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An evaluation of current technology in supply chain management

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Abstract

This research presents a scoping review of the evaluation of current technology that is being used in SCM by analysis of existing studies and contemporary concepts on this topic. A methodology based on a scoping review approach in the subject discipline was organized to carry out this research. Two databases and one search engine were searched for journals from 2019 to 2023 using relevant keywords designed for the study. Information regarding research designs, year of publications, publication authors, and findings of each study were documented. Out of the obtainable preliminary 70 studies extracted from the selected databases, only 44 research papers were accepted to meet the exclusion and inclusion criteria delineated for this study, where 45 % of papers were published between 2020–2021. Five different technological research areas were addressed in this scoping review. The major technology areas were AI and the IoT, followed by Data analytics and Big data IoT, and last but not least, Blockchain technology. The main obstacles to applying technology to SCM include change management, human reception/acceptance of these technologies, technical knowledge of the workforce already in place, and the significant costs associated with implementing these solutions. Leveraging technology improves customer happiness, reduces errors, and increases organizational responsiveness. Less crucial but still important are the difficulties in locating qualified workers and the possibility that technology will surpass human performance. However, there is undeniable proof that technology has many benefits; when applied wisely, businesses can benefit greatly from this new technology.

Keywords: Supply Chain Evolution; Emerging Technologies; Integrated Logistics; Technology Adaptation; Digital Interface.

1. Introduction

The Revolution of SCM has witnessed great changes and breakthroughs that have revolutionized the sourcing, transportation, and delivery of goods throughout history (Gold & Schleper, 2017). In the period preceding the 1900s, SC was primarily localized due to limited transportation options. However, the advent of railroads marked a pivotal moment, reducing distribution distances and paving the way for interconnected supply networks (Tseng *et al.,* 2019). The 1900s through the 1950s witnessed the expansion of global SC, with organizations like UPS playing a prominent role, leading to increased logistics and mechanization (Akyuz & Gursoy, 2020). The concept of 'unit load' gained prominence during this period, enabling more efficient transportation management.

The 1960s and 1970s saw the emergence of logistics giants such as DHL and FedEx. This era witnessed a shift from rail to truck transportation, giving rise to the concept of 'physical distribution' (Mukhamedjanova, 2020). In 1963, significant milestones included the establishment of the NCPDM and the introduction of IBM's automated inventory management system (Fahimnia *et al.*, 2019). In 1975, JC Penney introduced the first real-time WMS, which streamlined inventory management and business expansion.

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The 1980s saw the Integration of personal computers for planning into SCM. The NCPDM evolved into the CLM to reflect its expanding responsibilities. In 1982, the term SCM; optimization of operations from origin to consumption was posited by Keith Oliver. The 1990s and 2000s marked a period of technological adoption and global expansion for SC (Lu *et al.*, 2016). Collaborative robots, or cobots, were conceptualized in 1996 to enhance human-robot interaction. Amazon's initial public offering (IPO) in 1997 marked a significant milestone in the history of e-commerce. The fusion of Industry 4.0 technologies, including AI and IoT, into SC strategies occurred between 2010 and 2020 (Dalmarco & Barros, 2018). The critical importance of SC, leading to an emphasis on localization and digitalization to reduce disruptions and ensure resilient operations was heightened in 2020 during the pandemic. (Konur *et al.,* 2021).

SC managers face a multitude of daily challenges. Tracking cargo is a significant issue that often leaves management in the dark until goods reach their destination (Talavera, 2015). Disruptions require swift responses, and complex SC makes addressing quality issues more challenging. The lack of timely information hinders operational insights. Managing disputes can be particularly challenging, especially for businesses lacking clear operational visibility (Saghiri & Wilding, 2021; Noshad & Awasthi, 2018). Without precise performance data, evaluating suppliers becomes a complex task (Saghiri & Wilding, 2021). Compliance with regulations is difficult without a comprehensive overview, necessitating an analysis of past activities to develop effective strategies (Saghiri & Wilding, 2021).

In the face of these challenges, technology emerges as a dependable ally. It enhances visibility, simplifies intricate network management, and promotes collaboration among partners (Li *et al.,* 2020). Efficiency, customer experience, performance, risk management, and quality are all enhanced by Technology. (Li *et al.,* 2020). Its primary role is to streamline the entire SC, thus revolutionizing contemporary SCM (Li *et al.,* 2020).

1.1. The Evolution of Supply Chain Management

SCM evolution has witnessed a dynamic process impacted by emerging technology and characterized by important turning points. Initially, SCM began as a complex group of dispersed operations, including purchasing, warehousing, and transportation, in the 1950s and 1960s (Ballou, 2007). Businesses realized they needed efficiency and integration, so they implemented information systems and centralized procurement procedures. This signified the start of the simplifying the movement of products and services. A more flexible and effective business was made possible by fewer suppliers and the integration of different operations. Along with the consolidation of SC operations at this time, a more coordinated and efficient method of manufacturing and distribution also came into being (MacCarthy *et al.*, 2016).

