

# Sustainability in Supply Chain

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**Abstract:-** This paper takes a look into how SC and its operations might be made more sustainable. The supply chain, on the other hand, has been explored in the previous. Discussions about SC sustainability have gotten a great interest in the current year, therefore the amount of research in this area is growing. Furthermore, this study emphasizes the relevance of achieving sustainability from a marketing viewpoint and covers data from current studies on distribution network sustainability's advantages and disadvantages.

This research is inspired by the industrial fact that supply chain management platforms are progressively introducing sustainable initiatives. Its goal is to develop an analytical framework to assist managers in making sustainable decisions while taking into account technological advancements. Surprisingly, a greater platform charge increases the chances of a win-win situation for both the system and the producers. It focuses on specifics and how they may employ technical advancements to leverage the role of supply chain sustainability to their competitiveness. Finally, a plan for achieving supply chain expertise and experience is offered.

The research revolves around the results of gaps that need to be addressed to achieve final sustainability performance and enhance the current supply chain. The current manufacturing sustainability method employs technology to raise the substance savings %, and this is the most important criterion for strategic sourcing. The application of technological trends, according to this study, offers a solid foundation for future sustainability and practical research.

**Keywords:-** Supply Chain Management, Sustainable Strategies, Technological Trends.

## I. LITERATURE REVIEW

➤ This paper discusses the theoretical background of Sustainability in the Supply Chain and proposed theories.

Xiong (2020) pointed out that sustainability became a worldwide issue as a resource, environmental, and societal challenges grow more prevalent. Supply chain firms must make broad changes to the economic, environmental, and social gains they confront while following their progress, and bring the sustainability strategy into the supply chain to optimize the overall advantages. This approach is reflected in the term "sustainable supply chain." This study primarily discusses the current state of study on sustainable supply chains relying on the Triple Bottom Line (TBL) concept in 3

dimensions of economic, environmental, and social advantages, to summarise key conceptual findings from both domestic and international sources.

Marinagi (2014) pointed out that the implications of Information Technology (IT) practices on gaining a competitive edge all through the supply chain are examined in this article. A competitive advantage is built on a firm's ability to separate itself from its rivals through its skills. Companies must support internal processes as well as effectively connect facts with supply chain allies to solve these issues and increase their competitive edge. As a result, businesses must take advantage of IT, such as ERP systems, e-procurement, and e-commerce.

Hofmann, H. et.al. (2014) in their research brought the focus on the factual data suggests that corporations might suffer significant losses as a result of societal, environmental, or ethical issues in their supply networks. In addition, they developed a realistic management framework for supply chain risks connected to sustainability. The suggested approach can assist businesses in mitigating sustainability challenges in global supply chains, producing their lower sensitivity to losses caused by these threats. Its use can help promote sustainability norms throughout supplier networks.

R. Maharajan (2019) pointed out that in recent years, supply chain network design issues about sustainability have received a lot of attention. Even though the number of research on the subject is growing, few look at all three aspects of sustainability. Furthermore, while there is an assumption that sustainable supply chains are desirable, there is no evidence of their impact on network structure. The first model focuses on the traditional efficiency-based purpose, the second model integrates two components of sustainability, and the third model incorporates all three components of sustainability to establish the ideal supply chain network structure. Finally, numerical analysis is used to demonstrate and compare the three models' findings.

The purpose of this report is to give SMEs the skills and knowledge they need to start implementing changes in their businesses that improve the triple bottom line—financial, social, and environmental success. This is accomplished through an examination of academic research, industry best practices, and the authors' experiences working with enterprises. Supply chain sustainability is becoming more important for businesses, and SMEs, in particular, may be interested in learning more about it. According to a recent survey, 30% of manufacturers are reaping additional profits directly from sustainability measures, demonstrating a substantial promise for bottom-line gains. The notion of

supply chain sustainability is introduced in this study, as well as its significance in today's climate. The triple bottom line concept is utilized as the basis for long-term sustainability. This paper emphasizes the relevance of supply chain sustainability from a business standpoint and presents data from recent surveys on supply chain sustainability's benefits and problems. The article then focuses on SMEs in particular, and how they may use supply chain sustainability to their benefit. Finally, a path for achieving supply chain sustainability excellence and knowledge is described, as well as a tool for benchmarking and current state analysis. (Rebeca B. Sánchez-Flores, 2020)

