An analysis of technology adoption in supply chain management

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Abstract: In order to ensure effective control of today's hypercompetitive market, the use of technology in supply chains is regarded as a precondition. In the supply chain, modern technologies are helping to create a better level of visibility, to reduce operating costs and improve customer satisfaction as well as retention. The use of technology in supply chain management is limited despite the acknowledged importance of it. Investment in technology is questioned by organizations. The use of technology in supply chain management is limited despite the acknowledged importance of it. Investment in technology is questioned by organizations. The areas where companies are using technology or intend to use it in the future have been defined in this paper. And their short term objectives for this Performance Company are looking for. For the study, data was collected from Roorkee in which 10 supply chain professionals were interviewed. Chancing of the exploration are company is picky in technology but planning to apply advance technology in future. The areas of businesses that use technology in the future or want to use it, as well as their immediate objectives for this performance company are identified in this report. The study was based on data collected from Roorkee, where 10 supply chain professionals were interviewed. Chancing of the exploration are company is picky in technology but planning to apply advance technology in future. The areas of businesses that use technology in the future or want to use it, as well as their immediate objectives for this performance company are identified in this report. The study was based on data collected from Roorkee, where 10 supply chain professionals were interviewed. Chancing of the exploration are company is picky in technology but planning to apply advance technology in future.. According to the research's findings, the company uses cutting-edge technology sparingly but plans to implement it in the future. The objective is to improve technology while lowering costs, speeding up delivery, and integrating functions.

Keywords: Supply chain management, adoption of Technology, Objectives of supply chain Management

1. Introduction:

In the current global business environment, the adoption of digital technologies in manufacturing is becoming more and more important. Manufacturing companies have been investigating the application of new digital technologies, such as artificial intelligence (AI), big data analytics (BDA), and the Internet of Things (IoT), in supply chain management (SCM) and production over the past ten years (Addo-Tenkorang and Helo, 2016; Caputo et al., 2016). SCM involves managing, improving, and controlling the information and material flows via a network of linked organizations between initial suppliers and end users (Christopher 2016). According to Arunachalam et al. (2018), these technologies are thought to be a promising way to enhance supply chain operations like scheduling, planning, logistics, and procurement. IoT has been widely used in transportation and manufacturing facilities to track and trace logistics and warehouse operations, as well as to monitor the production process (Hopkins and Hawking, 2018; Caro and Sadr, 2019). By applying BDA and AI to the real-time data gathered from IoT devices and other supply chain processes, there is potential for generating significant business value (Kache and Seuring, 2015). It might aid businesses in more accurate demand forecasting, inventory problem detection, resource allocation optimisation, and supplier relationship management. Therefore the objects of this study are to probe

i. Establish the drivers of supply chain technology adoption.
ii. Determine the level of supply chain adoption.
iii. Establish the relationship between extent of supply chain technology adoption and performance of organizations.

2. Literature Review

2.1 Importance of Supply chain Management:

Supply chain management (SCM) is crucial for businesses across various industries due to its significant impact on efficiency, cost management, customer satisfaction, and competitive advantage. According to the findings of Harrison and C. New's 2002 large international survey on supply chain performance, 93% of the surveyed companies

acknowledged the critical role that technology plays in achieving competitive advantage in the supply chain. A competitive advantage and cost savings are achieved by the company through an effective and efficient supply chain. Utilizing technology can aid in achieving these goals. Studies indicate that technology is used in supply chains. However, prior to actual implementation, little to no work has been done to determine the true level of technology use and the areas that the company is concerned about.