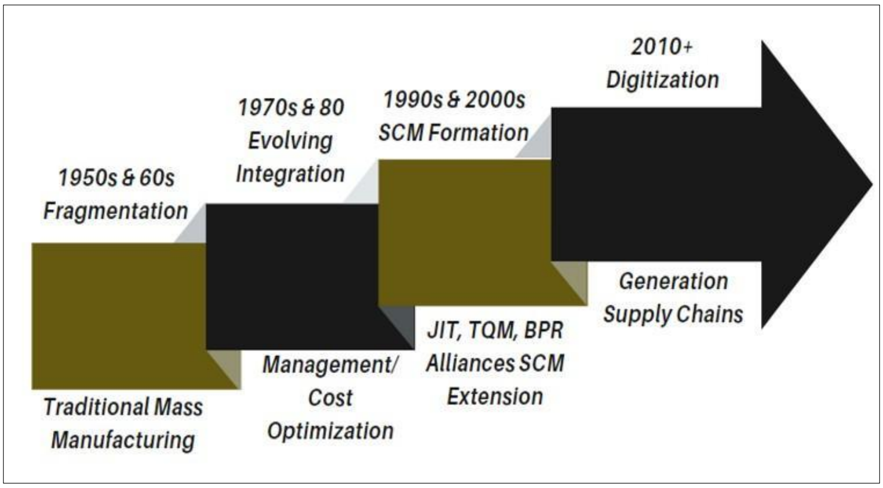

Figure 1 Evolution of supply chain management (Adopted from Attaran, 2020)

As the 1960s progressed into the 1970s and 1980s, there was a significant change in favor of effective inventory management (Ross, 1998). A careful balancing act between satisfying consumer requests and preventing surplus stocks typified this era (Mangan *et al.*, 2008). Businesses came to understand how crucial it was to match inventory levels to genuine demand trends. In order to achieve this balance, sophisticated planning techniques like analytical demand planning were essential. Technology integration gave businesses even more ability to manage inventory levels, guaranteeing that goods were available when needed without adding needless expenses to holding. The SC matured throughout this time as it adjusted to the complexity of a changing market. SCM became recognized as a unique and essential process in firms during the 1990s and 2000s. During this period, cooperation and trust between SC partners became important. Important procedures for a successful SCM system (SCM) were developed, including CRM and SRM, and demand management, (Lambert and Cooper, 2000). This period was marked by a deliberate attempt to promote cooperation and smooth coordination between the several parties involved (Ivanov and Sokolov, 2010). However, after 2010, the digital era signaled a radical shift in supply networks. Innovation and technology have become the main factors behind change. A new era of digital SC was brought about by the introduction of Big Data, advanced analytics with machine learning, and IoT, Cloud computing. Nowicka (2018) demonstrated how this change led to improved reaction times, more cooperation, deeper insights, and increased visibility. Sharing real-time information became essential, enabling several SC partners at once.

1.2. The Digital Supply Chain (Supply Chain 4.0)

Garay-Rondero *et al.* (2020) posit that the digital SC, also referred to as SC 4.0 or Smart SC, involves the utilization of electronic technologies across the entire SC. This includes the complete digitalization of the whole procedure, from manufacturing and transportation to distribution and management. Gafoor (2022) also highlighted other parts that make up the smart SC, including the usage of sophisticated technologies like predictive analytics, robotic process automation, AI, machine learning, 3D printing, IoT, and blockchain. The integration of electronic sensors and tracking enables live tracking of goods, promoting a seamless end-to-end connection and ensuring complete transparency and openness across all levels of the SC process.

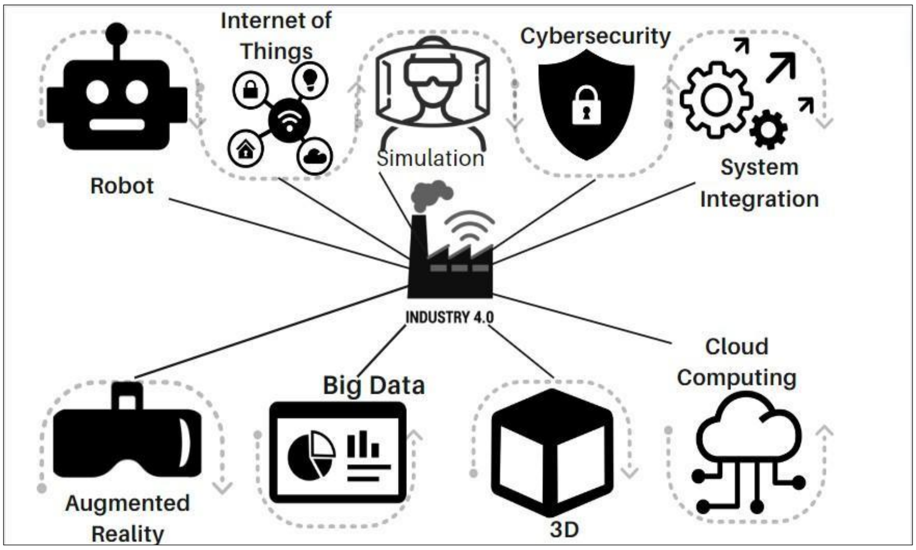

Figure 2 Digitally enhanced supply chain management (Adopted from Gafoor, 2022)