Authors (Junbin Wang, Xuan Gao, and Zhiguo Wang, 2021) in this study attempt to develop an analytical framework to aid managers in making sustainable decisions, based on the industry observation that e-commerce platform marketplaces (e.g., Amazon) are increasingly introducing sustainable plans. In the framework of a sustainable supply chain, this study develops a stylized game-theoretical model in which competitive traditional product manufacturers sell their products through the platform's marketplace, while the platform determines whether to introduce green items and pricing strategy. We discovered that when the difference in evaluation for the green product is small enough, the platform's launch of the green product benefits the producers (or third-party sellers). Surprisingly, a greater platform charge increases the chances of a win-win situation for both the platform and the manufacturers.

Mei Su (2015) pointed out that examining criteria and variants in inadequate facts, this paper presents a multilevel mottled decision-making test and reviews the experimental approach. It identifies characteristics and parameters for seller prioritization using the specified pyramid relationship. This contains a unique set of requirements for organizing features such as a long-term plan, sustainable communities, and long-term operational system management. The recycling/reuse/reduce option is presented as a measure to enhance the resource saves percentage in the findings.

(Jennifer Blackhurst, 2012) pointed out that supply chain sustainability and optimization are becoming increasingly popular in academics and industry. According to the results of the research, various SC optimization methods handle all 3 factors of sustainability at the same time, with the social performance of buildings being the least investigated. Continued studies should transition away from approaches that only consider the economic and environmental elements and toward better-integrated methods for predicting all 3 aspects of sustainability. Even though multiple writers have examined various elements of SC optimization and durability, there is still a vacuum in our expertise of SC sustainability.

(Vidal, 2018) pointed out that the purpose of this essay is to carry out studies on sustainable supply chain management in advanced markets from a worldwide viewpoint. The findings show that while undertaking factual or case research studies in underdeveloped nations, the context is critical. The conclusion emphasizes the need for

more research into various aspects of the supply chain, such as teamwork, sustainable practices, and strategic supplier.

Croom (2018) pointed out that the research adds to our understanding of the impact of social sustainability on operational success. A poll of US-based enterprises on their ties with important suppliers was used to gather data. Interestingly, effectiveness is predicted by performing appropriately through intermediate but not fundamental SSSC practices. The U. S. context, the inter format of the analysis, and the limitations of evaluating long-term inclination all constrain the findings.

Rao, P. et.al. (2021) in their research concluded that despite a tremendous increase in e-commerce in recent years, particularly in the business-to-consumer (B2C) online retail sector, past research has been inconclusive about its good and negative environmental impacts. Two conceptual models were originally built from the literature to better comprehend the environmental implications of e-commerce. The study offers vital insights for practitioners and policymakers in promoting and utilizing e-positive commerce's environmental advantages while attempting to minimize/eliminate its negative environmental repercussions. The study is perhaps the first empirical attempt to grasp the good and negative environmental consequences of e-commerce, as well as their influence on customer intention to use e-commerce, and so the study conclusions are innovative.

## II. RESEARCH METHODOLOGY

In this section, the research methodology is defined, and the steps taken are described briefly,

1.) First and foremost, given the goal of this study, a comprehensive literature review was chosen as the method of choice since it decreases bias and errors in qualitative research. The structured literature procedure began with the selection of relevant data for analysis, as well as the original study aim and accessibility. The information gathering began with publications with titles including the phrases "SC" and "sustainability" to identify related publications centered on SC. As a consequence, 30 papers were found, but only 12 were chosen for this study. The next phase in the verification process was to look through the titles, abstracts, and keyword sections of the 30 articles for specific words relating to emerging regions, including several alternatives and combination terms.

2.) *Sustainability*:

Concern over the decline of natural resources for subsequent years gave rise to the concept of sustainability, which is defined as "growth that meets current requirements without jeopardizing later years' capacity to satisfy their existing requirements."

The "triple bottom line" (TBL), which is the junction of the 3 factors of the TBL, is another name for the notion of sustainability (economic, environmental, and social). This theory arose from the realization that businesses were primarily concerned with financial matters and paid almost

no attention to ecological and societal concerns. The ecological ecosystem, consisting of significant waters, trees, and wildlife, is linked to the ecological factor of resilience. Human resource is tied to the societal component of sustainability; increasing this aspect entails establishing and executing procedures that are equitable and beneficial to employees, society, and the area in which the business functions. The financial part of sustainability is concerned with the financial gains made by chain partners, such as the society, area, and countries where the processes are taken out.

