. Compared to conventional SCs, digital SCs perform much better in terms of inventory level, cost, and order fulfilment rate. The model will be improved in the future via studies that compare simulation findings to actual instances in the business world. [6]

Hilda Kundai Chikwanda and Andile LN Zulu (2021) The primary objective of this research is to get a better understanding of the supply chain logistics sector by examining the problems faced by the sector and the technological innovations that have been developed to attempt to solve those problems. The report does this by conducting a comprehensive literature assessment of relevant works in the field, therefore revealing research strengths and limits and giving suggestions for future research. The evaluation was carried out by searching certain databases using keywords. Through the process of inclusion and exclusion evaluation, a total of 34 applicable papers were located. The article begins with a review methodology before moving on to the report's two key concepts: supply chain logistics problems and innovative technologies. Results from a literature review are given for these two ideas, and key findings are highlighted. This study, based on a survey of the relevant literature, may help other researchers better understand the connection between supply chain logistical problems and technological advances.[7]

Rajiv Bhandari (2018) In Greek, "logistike" meant "the art of calculation," which is where our modern term "logistics" comes from. The current meaning of logistics, however, can be traced back to the military, where it was used to describe the processes involved in the acquisition of ammunition and other necessities for frontline soldiers. In addition to overseeing interactions with vendors and consumers, logistics include the management of all aspects of the supply chain. On the other hand, the goal of logistic management is to meet those objectives by coordinating and integrating the supply chain. The primary goal of this article is to identify and classify the numerous information, communication, and automated identification technologies utilised in logistics and supply chain management. The implications of the technology on logistics and supply chain management are also discussed in the article. The author relies heavily on secondary sources to compile information on the several technologies used in supply chain and logistics management. The author concludes that technological advancements improve the overall efficiency and efficacy of the logistics system, which in turn boosts the competitiveness and performance of the supply chain. Technology advancements have also made the process quicker, less strenuous, and less of a chore.[8]

Michael J. Ferrantino (2016) A more integrated model of supply chain management is emerging as a result of the reorganisation of supply chains using cutting-edge technologies like the Internet of Things (IoT), big data analytics, and autonomous robotics, from a linear one in which instructions flow from supplier to producer to distributor to consumer, and back. While many of these methods find their natural home in the world of online shopping, they also show potential for increasing productivity in traditional businesses. Costs are being cut, production is becoming more agile in response to consumer demand, the number of jobs has increased (employment in supply chain sectors where such technologies are most likely to be applied has grown much more rapidly than in other supply chain sectors and the economy as a whole), and consumers are saving valuable time thanks to these innovations. It is unclear how these technologies will affect the length of supply chains; for example, they could shorten supply chains by encouraging the reshoring of manufacturing production to high-income economies, thereby reducing opportunities for developing countries to participate in GVCs, or they could strengthen GVCs by reducing coordination and matching costs.[9]

Catherine Marinagia, Panagiotis Trivellas, Damianos P. Sakas (2014) This research investigates how supply-chain competitiveness might be bolstered via the use of IT practises. An organisation has a competitive advantage if it has the characteristics that allow it to stand out from its rivals. According to the bulk of the relevant empirical research, the most crucial sources of competitive advantage are price/cost, quality, delivery dependability, product innovation, and time to market. Organisations understand that, in order to acquire supply chain efficiencies in light of the changing standards in the economic climate and the increased intensity of global competition, they must re-evaluate their enterprise business model. Supporting internal activities and exchanging information with supply

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chain partners efficiently may help businesses face these issues and gain a competitive edge. Therefore, businesses need to take use of IT, namely corporate programmes like ERP and CRM, as well as e-procurement and e-commerce. A study of 76 Greek manufacturers found that IT practises and procedures were critical to establishing a competitive advantage based on Supply Chain Management. Implications for managers are highlighted.[10]

METHODOLOGY

The survey approach was used to obtain primary data by means of a structured questionnaire. We have compiled secondary data from a wide range of print and online sources. In order to acquire questionnaire data, a purposeful sampling strategy has been used. 105 respondent were surveyed for this study. Madhya Pradesh is the site of the research. Analyses have been performed using the Chi-square test and a simple percentage breakdown.