As the years went by, SC has developed to become more sophisticated, costly, imprecise, and fragile. To address these growing challenges effectively, Butner (2010) argues that SC must evolve with innovative interconnected business systems beyond closed, local, and single-business applications. Smart SC involves the use of a variety of advanced technologies and systems, including smart machines, smart infrastructure, smart decision-making, IoT, and efficient processes, outcomes, and responses (Wu *et al.*, 2016), creating a broad and intelligent framework for integrating data, physical objects, information, assets, and business operations.

The Smart SC provides a comprehensive network that combines both vertical and horizontal integration. According to Ardito *et al.* (2019), in this network, various value-added elements, such as production machines, smart products, connected customers, smart materials, smart suppliers, and smart factories interact and communicate seamlessly in real-time on a worldwide level. Usage of advanced technologies; big data analytics, IoT, and cloud-based data solutions is driving the decentralization of manufacturing, allowing materials, machines, process controllers, and human resources to communicate in real-time, reflecting the natural interactions observed on social media (Wang *et al.*, 2016). Technological innovation in the SC has also created advanced systems, including SMART warehousing, SMART shelves, SMART manufacturing, SMART containers, and SMART ports. These advances, along with the digitization of SC, have brought greater transparency, better control, greater communication efficiency, and better oversight. Consequently, this reduces risk, waste, downtime, and errors throughout the SC process (Ghobakhloo & Fathi, 2019).

These technological innovations facilitate the seamless integration of SC, logistics, and lean manufacturing, thereby improving a company's productivity by concentrating on reducing inefficiencies across the whole value chain (Tortorella *et al.*, 2019). Furthermore, according to Chaopaisarn & Woschank (2019), integrating advanced technologies into SC not only reduces waste but also improves their adaptability, giving members the capacity to adapt quickly to business and technology developments through an adaptable SC cloud network.

1.3. Differences between the Digital Supply Chain and Traditional Supply Chain

Research conducted by Wu *et al.* (2016) revealed that Smart SC has different characteristics when contrasted with traditional SC. Firstly, most of the information in smart SC is generated by machines. Secondly, the entire SC, including assets, products, business operations, IT systems, and various smart objects, is interconnected. Additionally, large-scale decisions are made to improve performance. Furthermore, machines manage a significant portion of Smart SC processes automatically, replacing less efficient resources such as manual labor. Additionally, the integration of SC processes is achieved through collaboration at different stages. Ultimately, this approach leads to the creation of new value through solutions that meet emerging needs.

These attributes perform a crucial function in enhancing collaboration and seamless integration within a smart SCM platform. This, in turn, leads to various benefits. For example, information and communications technology (ICT) enables the digitalization of products and manufacturing processes. Additionally, through simulation and modular engineering, companies can decentralize and tailor manufacturing processes, thereby driving faster innovation in processes and products (Brettel *et al.*, 2014). Additionally, better visibility into the SC leads to reduced product design and prototyping time. Additionally, better availability of data at the SC level saves time, by compressing cycles of innovation (Kache and Seuring, 2017). Ultimately, SC members can significantly reduce their research and development costs and be better equipped to meet specific customer needs.

Moreover, several advanced technologies can be used to collect important information to support SCM (Ramanathan *et al.*, 2017). The transition to SC digitalization is leading to the fusion of various SC functions. This includes tasks such as automating warehouses, utilizing autonomous smart vehicles, facilitating human-machine interactions, employing SMART logistics planning algorithms, offering dependable online tracking of orders, enabling real-time adjustments, and implementing no-touch processing. These advances provide advantages in both physical goods flow and order management (Brettel *et al.*, 2014).

The increased adoption of these cutting-edge technologies offers new openings for growth. However, it also presents unexpected problems in creating new company models and perfecting the current strategy, which ultimately brings business benefits. These benefits include access to comprehensive data on consumer demand, costs, locations, inventory levels, capacity, prices, quality, and technology information, all of which can be divided between collaborators (Pedroso & Nakano, 2009).