3.) *Sustainable Supply Chain Management in the Global Context:*

The early focus of SCM was on ensuring the timely and dependable delivery of raw materials and final goods to buyers. Corporations were seeking methods to reduce waste at the time, not for societal or natural reasons, but commercial reasons. Furthermore, SCM currently plays a critical role in world trade, necessitating a thorough examination that highlights the interdependencies among its members. As a result, companies that have successfully controlled their supply chains have discovered new measures to cope with and adapt to worldwide hazards. As a result, SCM has pushed on to increasingly complicated situations, pursuing not just economic gains but also environmental sustainability in its activities.

4.) *Sustainability in Supply Chain with the help of Technological Trends:*

- Artificial Intelligence and Machine Learning - AI and ML are advancing at a breakneck pace. These innovations give the SC new automated capabilities, such as strategic scheduling, sales prediction, and coordinated shipment.
- Robotics and Automated Things - Internet buying has expanded by almost 140 % before the outbreak, and consumer demands for quicker and inexpensive shipping have soared. Companies can boost production, speed, and quality of products by using robotic technology, such as industrial robotics, inventory control robots, and cleaning robots.

1.) *Artificial Intelligence (AI):*

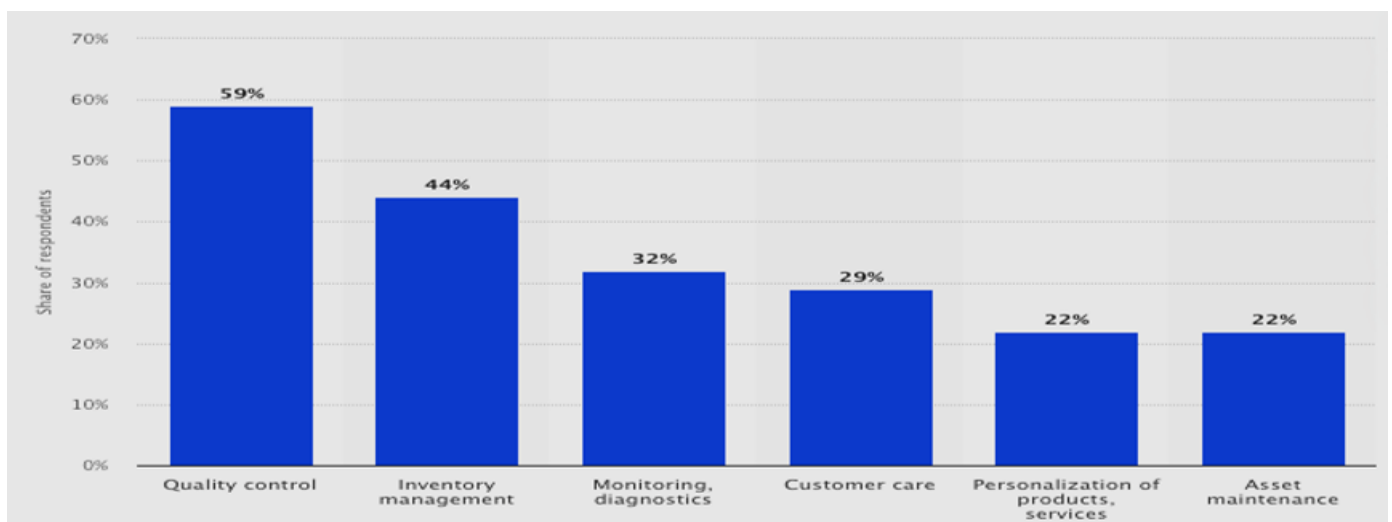


Fig.1 – AI uses in manufacturing industry worldwide as of 2020

- 3D Printing or Additive manufacturing - Businesses may now keep virtual inventory and produce stock on needed thanks to this latest tech. This means companies may save a lot of money on transportation and packing, as well as on power. The use of recyclable materials from the distribution chain as the basic materials has the potential to add value.
- Industrial Internet of Things (IIoT) - IIoT systems enable true data collection, exchange, and analysis, allowing physical characteristics to be optimized and servicing to be automated, reducing energy consumption and eliminating inconsistencies in processes.
- Blockchain - By establishing an auditable of facts from across the distribution chain, blockchain technology can help organizations become safer and more accessible. Products can be reliably dated directly to their origins.
- ERP Systems - Implementing a cutting-edge cloud-based ERP system could boost company efficiency while also optimizing the distribution network. ERP systems help companies to make wise choices by allowing them to manage, analyze, and display massive data through input displays. This includes determining which areas need to be adjusted, improved, or removed.