DATA ANALYSIS

TABLE: 1.1 ANALYSIS AND INTERPRETATION PERCENTAGE ANALYSIS

Demographic variables	Particulars	Participants Quantity	Percentage
Time Spent in the Industry	0 to 5years	37	33.6
	5 to 10years	55	50
	10 to 15years	14	12.7
	More than 15years	4	3.6
Type of technology that is currently in use	Electronic Data Interchange	51	19.17
	Barcode Scanner	29	10.9
	Radio Frequency Identification	55	20.68
	Enterprise Resource Planning	44	16.54
	System Application Product	8	3.01
	Distribution	45	16.92
	Requirement Planning		
	Integrated logistic portal/E-market place	34	12.78
	Integrated logistic portal/	31	28.2
	Radio Frequency Identification application	19	17.3

	Local Area Network, GPS (Global positioning System)	21	19.1
	Web-based E-mail and mobile application	39	35.5
Satisfaction with current Technology	Yes	71	64.5
	No	1	0.9
	Maybe	38	34.5
Faced error / system crash	Often	13	11.8
	Sometimes	70	63.6
	Not at all	27	24.5
Gained more accuracy than with manual modes	Strongly agree	54	49.1
	Agree	43	39.1
	Neutral	11	10
	Disagree	2	1.8
	Strongly Disagree Easier	Nil	Nil
	access to		
Technologies in supply chain process in southern region	different states	66	60
	Profitability	5	4.55
	Accessing data from any	39	35.45
Problems facing on the inter-connected technologies within region	Lack of knowledge	11	10
	Deficiency in storage	72	65.46
	Network issues	27	24.54

In the table above, we can see that 65 percent of respondents are satisfied with the current state of the art, 35 percent use web-based E-mail, 63 percent occasionally experience error or system crash, and 49.1 percent strongly agree that "use of IT is essential to my job."

Table 2: Chi– square

		Observed	**Expected**	Chi-	Asymp.
Enhanced Accuracy Compared to Previous Methods	Strongly agree	54	27.5		
	Agree	43	27.5		
	Neutral	11	27.5		

	Disagree	2	27.5		
Costs have gone down while productivity has gone up.	Strongly agree	34	22.0		
	Agree	36	22.0		
	Neutral	28	22.0		
	Disagree	10	22.0		
	Strongly disagree	2	22.0	41.818	.000

CONCLUSION

In conclusion, Information Technology (IT) has had a significant impact on the global supply chain and logistics industry. The implementation of IT solutions and technologies, such as supply chain management systems, advanced analytics, IoT, and blockchain, has improved efficiency, visibility, and collaboration among supply chain stakeholders. These advancements have led to reduced costs, improved responsiveness, enhanced sustainability, and better risk management. However, challenges associated with IT implementation exist, including integration complexities and cybersecurity risks. Nevertheless, businesses that embrace IT adoption and leverage its potential can gain a competitive advantage in the interconnected world of global supply chains. As technology continues to evolve, IT will remain a crucial driver for innovation and transformation in the supply chain and logistics industry. Companies are investing in IT because they have to in order to stay competitive, and this has had a major influence on the level of service they can provide to their clients. Technology has advanced at the same rapid rate as globalisation, which has increased communication between people in different parts of the globe and facilitated the distribution of a wider variety of goods to consumers in different regions. The competitive position of the supply chain has been improved as a result of the impact of technology on building solid relationships with clients, determining their requirements, and establishing sales channels. It is clear that in today's competitive market, every business needs a highly competent technology that assists them in interacting with their suppliers if they are to thrive. Therefore, the corporation must exercise extreme caution when selecting a technology that can help them save money and increase their profits.

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