1.4. Risks of Modern Technologies in Supply Chain Management

While the literature review has so far shown the advantages and opportunities for growth provided by modern technology in SCM, the usage of modern technologies carries some risks. Events in recent years have shown that along with utilizing these cutting-edge technologies, new risks, like data protection and cyber threats, are concurrently rising. For example, in 2015, criminals not only stopped the manufacture of cookies at a factory in Canada but also caused a total overhaul of the factory due to the presence of dry powder in the pipes (Ries, 2015).

In a research carried out by Kessler *et al.* (2022), they posited that there are numerous risks linked with the use of modern technology in SCM. Firstly, the introduction of new technologies may result in an increased complexity of SC activities (Varma & Khan, 2015). This results from the centralization of functions and boundaries, ultimately leading to a more complex SC framework. This complexity can pose synchronization and flexibility challenges. Additionally, the absence of people who are capable of using these new technologies may lead to increased dependence on technology vendors, which can lead to execution problems, particularly notable in traditional manufacturing sectors with a historical emphasis on non-digital goods (Fischer-Preßler *et al.*, 2020).

Furthermore, there are also the challenges of legal issues around data transparency, privacy, and security (Zimmermann *et al.*, 2019). Many businesses may not be familiar with the new technologies and regulations, which may lead to financial loss and damaged reputation (Gu *et al.*, 2021). Moreover, digital transformation at the organizational level can lead to new sources of vulnerability in the SC that can disrupt well-established processes (Kessler *et al.*, 2022). Inadequate management of supply uncertainties can increase the risk of SC disruptions as well as over-reliance on technology suppliers. Businesses must find a way to mitigate these risks if they are to maximize the advantages of applying modern technology in SCM.

1.5. Research Gaps

While there is a lot of information available from literature on the benefits and potential of modern technologies in SCM, a closer look reveals a conspicuous ignorance of the state of modern technologies and the extent to which they are being applied in SCM. Consequently, this scoping review seeks to address the gap by analyzing relevant papers from reputable sources that comprehensively understand the current state and extent to which technology is being used in SCM. This knowledge will be useful for practitioners and decision-makers in SCM and businesses to make the best decisions and consequently improve SC processes.

1.6. Statement of Problem

The dynamics of SCM and the Integration of technology have emerged as a crucial catalyst for improving efficiency, competitiveness, and resilience (Li *et al.*, 2020). The modern SC landscape is characterized by the widespread adoption of various advanced technological solutions, including IoT devices, blockchain, AI, and data analytics. These technologies are strategically employed to enhance visibility, mitigate risks, and optimize overall operations (Gayialis *et al.*, 2022).

However, despite the noticeable transformation brought about by the incorporation of these technologies, a significant issue arises due to the persistent lack of research addressing their actual effectiveness. While existing literature does indeed highlight the potential benefits of technology in SCM, a closer examination reveals a notable absence of comprehensive evaluation methods and a range of associated challenges (Wong & Ngai, 2019; Seidiaghilabadi *et al.*, 2019). Current research primarily focuses on isolated cases and specific instances of technology adoption rather than offering a holistic comparison of various evaluation approaches. As a result, there is a significant deficiency in standardized frameworks for assessing the tangible impact and Return on Investment (ROI) of technology (Jiang *et al.*, 2016). The complexities that characterize different industries further compound this issue. Industry-specific challenges, ranging from regulatory compliance to evolving customer expectations, contribute to a noticeable research gap regarding how technology adoption and evaluation practices differ across various sectors (Chauhan *et al.*, 2020). A comprehensive exploration of types of technology and the challenges inherent in technology application within SCM aims to establish a strong foundation for assessing technology's effectiveness (Montecchi *et al.*, 2021). Consequently, this scoping review endeavors to address the critical knowledge gap in the contemporary SC landscape by understanding the state of technologies being used, the extent of their application, identifying the factors contributing to their success, and proposing strategies for overcoming implementation obstacles.

Aim and Objectives

Aim: To conduct a scoping review on the current technology application in SCM.

Objectives

The objectives are as follows:

- Conduct a scoping review of existing literature on modern technologies applied in SCM from reputable sources.
- To explore how modern technology has impacted SCM.
- Evaluate the challenges that hinder technology implementation in SCM.
- To determine the factor that drives the adoption of technology in SC.

2. Methodology

The research work aims to carry out a comprehensive scoping review, which is done in order to evaluate the scope and determine the volume of literature already existing on the role and impacts of current technology on SCM. According to Arksey & O'Malley (2005) and Munn *et al.* (2018), a scoping review is conducted to identify gaps in existing literature to indicate the areas that need further research. The scoping review is unique from other reviews that focus on typical questions such as systematic reviews (Arksey and O'Malley, 2005). Although the scoping literature reviews follow a similar approach as a systematic literature review, systematic literature reviews and scoping reviews have different objectives. The approaches of Arksey and O'Malley (2005) on scoping review were used as the foundation for formulating the methodology of this study as the goal of the review is to address the current research on technologies being utilized in SCM.