III. ANALYSIS

The 30 articles were analyzed and divided into several groups based on attributes and substance at this stage. The qualitative study began with the SC process, which involved connecting sustainability to all 3 TBL elements, key industries, and research methodology. The various methods and procedures employed in the SC were also categorized as part of the research methodology content investigation in this study.

The 6 technological trends analyzed and their usage in a global context is discussed below with the help of statistical illustrations.

(Statista,2020)

Quality assurance is the main significant use case for ai technology in the production line, according to the majority of respondents (59 %). QC, in general, refers to the establishment of rules that standardize output. Ai technology, for instance, can help enhance general quality checks by integrating modern cams to optimize inspection operations, saving cost. The production sector is made up of businesses that turn raw materials and parts into completed goods.

2.) Robotics and Automated Things:

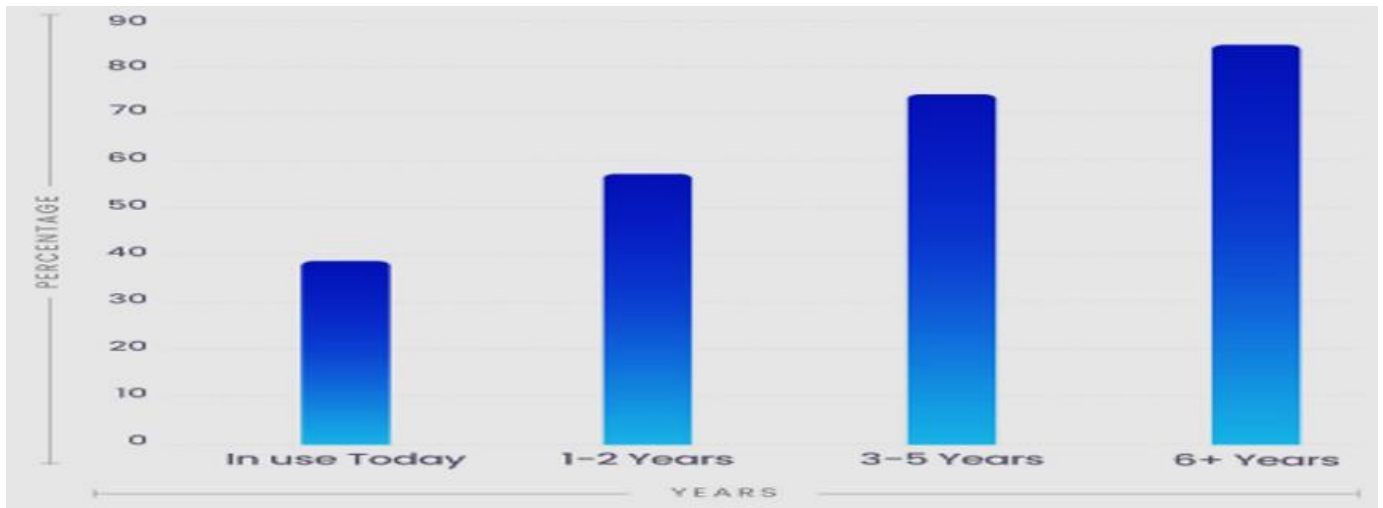


Fig.2 – Adoption of Robotics & Automation in industries. (Sunol,2021)

Robotics and automation are currently one of the most extensively implemented warehouse technologies. It is already being used by 39% of the 1,100 responders, confirming its value to the industry. Currently, it is 38% of the robotics warehouse is used and in the upcoming 2 years it will be increased to 55% and in 6+ years it will touch 85% of the usage of the robotics warehouse. This graph is showing the shift of trend and how the companies are extensively adopting the robotics warehouse.