2.2 Importance of technology in supply chain Management:

Technology is integral to modern supply chain management, driving efficiency, visibility, communication, flexibility, cost reduction, customer satisfaction, risk management, sustainability, and scalability. By leveraging advanced technologies, businesses can optimize their supply chains, stay competitive, and meet the demands of a dynamic market. According to Enver Yücesan (2007), Web-based technology offers an almost free platform for improving transparency, removing information delays and distortions, and drastically lowering transaction costs. IT is the driving factor behind marketing success and customer satisfaction. Information technology has been identified as a critical component in improving supply chain performance. Over the past 20 years, significant advancements in information technology have made it possible for modern supply chain management to emerge ((Placeholder1)Fawcett, S.E., Wallin, 2011). This is due to the technology's ability to provide timely, accurate, and reliable information (Li, G., Yang, H., Sun, L., and Sohal, A.S., 2009), to improve integration and collaboration between partners, and to increase the agility and flexibility of the focal firm and its supply chain partners.

2.3 Adoption of technology:

Careful planning, strategic integration, and ongoing improvement are necessary when implementing technology in supply chain management. By utilising cutting-edge technologies such as block chain, IoT, automation, data analytics, cloud computing, and sustainable practices, companies can improve the transparency, efficiency, and adaptability of their supply chains, giving them a competitive advantage in the Business.

Source: Procurement Tactics

Figure 2.1 Adaption Rate of Technology in Supply Chain Management

Source: Tranifex

Figure 2.2 what are the main benefits of digitizing your supply chain

2.4 factors influencing supply chain technology adoption

There are three main important factors which include organizational and external factors such as organizational structure, supply chain member pressure, organizational size and organizational complexity. These factors are with specific reference to the manufacturing sector

i. Organizational structure
ii. Pressure From Other Supply Chain Members
iii. Size of the Organization

2.5 Challenges in adoption

Costs and Budgetary Restrictions: Supply chain technology implementation frequently necessitates a sizeable upfront investment in hardware, software, infrastructure upgrades, and training. Many organizations—small and medium-sized enterprises (SMEs) in particular—may struggle to justify the upfront costs of adopting new technology due to financial constraints.

1. Complexity of Integration: It can take a lot of effort and time to integrate new supply chain technologies with current systems and procedures. Compatibility problems, dissimilar data sources, and outdated systems could provide difficulties for the integration process. The successful adoption of new technologies and platforms depends on ensuring their seamless interoperability.

2. Data Quality and Standardization: Adoption of supply chain technology faces fundamental challenges related to data quality and standardization. Data that is erroneous, lacking, or inconsistent can compromise the efficacy of technological solutions and result in less-than-ideal decisions. To enhance data quality throughout the supply chain, organizations need to invest in data governance procedures, data cleansing technologies, and standardization initiatives.

3. Change Management and Organizational Resistance: The implementation of supply chain technology may be hampered by organizational inertia and resistance to change. Because they are unfamiliar with the technology, fear losing their jobs, or believe that new technologies will interfere with their current workflows; employees may be reluctant to accept new ones. To overcome resistance and promote an innovative culture, it is imperative to implement effective change management strategies, training programmers', and stakeholder engagement initiatives.

4. Concerns about data privacy and cyber security: Cyber security and data privacy issues have gained prominence as supply chain processes become more digitally automated. Data breaches, cyber attacks, and unauthorized access to private information are risks that organizations must deal with. When adopting supply chain technology, safeguarding digital assets, putting strong cyber security measures in place, and abiding by data protection laws are essential factors to take into account.

5. Partner and Supplier Collaboration: Adopting supply chain technology frequently entails working with partners, suppliers, and other stakeholders from all around the ecosystem. It can be difficult to guarantee alignment, transparency, and interoperability with outside partners, especially in international supply chains with diverse networks of vendors and service providers. Achieving successful technology adoption requires the establishment of efficient channels for communication, agreements for data sharing, and cooperative platforms.