2.1. Research Philosophy

The chosen philosophy for this paper is grounded in a combination of positivism and pragmatism philosophical approaches. The pragmatic philosophy empowers the researcher to focus on practical applications and the effects of this current technology on SCM. Furthermore, the pragmatism philosophy approach emphasizes the importance of addressing real-world issues, while also providing organization leaders important information that can help in the business world. The positivist philosophical approach helped in using empirical research to systematically assess the role of contemporary technologies in a different aspect of SCM. Hence, by applying both philosophies in this research, a thorough evaluation of the application of current technological tools that have impacted SCM was conducted.

2.2. Research outline

The systematic steps used in conducting the scoping review are outlined below; formulated from Arksey and O'Malley's (2005) study.

2.3. The Research Question

Population, concept, and outcome framework were used to develop the study topic. Using this framework, the population of interest for this research issue consists of teams and managers that use contemporary SCM technology. In contrast, this study's concept used contemporary technological tools and solutions—like artificial intelligence, information technology, the IoT, and big data—to SCM procedures. Finally, the outcomes speak to how this contemporary technology affects SCM efficacy, affordability, cooperation, and success in general.

2.4. Research Question

The research questions are formulated in alignment with the objectives outlined earlier:

- What is the available existing literature on technology related to SCM?
- What are the types of technology evaluated from existing literature?
- What are the critical factors that affect the acceptance and utilization of various modern technological tools such as AI, the IoT, Information technology, and Big data in SCM?
- What are the obstacles hindering its efficient implementation and utilization?

2.5. Selection of studies for inclusion based on pre-defined criteria

2.5.1. Eligibility Criteria for Included Study

The criteria of eligibility scoping review refer to a predetermined standard based on the qualities of the evidence of the study to be included (Kitchenham and Charters, 2007). Both primary and secondary studies were the study types deemed appropriate for this scoping evaluation. Secondary studies of all types, including literature reviews, systematic reviews, and scoping reviews, were included in this scoping review since one of the aims of this paper is to review current literature on technology related to SCM. Lastly, only a study published in the English language was included in this study. This is because the research's author lacks a proficient command of any other language.

2.5.2. Excluded Study

Articles from news and internet posts were not included in this review. Also, primary and secondary research work published longer than five years was not included to ensure that only recent and pertinent papers were included in this research. Hence, the paper included in this research was restricted to the five years (2019–2023).

2.6. Study Search

2.6.1. Database Selection

For this research, two databases and one search engine were selected to find relevant literature for this scoping review. The following databases were chosen: Scopus and Science Direct, while the search engine selected was Google Scholar. The Databases and search engines selected were based on the accessibility and breadth of research journal content.

2.6.2. Keywords formation

Keywords for this research were formulated and divided into three categories: the first category focused on technology, and the second and third categories focused on its important subfields. Based on evidence from the literature, using keywords to search for research publications on selected databases is important for sourcing relevant materials for a scoping review (Pati and Lorusso, 2018). This is because research papers important to the study research questions can be found more easily when using keywords. Also, past research was utilized to pinpoint specific keywords to enhance the search, and lastly, the Boolean operators were employed to merge the three keyword categories.

Explained below (Table 1) is the formulation of keywords using Boolean operators to combine them to search for past research. The search period was set from 2019 to 2023 to ensure a comprehensive examination that focuses only on current research related to modern technologies in the area of SCM.

Table 1 Combination of keywords utilized for search strategy.

Keyword		**Keyword**		**Keyword**		**Keyword**
“Supply chain”	AND “	“Technology”	AND	“Modern “	OR	“Current”
Supply chain management”		“Technology”		‘Challenges”		“Strategy”
“Supply chain management”		“Artificial intelligence		Practices		“Adoption”
“Supply chain management”		Blockchain		“Adoption “		“Challenge”
“Supply chain management”		“Internet of Things”		“Adoption “		“Practise “
“Supply chain management”		“Internet 4.0”		“Adoption”		“Program”
“Supply chain management”		Digitalization		“Adoption”		“Challenges”
“Supply chain management”		“Future research”		“Technology “		“Adoption”

3. Literature Search Strategy

To extract important and recent literature for this review, a triple-stage search strategy procedure was used. Firstly, using the specified keywords designed (in Table 1. above), a preliminary search was carried out in the selected databases; this was done to find out the scope of literature available on the topic. Secondly, using the article index terms as a guide, the abstracts and titles of studies deemed essential to the study were examined on the preliminary search outcome, minimizing the possibility of overlooking pertinent information. Finally, the Rayyan web-based tool (Rayyan, an online platform created specially to assist academic researchers in assessing and choosing papers for inclusion in scoping reviews) was used to screen all the identified evidence sources to find and eliminate duplicate research and create space for new studies. Evidence from the study was then checked against the eligibility standards established purposely for the study and a "YES, NO, or MAYBE" option was selected for each study. A second reviewer carried out the same procedure to determine the screening outcome. When two team members selected different answers for a given study on the "YES, NO, or MAYBE" checklist, another team member handled the conflict. The remaining data were then subjected to full-text analyses in compliance with the qualifying criteria. Upon the completion of the full article review of the articles to be included, each member of the review panel was tasked to select studies that satisfied the standard for eligibility; any study that didn’t meet the eligibility criteria was excluded.