3.) 3D Printing or Additive manufacturing:

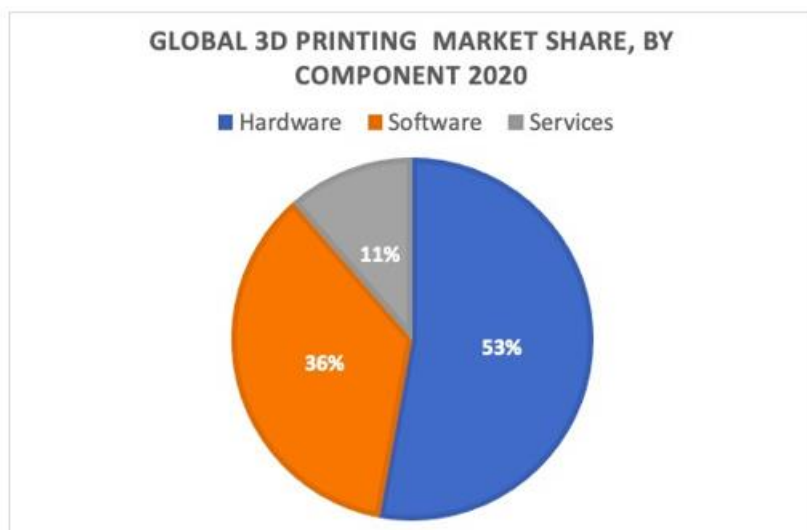


Fig.3 –Market share of 3D Printing in Global context, 2020. (Forecast Report, 2026)

➤ The marketplace has indeed been split into hardware, software, and service based on element types.

Hardware implementation for 3D printing material manufacture gained the most market share and is expected to continue its control over the projection period. The main players are expanding their item portfolios and developing the technology to meet the rising need from a variety of business verticals, making the hardware more robust. Businesses are paying in r&d., which has resulted in increased growing demand. As during forecasting, the technology segment is projected to expand at a high CAGR. The program

is frequently used in a variety of industries to design items and parts that will be printed. As organizations move to shift from mainstream production techniques, a software tool has become more popular for printing variations of various industrial parts.

4.) Internet of Things (IOT):

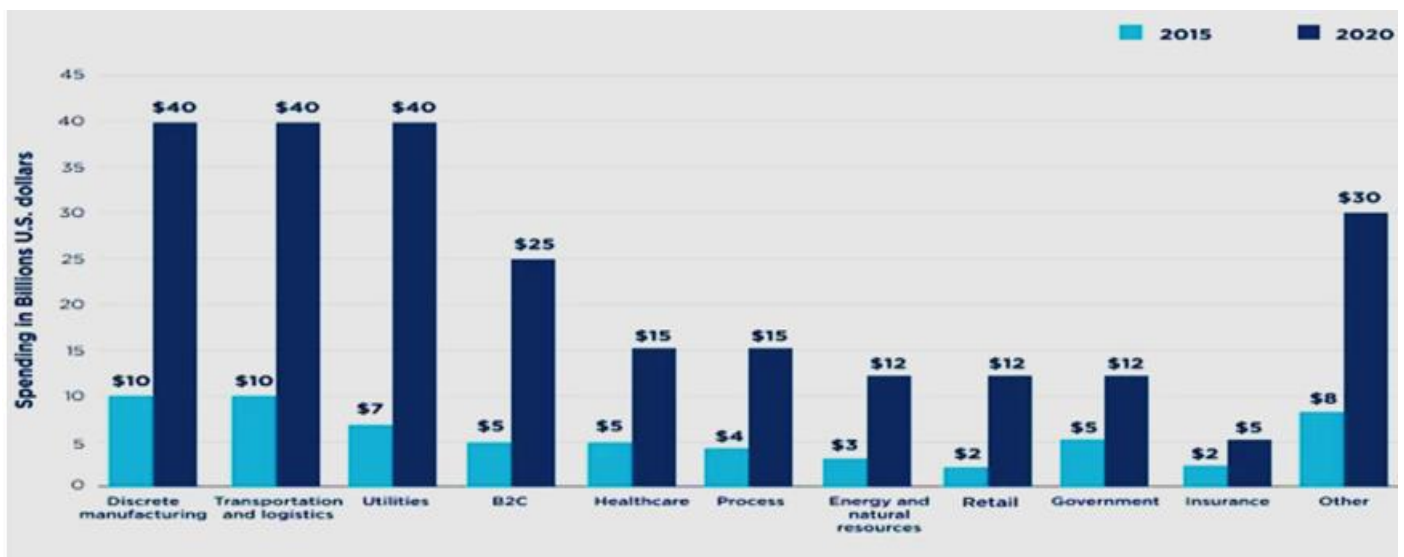


Fig.4 – usage of the Internet of Things worldwide in 2015 and 2020. (Ilchenko,2019)