3. Research Methodology

Stratified sampling was applied to pick 10 respondents such that each of the sectors was adequately represented in the study. The choice of the sectors was expected to reduce the study cost for the researcher and it's expected that the sector provided a sample that represent adequate elements of the manufacturing sector in Roorkee .The industry under study was divided into main sub-sectors. These were listed below;

Name of organisation	Sector/Industry	Number of employees in Organization	How long has your organization been operating in the Indian market?
SGS PHARAMA	HEALTHCARE	500 to 1000	15+ YEARS
VRL LOGISTICS	LOGISTICS	More than 1000	15+ YEARS
SAFEEXPRESS	LOGISTICS	More than 1000	15+ YEARS
PRITAM INTERNATIONAL	COSMATICS	More than 1000	15+ YERAS
WONDER ELECTRICAL	ELECTRICAL	More than 1000	20+ YEARS
GOLD PLUS FLOT GLASS	MANUFACTURE	More than 1000	20+ YEARS
JYOTI LABS	PHARAMA	More than 1000	15+ YEARS
ACME INDUSRIES	HOSEHOLD	500 to 1000	15+ YEARS

POLYCAB	ELECTRICAL	More than 1000	20+ YEARS
PARAG TECHNOLOGIES	CONSTURCTION	500 to 1000	10+ YEARS

Research Methodology For the purposes of examining the use of technology in Supply Chain, two a priority constructs was developed: 1) The types of technology use in Supply Chain and 2) the forces of use with its objectives. Descriptive research methodology is used for the study. Characteristics of the repliers are citation in the following
Reports and company web-pages, research papers, company research reports etc. All the data collected was assay using graphs and tables

Data collection

Primarily, structured questionnaires were employed to gather data. The business received the questionnaire. Closed-ended questions with multiple choice, short answer, and Likert scale were included in the survey. Information from secondary information sources, including annual reports, company websites, research papers, company research reports, etc., was added to the data collected through the questionnaire. Graphs and tables were utilized to analyze all of the gathered data.

4. Research Question

Relinquishment of technology in the force chain performance isn't a new exploration problem. Over the years, different approaches and models have been introduced in the literature to explain this relationship between technology and supply chain performance. But is necessary to understand the factual position of perpetration of technology. Therefore the research questions formulated are

i. Reasons for adoption of Technology in Supply chain?
ii. No of objectives of Improvement in Supply Chain?
iii. Use of Technology in Supply chain?
iv. Reasons for not using technology
v. Parts of Supply Chain where Organisation Planning to implement Technology
vi. Technology in Supply Chain influences the following factors
vii. What is the Size of Warehouse Mark Given below Options?
viii. What is Type of Technology currently using in your warehouse?
ix. Performance outcome after implementing technologies
x. Technologies planning to implement in near future in warehouse

5. Data Analysis

At the end of data collection, the completed questionnaires were audited for absoluteness, edited for crimes and deletions before being enciphered and the data captured. Responses to the questionnaires were coded numerically, entered in an Excel spreadsheet for analysis and cleaned. Quantitative data was then imported.