3.1. Data Extraction

The procedure of deducting/extracting information from the study in the scoping review was done mainly on the aim, methodology, and outcome of the research. To present the extracted information from each included study the JBI tool for data extraction was used.

3.2. Quality Assessment

This was conducted to examine the study’s quality evidence of the paper to be included in this scoping review. To do this, the evaluation of the methodology of the included research papers was appraised with the JBI critical appraisal checklist. This checklist was adopted because it encompasses diverse research designs.

3.3. Synthesis Processes

Information from the selected study was combined from other sources during the results synthesizing process in order to make a point. By integrating subtopics from the evidence, this synthesis explores the themes and objectives of the review and advances our understanding of the topic. Together with a tabular presentation of the information, a narrative synthesis is used to explain the conclusions of the review questions. The narrative synthesis was utilized since it was deemed to be effective in summarizing important research findings while also highlighting the parallels and discrepancies between them.

4. Result

The step-by-step process used in the extraction of data from the papers included for the purpose of this study will be covered in depth in this chapter. To select the included studies, two search databases—Science Direct and Scopus—and one online search engine—Google Scholar—were used. The step-by-step process involved in accessing, locating, and ultimately choosing the publications included in this study was depicted using the Prisma flow diagram.

Also, the section of this research offers a summary of the important conclusions drawn from the last included investigations.

4.1. Summary of Search Generated from Selected Databases

Using the selected keywords designed for the research, a total of n=8893 searches was generated across all the selected databases. For each of the three databases, 2403 searches were caused by Scopus, and 1597 searches were generated from Science Direct. In addition, Google Scholar was searched for publications, generating 4893 search results, as shown in Table 2 below.

Table 2 Summary of search generated from selected databases

S/n	Database	Searches number)	Generated	In	Searched date
1	SCOPUS	2403			10/10/2019- 10/11/2023
2	SCIENCE DIRECT	1597			15/12/2023-15/12/2023
3	GOOGLE SCHOLER	4893			10/10/2023-09/11/2023

4.2. Extraction of Data from Searched Studies

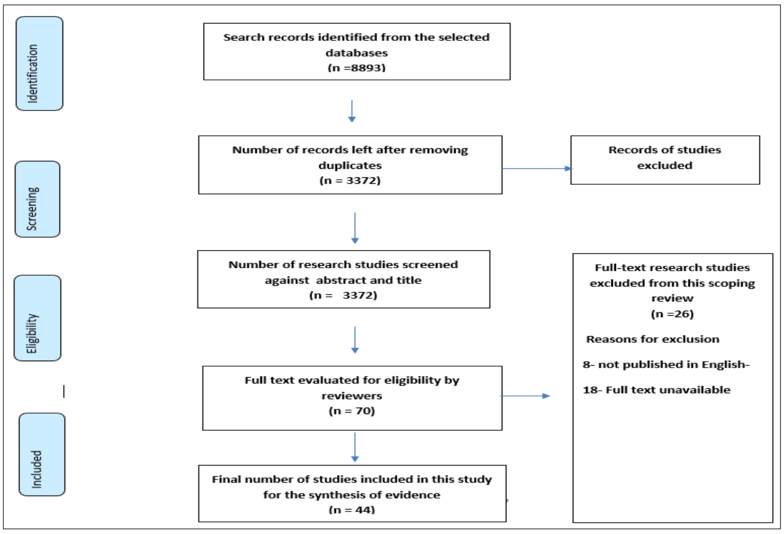

Figure 3 PRISMA flowchart illustrating the entire process of screening, identification, and inclusion of studies for this scoping review (Adapted from Moher et al. 2009).

As a result of the searches generated from the selected databases, there were 8893 total records, of which 5621 were eliminated as duplicate studies, leaving 3372, then the remaining studies were uploaded to Covidence. Afterward, the two reviewers designated for reviewing the selected studies evaluated the searched studies using the title and abstract of 3372 searched studies against the inclusion and exclusion criteria of this research work. Due to the reviewers' analysis, complete studies were acquired for 70 research studies and screened against the eligibility criteria. A total of 44 studies were found to satisfy the criteria for inclusion in this research and were kept for quality assessment.

4.3. Bibliometric Analysis

A total of forty-four papers covering the years 2019 through 2023 were selected to investigate how technology is used in the discipline of project management. Following a thorough review of all the data, an analysis was done to search for patterns and trends that would clarify recent developments and, perhaps, offer a practical path forward for integrating technology into SCM.