There is a slew of IoT devices on the market right now. As a result, by the close of 2019, the amount of IoT-enabled gadgets (except phones, ipads, and desktops) is expected to reach 8.3 bn. Furthermore, by 2025, the amount of IOT device units in various businesses would total half of it with 27.3 million. Various worldwide organizations have effectively adopted IoT tools into existing systems. It enables them to improve the manufacturing process, shorten delivery times, and cut costs. As a result of all of this, the Internet market is anticipated to skyrocket in the coming years.

5.) Blockchain:

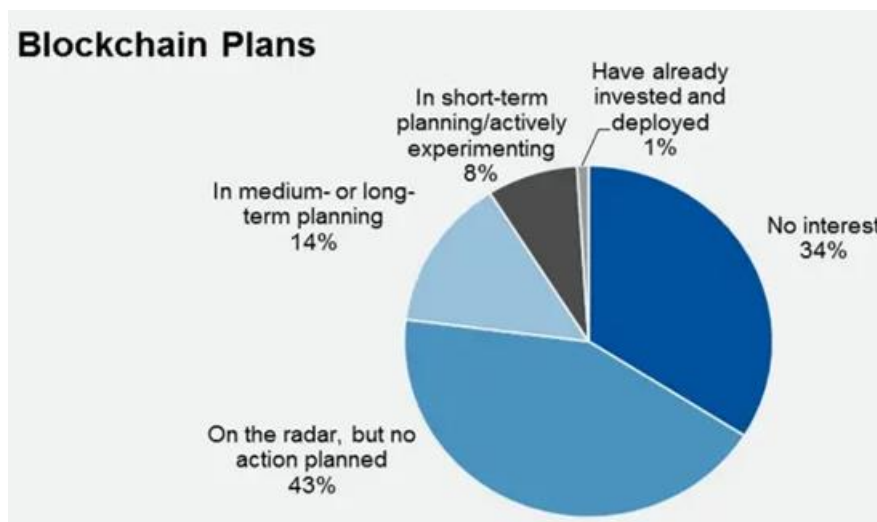


Fig.5(a) – Usage Plan of Blockchain (Mearian,2018)

The first graph is showing about blockchain plans. As mentioned in the graph that 14% are using in medium-or-long term planning, 8% are actively experimenting and adopting, 43% of organizations are on the radar but the action didn't plan yet and 34% have no interest in this.