1. Reasons for adoption of Technology in Supply chain

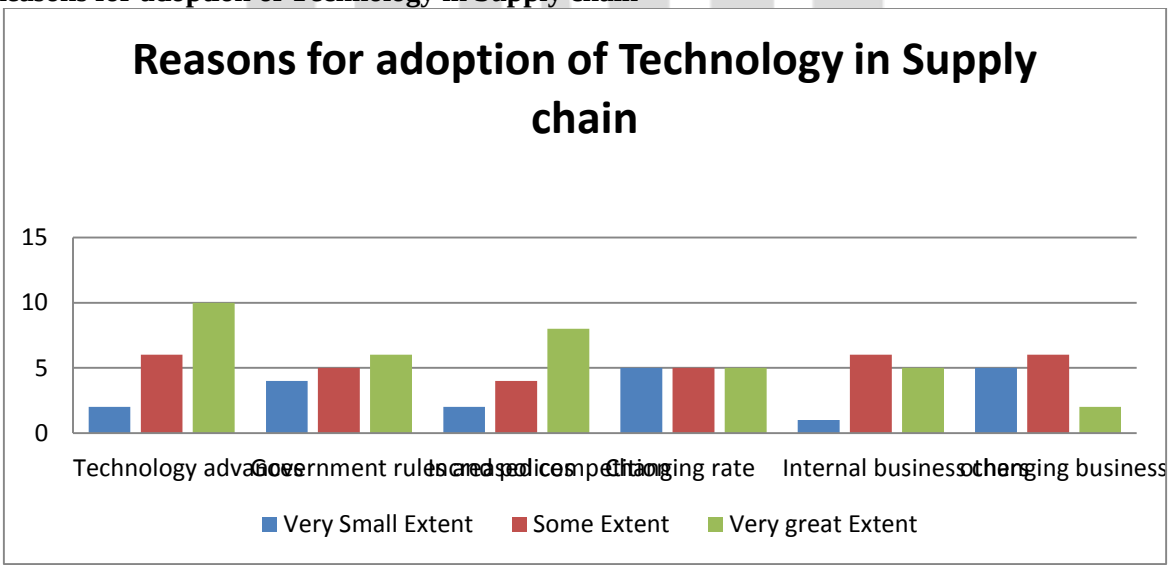

Figure 5.1: Reasons for adoption of Technology in Supply chain

The two main drivers of technology use in supply chains are increased competition and technological advancement.

2. Objectives of Improvement in Supply Chain

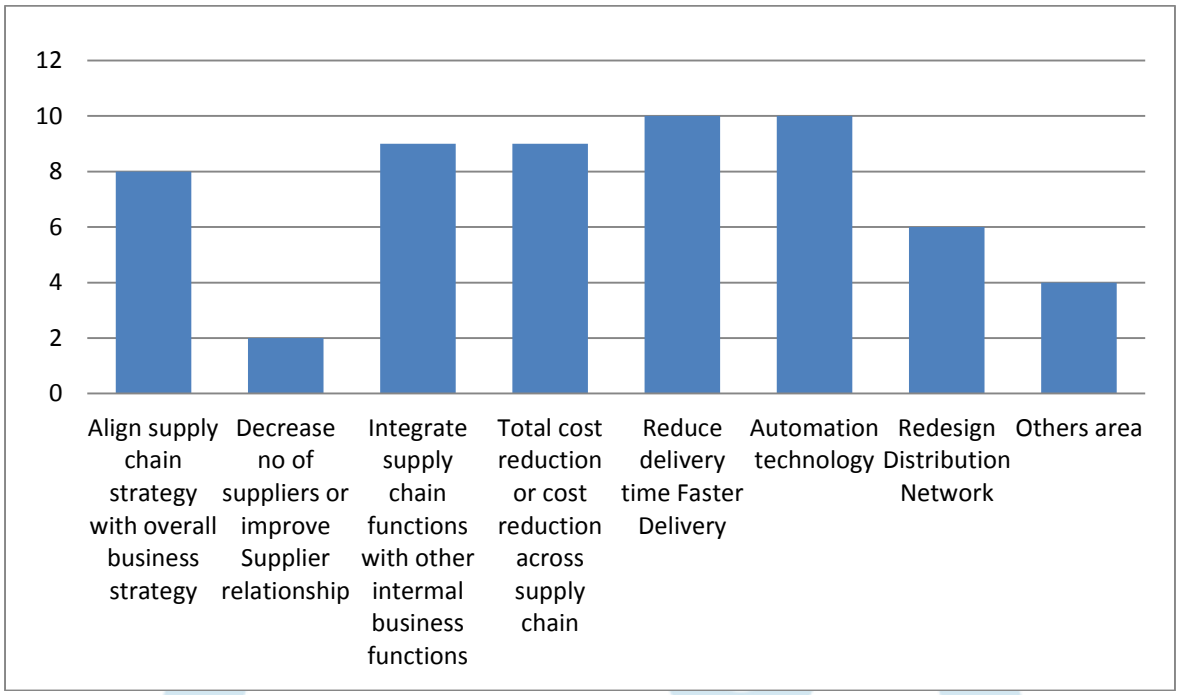

Figure 5.2: Objectives for overall improvement in Supply Chain

Integration of different functions, cost reduction, delivery times which are in turn driven by consumer needs, distribution network restructuring etc. is a key objective for improving supply chain performance.