4.4. Analysis of the Included Studies Based on Year of Publications

Figure 4 Below is a bar graph showing the analysis of the included studies based on the year of publications. The graph showed that 35 documents from the final three years of 2019 to 2021 were included in this research, and just 9 publications from the final two years of 2022 and 2023 were included. The years 2020 and 2021 have the highest number of research studies published on this subject.

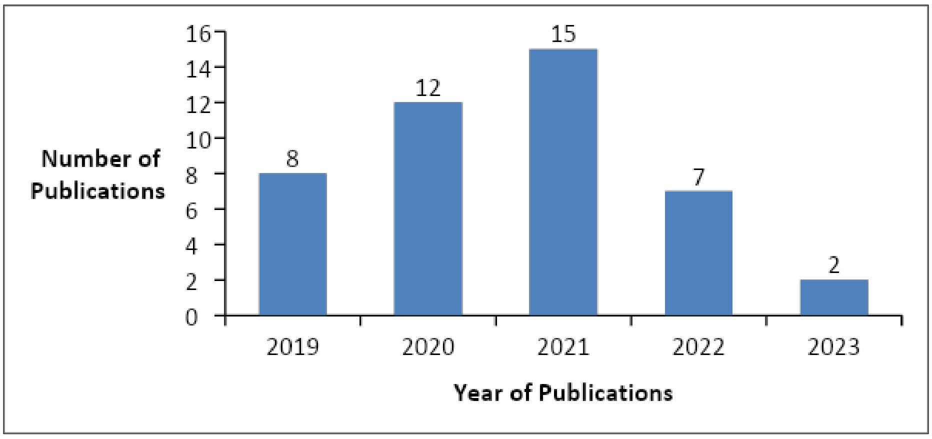

Figure 4 Graph showing the Analysis of the included studies based on the year of publications

4.5. Analysis of the Type of Technology Extracted from Included Studies

Table 3 and Figure 4 below are the analyses of different technologies evaluated from the studies included in this research. The analysis showed that AI (38.30%) and the IoT (24.68%) were the most researched aspects of technology relating to SCM in the last 5 years, while Blockchain technology was observed to be the least aspect of technology pertaining to SCM that has been researched.

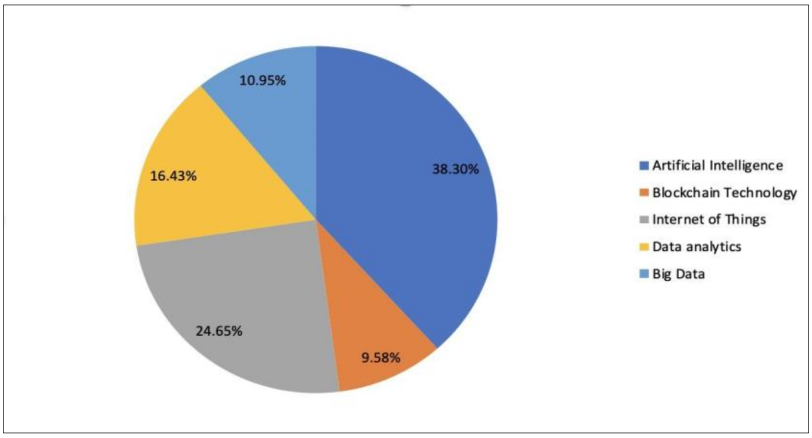

Figure 5 Pie Chart showing Types of technology identified in the included studies

Table 3 Types of technology identified in the included studies.

S/n	Technolog y identified	Research publications
1	Artificial Intelligence	*Camargo et al. (2020), Chen et al. (2022), Di Vaio et al. (2020), Jaouhari et al. (2022), Mohsen, (2023), Hu et al. (2022), Li et al. (2020), Liou et al. (2019), Pournader et al. (2021), Toorajipour et al. (2021), Wang et al. (2022), Xie, et al. (2020),Zamani et al. (2022), Zouari et al. (2021), Khan, et al. (2022), Ni, et al. (2019), Bueno et al. (2020), Spieske & Birkel,(2021), Konovalenko, (2019), Sharma et al. (2020), Birkel, Müller, (2021), Baryannis et al. (2021), Seyedghorban et al.(2020), Rejeb et al. (2021), Peres et al. (2021), Jahani et al. (2021), Akbari et al. (2021). Ng et al. (2021)*
2	Internet of Things	*Ben-Daya et al. (2019), Camargo et al. (2020), Jaouhari et al. (2022), Jabbour et al. (2020), Núñez-Merino et al. (2020),Wang et al. (2022), Zouari et al. (2021), Khan et al. (2022), Ni et al. (2019), Bueno et al. (2020), Koot et al. (2021), Spieske & Birkel, (2021), Centobelli et al. (2020), Rejeb et al. (2021), Birkel, Müller, (2021), Seyedghorban et al. (2020), Rejeb et al. (2021), Jahani et al. (2021).*
3	Block Chain Technology	*Karakas et al. (2021), Li et al. (2020), Vishnubhotla et al. (2020), Birkel, Müller, (2021), Lim et al. (2021), Xu et al. (2019), Kamble et al. (2021)*
4	Big Data	*Chandra & Verma, (2021), Cheng et al. (2021), Sharma et al. (2020), Liou et al. (2019), Mohammed et al. (2023), Zamani| et al. (2022), Bueno et al. (2020), Spieske & Birkel, (2021).*
5	Data Analytics	*Jaouhari et al. (2022), Wamba & Akter, (2019), He et al. (2022), Hu et al. (2022), Jabbour et al. (2020), Li et al. (2020), Xie et al. (2020), Bueno et al. (2020), Spieske & Birkel, (2021), Konovalenko, (2019), Birkel & Muller, (2021), Seyedghorban et al (2020).*

