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IMPACT OF INFORMATION SYSTEMS IN THE SUPPLY CHAIN: A SYSTEMATIC LITERATURE REVIEW

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Abstract: *Information system (IS) has in many ways impacted supply chain management (SCM), from accumulating. organizing, and assessing data to optimizing the whole operation. With the help of technological advancement and efficient data control, companies can move forward with amending the SCM according to what customers expect. The present study has predominantly focused on how the IS helps the managers and the entire workforce to give their best effort to make SCM successful which accordingly can control the productivity, revenue and data throughout business operations. This systematic literature review is based on an analysis of over 250 articles published in peer-reviewed journals over the last four years to reach out to the learning areas aligned with the topic of how IS aids SCM in different sectors. In general, the findings point out that the integration of information technology into their supply chains provides a competitive advantage. In addition, the study indicates that technology enhances supply chain management's information accessibility, insight, agility, cooperation, and client loyalty. On the other hand, software's could improve supply chain efficiency, but using new technology comes with risk. Unwilling partners and suppliers, poor planning and preparation, communication difficulties, customer issues, complaints, and awkward encounters are among the common complications.*

Keywords: *Information system (IS), supply chain (SC), supply chain management (SCM), Systematic Literature Review (SLR)*
(JEL code: M10)

INTRODUCTION

An information management system is one of the major elements that help to enhance the supply chain system and improve the performance of the organisation (DEHGANI and NAVIMIPOUR, 2019). The employees and managers can maintain key information in a format which can be accessible. This helps them to create a strong plan so that they can achieve the targets of the organisation. However, sharing the company data with the help of an information system helps the management and staff to develop better relationships and maximise the profit of the organisation. As discussed by (FATORACHIAN and KAZEMI, 2021), information systems and technology developments need to be integrated and aligned so that it can help employees enhance their company culture. Focusing on this strategy can help the company's management increase the efficiency of their workforce. It also gives the opportunity to drive down the cost of operations so that they do not have to face any kind of challenges. The application of the information system in the supply chain also help the organisation to satisfy customer requirements (GHADGE et al. 2020), it increases the opportunity to manage the cyber risk system of the firm.

(HAGHNEGAHDAR et al. 2022) argued that there are several types of information technology that help enhance supply chain management: Internet of Things (IoT), cloud-based services, cognitive computing, big data, etc.; it is still insignificant for managing the technical systems so that the working methods of the company can be enhanced. According to (RANA et al. 2022) employees and managers should learn the techniques of the information system so that they can handle their regular operations and enhance the overall performance of the firm. They also stated that employees and managers should learn the techniques of the information system so that they can handle their regular operations and enhance the overall performance of the firm. Information is essential to the efficient operation of the supply chain because it serves as the basis on which managers determine how to go forwards with operations and also how the supply chain will complete them (RANA et al. 2022). As opined by (SCALA and LIND-

SAY, 2021) without knowledge of these factors, management is unable to determine the public's preferences, the amount of inventory at hand, or the most efficient time to produce or provide more items.

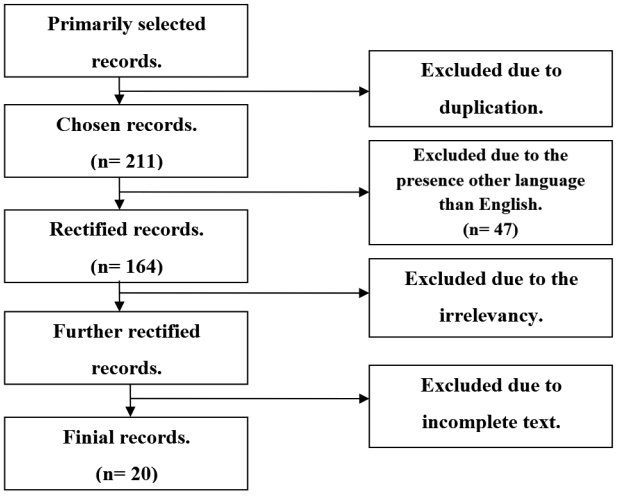
The main aim of this research is to analyse the impact of the information system in the supply chain and highlight the issues which have affected the organisation. Hence, the purpose of the study is to examine the role and effects of information systems in the supply chain, to discuss the advantages of information systems which are creating a positive impact on the supply chain practices and to determine the supply chain challenges that the information technology system has brought about.