3. Use of Technology in Supply chain

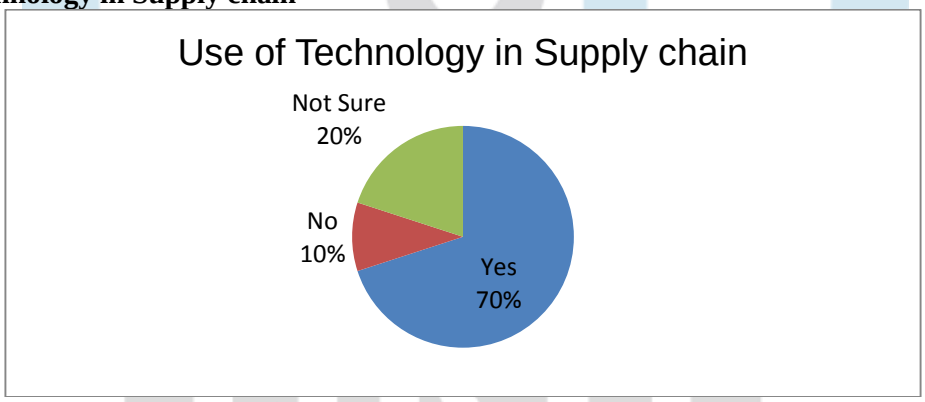

Figure 5.3: Use of Technology in Supply Chain

Out of 10 respondents 71% told they are using technology in their supply chain

4 Reasons for not using technology

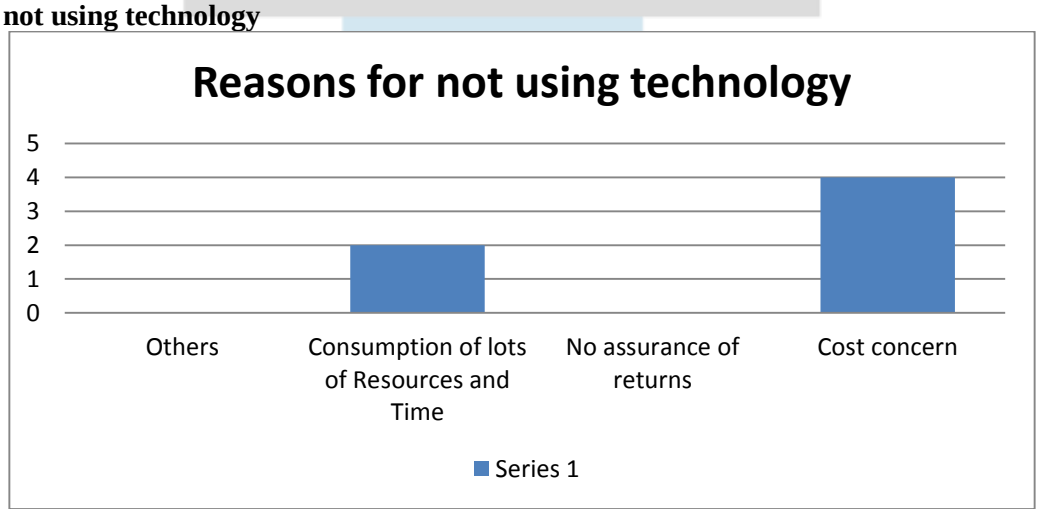

Figure 5.4: Reasons for not using technology

Cost, resource consumption and time are the main reasons for the use responded to 5.