Table 4 Summary of research studies mentioning barriers and drivers.

Parameter	Studies
Challenges to adopting technology	*Khan et al. (2022), Ni et al. (2019), Ng et al. (2021), Yang et al. (2021), Sharma et al. (2020), Centobelli et al. (2020), Ben-Daya et al. (2019), Rejeb et al. (2021), Sahu et al. (2020), Birkel & Müller (2021),*
Factors leading to the acceptance of SCM technologies	*Khan et al. (2022),), Birkel & Müller (2021), Rejeb et al. (2021), Ni et al. (2019), Bueno et al. (2020)*

4.6. Distribution of Included Studies Design

In terms of the included studies' designs, the majority of the studies this research assessed were systematic reviews. Every study design that was presented included information on the types of technology evaluated.

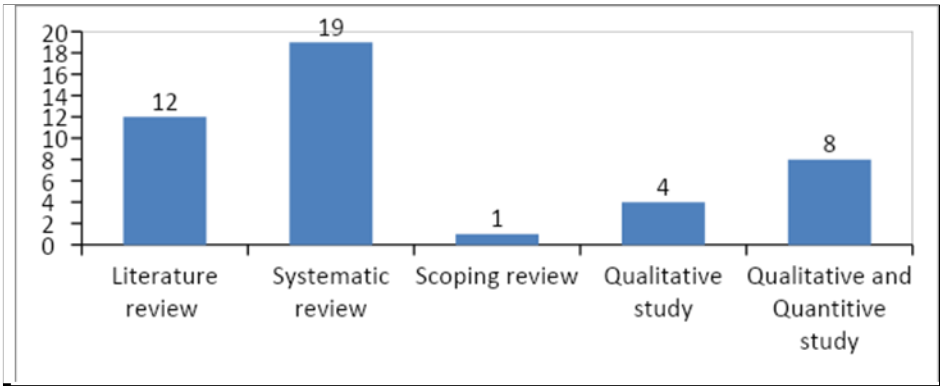

Figure 6 Distribution of included studies design

5. Discussion

The study's goal was to undertake a scoping review on the evaluation of the current technology used in SCM. To carry out the research, the research evaluated the existing research publications on the current usage of technology used in SCM, evaluated the types of technology discussed in the past publications, and also examined the challenges and factors that led to the usage of this modern technology. The output of the scoping review in this study showed the usage of available existing technology in current SCM processes is essential, as it has numerous benefits in diverse fields under SC, such as the ability to forecast customers' future demand, logistics hub, distribution and transportation, marketing, planning production system, and taking inventory in a warehouse. Also, the research further showed that technology can enhance SCM from the standpoint of Agile and Lean by improving the organization's potential to adapt and adjust to the labor market, cutting waste in production, and improving customer happiness and teamwork (Mohsen, 2023). Despite the several possible advantages of technology application in SCM, it is vital to indicate that integrating technology into SCM involves some challenges. This section of this chapter shows how the data extracted from the selected studies for this scoping review address the goals and objectives of this research.

6. Conclusion and Future Research

The significance of technology in modern SCM has sharpened its processes, and this impact has been proposed to increase in the coming. The result of the study has revealed that there is much interest in this topic, and this is driven by companies that are aware of the impact of this technology on their organization. Hence, by analyzing the research's findings of this work and identifying prospective domains for its use, organizations can gain insight into the practical application of this study. Hence, this study can be used as a framework to provide future insights into the enactment of technology in SCM processes. Future research may need to address some of the shortcomings of this study. One of these drawbacks is that the scoping review primarily focuses on works written in English, which means that publications published in other languages were not reviewed in this research. In light of these constraints, it would be advantageous to expand the inclusion criteria for this research to include a more varied assortment of journal papers published during the last 5 years, irrespective of their language. As a result, this study—comprising a compilation of recent articles—would become more thorough and representative.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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