MATERIALS AND METHODS

This research followed a three stage approach methodology for the literature review. In the first stage, papers of various researchers are gathered, secondly, efficient frameworks are being made based on the papers and lastly, the research will be discussed and properly elucidated depending on the topic.

Applying PRISMA tool, may be used to conduct the review and provide the desired results (ALVARL and GRIFFITHS, 2021). The application of the PRISMA flowchart (Figure 1) explains both the total number of records used and the number of records necessary for accurate analysis, (AGERON et al. 2020).

Figure 1. The PRISMA Flowchart



Source: Author's own work

Twenty papers were compared to the references in this article to establish the learning areas of the research. An overview of the procedures to be applied in observational research is also included in the secondary analysis. The approach of the sustainable strategy of the Information management system and its impacts on supply chain management have been extensively elucidated in the present studies that have been made publicly available and are sufficient to understand the results while greatly reducing the risk of bias. As per (AGERON et al. 2020), numerous studies have also concentrated on quantitative research in order to provide a thorough understanding of the effect of information systems on the supply chain.

Quantitative studies have more influence than qualitative research because experimenting with officials and considering their observations will be more likely imperative elements for the current topic.

The criteria for inclusion encourage disagreement and offer direction throughout data collection and screening, which helps in debating the research population in a trustworthy and objective manner. The ability to evaluate how a decision impacts external validity is helpful. (LONG et al. 2020), one method of exclusion criteria that aids the researcher in completing the screening process is to use an effective workflow, summarise the justifications for the study's exclusion, and include a systematic review. The study's conclusion was reached using both approaches. The researcher was able to find and gather significant and pertinent papers because of the keywords utilised in this work. Additional factors and theoretical research were employed to further the goals and objectives of the study. The application of the inclusion criterion can be done by clinical and demographic means, allowing for a clear reason.

The articles were chosen by the following steps:

1- Using keywords 263 articles were identified through database searching between 2019-2023.
2- The search results across different data sources were merged, thereby removing multiple entries in the process. After duplicates were removed there were 211 articles remaining.
3- Then the articles were read based on pre-determined inclusion and exclusion criteria. Irrelevant articles were also removed based on scanning the titles and abstract of articles. Through this process 75 articles were rejected
4- The articles that were chosen were reviewed sensibly in order to examine the research methods, theories and content. Hence, 69 articles were rejected.
5- Finally, 22 articles were retained for the entire review.
6- It was noticed that it was possible that some publications have not been considered due to their failure to address the keywords searched for in their titles or abstracts, hence several highly relevant articles were manually added by conducting an additional search (SCHALTEGGER, 2002).

A well-liked method for addressing the quality evaluation of cooperative and constructive intervention is the Critical Appraisal Skills Program (CASP) see table 1. The entire chart, which itself is applicable to systematic reviews, randomised controlled trials, and economic assessments, was built on the assessment checklist. According to (LONG et al. 2020), using the CASP instrument correctly is essential to avoid distorting the evaluation's results. The researcher can fully understand the process thanks to the chart that shows the results. This has proven the effectiveness of the treatments in addition to enhancing teaching and learning. The researcher may also draw judgements in order to satisfy the requirements of this article. Its properties, which are reliant on the subsequent synthesis, may

determine how it is understood. A unique approach that could organise the full explanation has been studied using the findings of the quality evaluation based on the synthesis of the evidence.

The use of the PRISMA tool clarifies the researchers' methods for spotting public data. It was vital to know how many studies were chosen and rejected in order to get the information that was required and pertinent to the problem. This method also makes it simpler to delete undesirable content from the page and draw noble conclusions.

RESULTS AND DISCUSSION

(KOIVISTO and HAMARI, 2019) suggest that information has enhanced the way companies are trying to inculcate success into their operations by accessing knowledge. Every business requires to be exposed towards the most accurate and correct information so as to ensure that overall market power can be gathered. It is immensely important to understand that in the present world, every organisation works within the data-heavy dimension and thus, requires a proper information system so that articulated objectives associated with business goals can be achieved in an effective manner. In this regard, (RAINER and PRINCE 2021) add that information system are a dignified collection of different information resources that are used in order to gather, precisely process, collectively store and separate information for the usage of companies in order to gain competitive advantage. Organisations and different companies are found to employ distinctive information systems in order to work and communicate with their suppliers and customers, perform important business-oriented operations, manage the company and last but not the least maintain and roll out marketing campaigns. This does suggest the extensive manner through which the overall requirement of information systems is required by businesses.