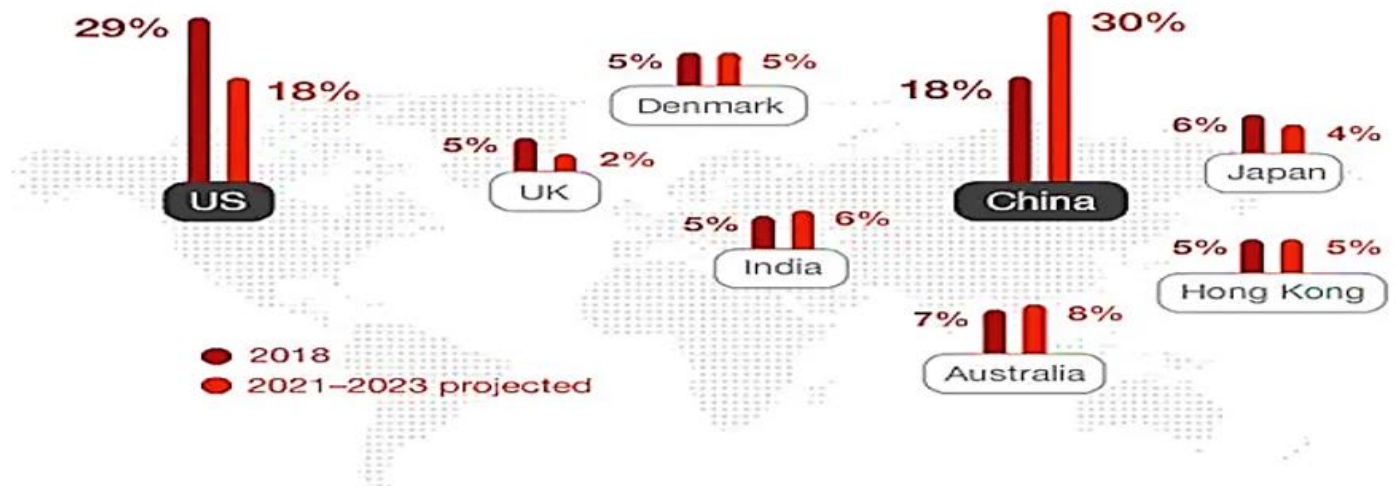


Fig.5(b) – Leaders of Blockchain in 2018 compared with projected of 2021-2023. (Mearian,2018)

In this second graph, it has been shown who were the leaders of Blockchain in 2018 and who will be in the upcoming years (i.e., 2021 -2023), The shift in the previous leaders of blockchain to the projected one is shown in the graph. China will be the projected leader in Blockchain with a growth of 12%. It’s how the world is grasping blockchain technology.

6.) ERP:

2017 ERP Market Share

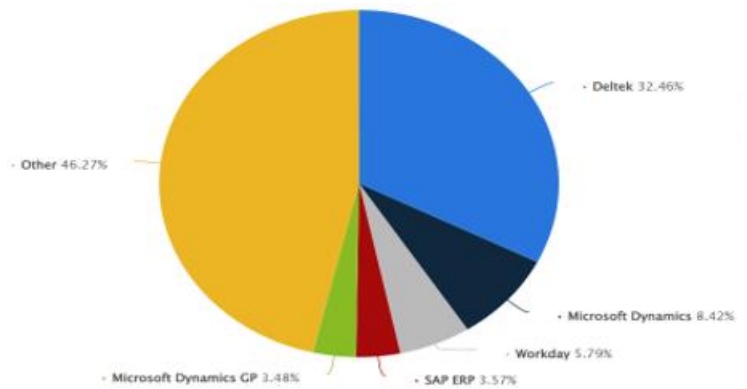
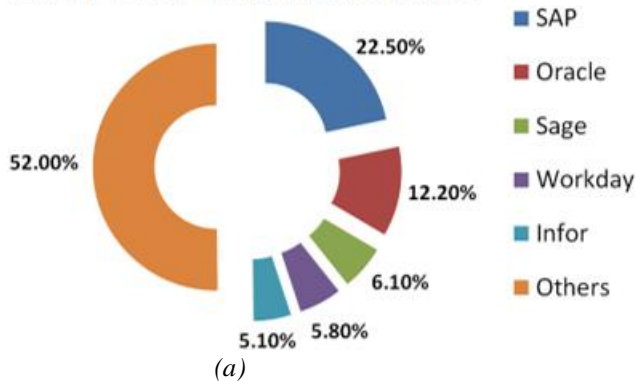


Fig.6 – ERP market share (Statista,2021), (Elearnmarkets,2022)

The second graph shows the market share of the ERP. This market share shows how the ERP system is growing. There are different systems in ERP like SAP ERP, Workday, Microsoft Dynamics GP, etc. One of the major shareholders is Delttek which has 32.46% of the market share and there are other systems also in the market.

In the first and second it is concluding that how there is a difference in the market share. In 2017, SAP had the major market share but in 2022 Delttek became the major market share in the market. Even Workday loses its market share in comparison to the market share in 2017 to 2022.

IV. CONCLUSION

This paper concludes that there are various ways by which we can add sustainability to the supply chain. The paper focuses on two ways, which the first one is about how

in past the industries were focusing on economic factors while performing their supply chain activities but now as it becomes global due to globalization, the industries start focusing on the other factors as well like social and environmental on global context.

The second way is implementing technological trends in the supply chain network. Now, the world is running towards sustainable technology and the updating of networks. Adding this technology to the supply chain creates a great impact not only on economic factors but on economic and social factors also. Various technological trends strengthen the supply chain globally, e.g. Artificial Intelligence, Machine Learning, Blockchain, 3D Printing, etc. The supply chain is a vast network concept that is expanding at a fast speed and capturing various departments in an industry so to make it sustainable this research paper ponders upon the technical and other aspects also.

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