5 Parts of Supply Chain where Organisation Planning to implement Technology

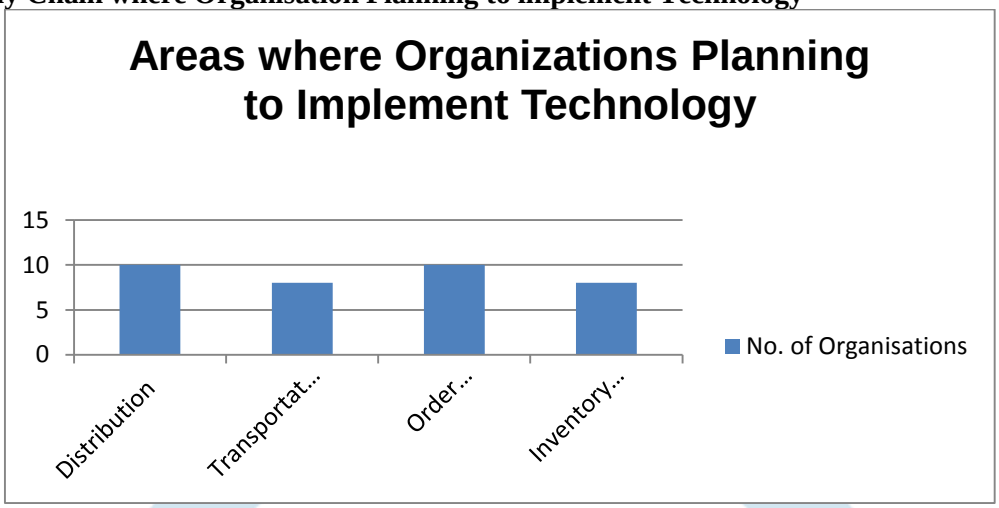

Figure 5.5: Areas where Organizations Planning to Implement Technology

Organisations plan to use technology in areas such as warehouses, distribution, transportation, order management and inventory.

6 Technology in Supply Chain influences the following factors

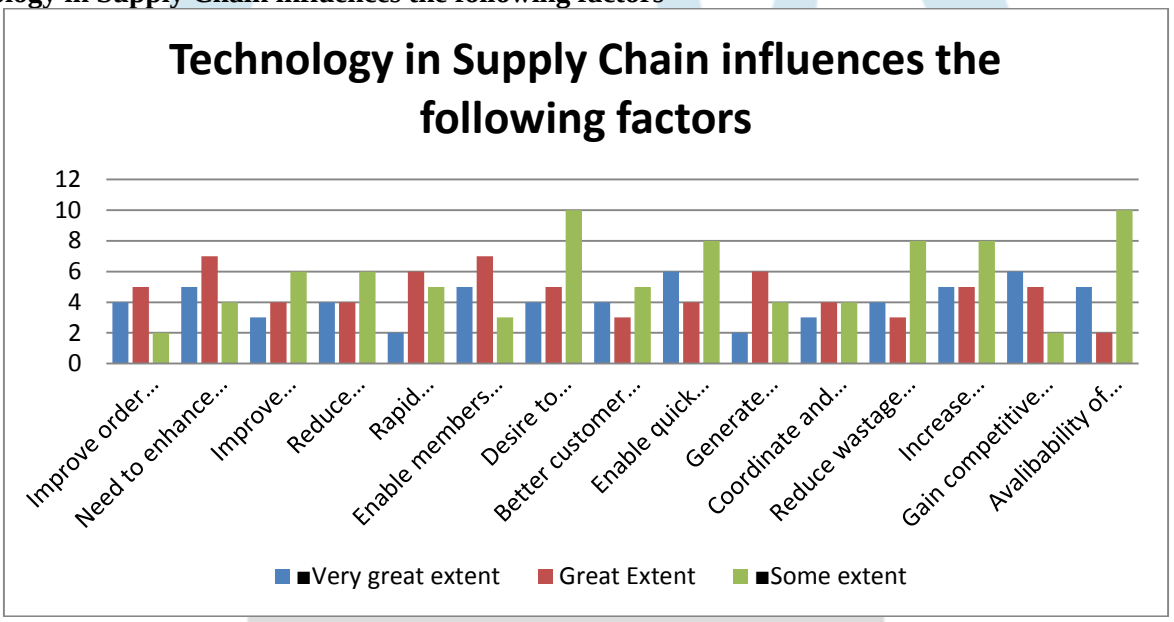

Figure 5.6: Technology in Supply Chain influences the following factors

Technology can only help to solve the problem in a limited way, according to most respondents.