Additionally, (NAIM and ALQAHTANI, 2021) suggest that the applications of distinctive information systems are transaction processing systems (TPS), office automation systems (OAS), knowledge work systems (KWS), management information systems (MIS) and decision support systems (DSS), and executive support systems (ESS). In this regard, it is important to suggest that TPS is the information system that is used by businesses at the operational level while KWS and OAS are found to operate significantly on the knowledge level. However, it is important to suggest that DSS and MIS are found to operate right at the managerial level whereas, ESS is for the strategic level. (ENNY and NI LUH, 2021) suggest that all of these applications that are associated with information systems are structured or designed in such a manner so that every minute details at the organisational level can be easily achieved with the help of the mentioned applications all together. In other words, it can be suggested that all the mentioned applications of information systems are beneficial today implemented organisations because it's not only induces proper and precise innovation into different business activities with the help of its research and development dimension but also in a bus smooth automation by reducing the overall steps that are required to complete any allocated and complicated task. Moreover, the applications also ensure to keep completely safe software, data storage, hardware, and networking systems are completely up to date (ENNY and NI LUH, 2021). Thus, these are some of the important applications of the information system along with its benefits for which different businesses imply them to their work procedures in a significant manner. According to (FU et al. 2022) findings, to enhance the power of Information Management in SCM within firms, the operational processes must be conducted in a unified structure. Exploratory analysis has compelled a few researchers to eliminate observed variables and intersect them with a common link. Out of 10 potential research data, 3 studies may be fully devoted to finding the indicated factors within the topic. On the other side, confirmatory analysis has delivered the result regarding the approach of implications of various strategies in order to scale up the financial performance of the firms. As per the views of (SCHNIEDERJANS et al. 2020), many firms have invested in technology and software designs to make improvements in organisational culture by accelerating team performance along with tuning up their future abilities to address problems within the business process. Few researchers have focused on implementing strategies in the process of supply chain management with the aid of information management along with proving a point that the competitions are consistent among various strategies not among the firms (ABBAS, 2020). Competitive advantage and conceived challenges among strategies have impacted organisms' operational and revenue performances. The list below presents the top five advantages of employing management of the supply network with technology.

Better Information Access

Supply chain-based technology offers insight into customer behaviour in addition to network-wide data on crucial supply chain demands, operations, and interruptions.

Enhanced insight

Businesses may quickly make better judgements by utilising the supply chain technology's decision-support capabilities, (SONI et al. 2022). It is also made simple to analyse data, develop conclusions, and form opinions.

Greater agility

Technology in the supply chain improves agility, enabling executives to handle issues more quickly and formulate preventative solutions (FÜZESI et al. 2020).

Greater Cooperation

Successful supply chains must include technology and processes that encourage, monitor, and assess engagement between individuals, groups, and organisations because they ensure a continual stream of data, analysis, and choices.

An increase in client loyalty

Supply chain technology is essential for omnichannel consumer success and loyalty given the challenges they face. (KUMAR and TING, 2019), mentioned that retailers need visibility, precision, and agility to make sure they have the proper items in their stores and can fulfil online purchases. This is not possible without supply chain technology.

With the aid of the methodologies utilised in this part, it is made clear how information systems impact the supply chain and what has to be done to stop issues from being brought on by such systems, (AMMAR et al. 2019). The study found that an information management system is one of the key elements that enhance the effectiveness of the organisation's performance.

(WINARTO 2021) makes sure to suggest that the overall benefits of different applications evident in the information systems are found to immensely support companies with all complicated and knowledge-based tasks. Significantly, the help of applications ensures that all allocated tasks can be completed within a short time frame and all the business-related goals can be. Therefore, these are all the applications of information systems.

The improvement of supply chain processes may be considerably aided by software. However, there is usually some risk involved when adopting new technology, especially if it challenges the cultural norms and organisational practises that are currently in place. According to (BERDIK et al. 2020), frequent data integration problems include the lack of a plan, digitising records, automating procedures, managing the growing volume, safeguarding access to information, reducing information silos, connecting with legacy systems, and removing low-quality data.