7 Size of Warehouse

Less than 10000 sq ft	3	30%
10000sq ft to 50,000 sq. ft	4	40%
More than 1 lakh sq ft	3	30%

Table 5.1: Size of Warehouse

8 Type of Technology currently using in warehouse

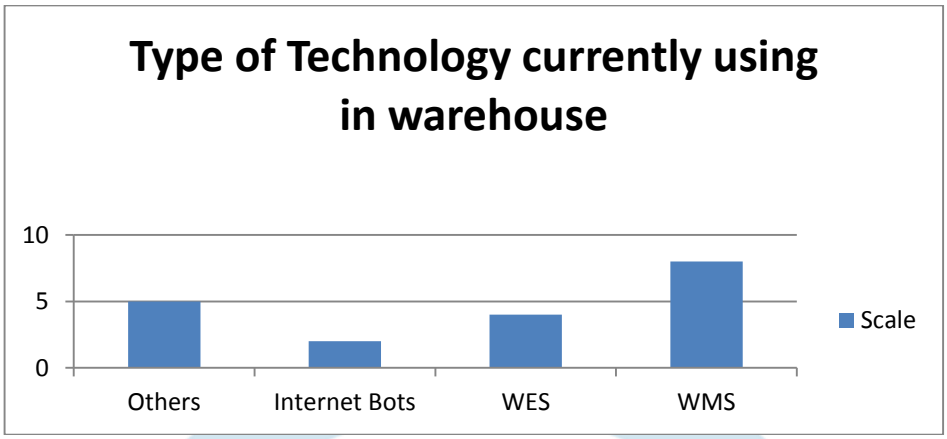

Figure 5.7: Type of Technology currently using in warehouse

9. Performance outcome after implementing technologies

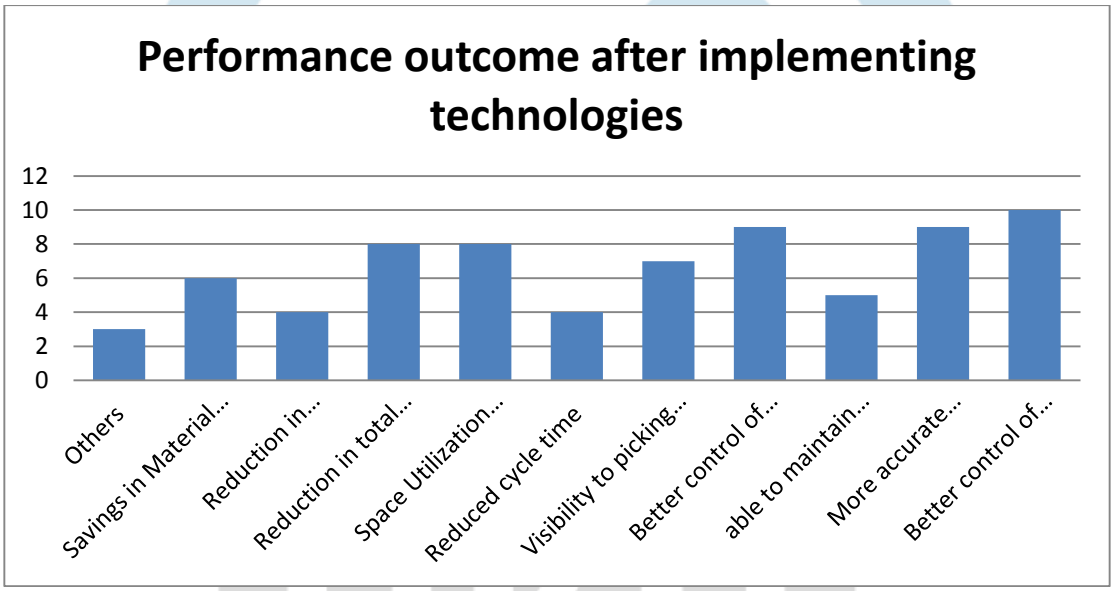

Figure 5.8: Performance outcome after implementing technologies

5.10 Technologies planning to implement in near future in warehouse

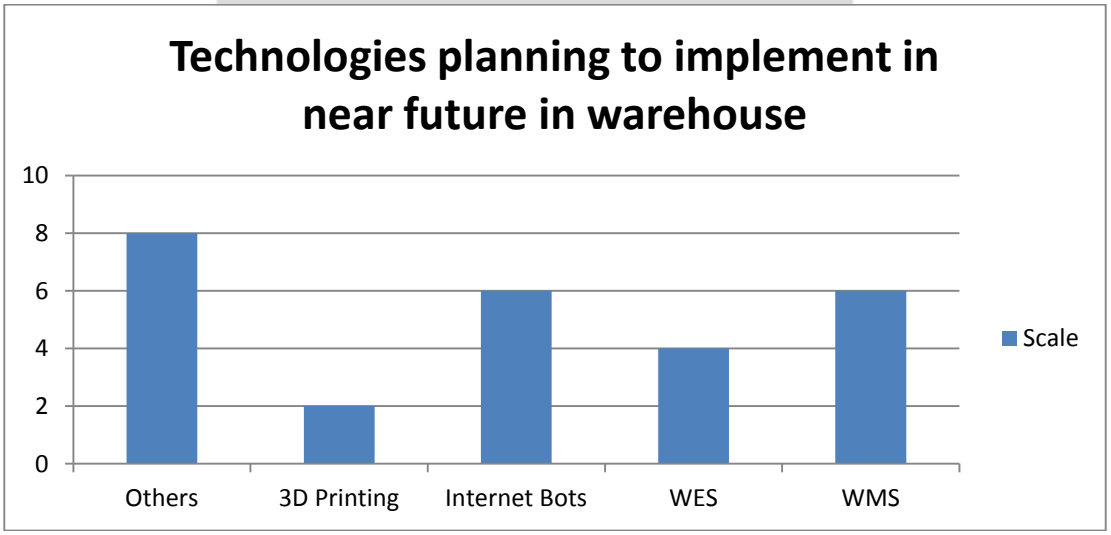

Figure 5.9: Technologies planning to implement in near future in warehouse

6. Discussion

The study's conclusions clarify the industry's ifs and buts regarding the application of technology in supply chains. The two main drivers of technology use in supply chains are increased competition and technological advancement. Other elements, such as internal company strategy and governmental laws and regulations, are also significant. Supply chain optimization's primary goals include integrating with other functions, cutting costs, speeding up deliveries, redesigning the distribution network to better meet customer needs, increasing performance, and improving visibility. While a lot of research has been done on the use of technology in supply chains and even a global survey explaining its usage and intended use, very little of it is used in Roorkee, which is representative of the Indian scenario. Even now, businesses are considering accepting the changes, but there may be a delay because of the availability of inexpensive labor, with cost being the primary factor. Businesses are under market pressure to perform, but at a lower cost and with higher-quality goods and services.

The results of the study suggest that organizations are wanted to implement, but it is not clear what will become of them. There's technology adoption, but there's also a need to take care of progress. The results of the study suggest that organizations are wanted to implement, but it is not clear what will become of them. There's technology adoption, but there's also a need to take care of progress.

Conclusion

In order to remain competitive, most industries now require supply chain integration and the technologies to make it happen. A growing number of businesses use technology to enhance inventory control and expedite delivery. They seek technology coordination in order to increase cost-effectiveness and operational efficiency. However, when thinking about the warehouse, WMS and order delivery fulfillment are the most frequently used technologies. In the future, businesses intend to use cutting-edge technologies like 3D and BOTS to meet the growing demands of their clients for better services and faster delivery times, as well as to boost internal productivity.

Based on the results, the study draws the conclusions that supply chain technology, when used as a tool, not only increases the efficacy and efficiency of operations, but also serves as a competitive advantage for the organization's strategy. Supply chain technology adoption is essential for cost savings and improved competitiveness, particularly in the wake of economic liberalization and globalization that sparked competition.

The study also comes to the conclusion that companies with flatter, more decentralized organizational structures should be more likely to have embraced cutting edge, innovative technology to improve coordination and communication both within the company and with supply chain partners.

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