Typical problems with supply chain software implementation
- When putting new software into use, the following problems commonly occur:
- Partners and suppliers are unwilling to compromise.
- New processes and resources are proving to be difficult for employees to adapt to, (HELO and HAO, 2019)
- Poor practice and preparation in terms of training.
- Communication issues on both the internal and external levels, (REJEB et al. 2019)
- Consumer problems, grievances, and negative encounters.

DISCUSSION, IMPLEMENTATION AND ANALYSIS

This study has provided a combined-method proposal to assess the responsibilities of supply chain management in firms' operational and economic healthy by particularly concentrating on the manufacturing and production of different parts of the country. The analysis framework majorly sheds light on the areas of how the information system has impacted SCM from starting a process to delivering the outcome to the end-users. The researchers have also discussed that the firms oftentimes implement different strategies of sustainable management programmes which are aligned to reach the business aim and objectives effectively.

According to (FATORACHIAN and KAZEMI 2021), the analysis of the impacts of IS on SCM has primarily focused on the constructive areas that showed the financial improvement of the organisations due to the information system's agility. On the contrary, the consequent part of the study also focused on cynical areas by discussing the low significance of information management in SCM. However, gathered samples have significantly concluded that the financial performances of supply chain management have enormously improved by decreasing all the complexities within the operational processes such as hazards of collecting raw materials, high logistics costs and more. On the other side, the researchers have similarly stated the positive results of IS impacts on supply chain technology. Straightforward application of IS has helped organisations to enhance the performances of the workers as well as make the management team more efficient. Decision-making and problem-solving skills are therefore enhanced by the company professionals, as information management with real time data helps the employees to work on the constructive analysis of process execution. As per the views of (GURTU and JOHNY 2019) blockchain technology has also played an essential role in making fast changes in various sectors worldwide and simultaneously omitting intermediaries to make supply chain management more relevant to rapid business growth.

Contribution and significance of information system implementation

The implementation of new technologies improves the overall performance of a supply chain. The main goal of this study is to examine the possible impact of the technological revolution. The use of technologies is found to enhance the overall usage of significant knowledge into the operations of a company to simplify any complicated procedures (FATORACHIAN et al. 2021). Blockchain technology improves transparency and visibility by eliminating the drawbacks of belief matters in a supply network. The blockchain model is built on the combination of three theories: the technology acceptance theory, the networked readiness theory, and the self-determination theory. The adoption of blockchain technology in the distribution network and the outcomes indicate that supply management experts comprehend blockchain technology adoption to be effortless, enabling them to generate the highest advantages for increasing the performance of the supply chain (KAMBLE et al. 2019). The information system focuses on contributing to supply chain management through deep analysis. The contribution in the internal supply domain is to introduce supply chain adjustment concepts and analyse information technology usage, whose involvement may improve the performance of the supply chain.

Results using the CASP tool

Table 1. Results of Systematic Literature review

Serial No.	Authors	Findings	Aims	Sample	Methods	CASP
1	(KOIVISTO and HAMARI 2019)	Barriers in the integration of technology and supply chain	Understanding the functions of constructive intervention	Employees	Qualitative approach through interviews	5
2	(RAINER and PRINCE, 2021)	Autonomy is designed through collaborative interevent.	Develop the means of implementing information system within the supply chain	The administrator	Mix integration has been Incorporated along with experimental design	4
3	(NAIM and ALQAHTANI, 2021)	Information systems' function in managing customer relationships	Understanding cooperation in technological implementation	Employers	Grounded approach with the usage of interviews.	6
4	(ENNY and NI LUH, 2021)	Information Management Practices at an Online Transportation Service	Role of collaboration in developing the performance of supply chain	Employees	Interviews were carried out	5
5	(WINARTO, 2021)	Supply chain is enhanced through constructive intervention.	Highlighting the vitality of collaborative practices.	Employees	Qualitative interviews and secondary literature.	7
6	(HUO et al. 2023)	Constructive interventions put an impact on the supply chain.	Introduction in the field of supply chain	Teachers as well as learners in higher education.	Systematic data extraction using descriptive design.	7
7	(SONI et al. 2022)	Understanding inclusive technology	Advanced technology is necessary for inclusivity	Entrepreneurs and staff	Systematic literature review was utilised.	5
8	(KUMAR and TING, 2019)	Agile Supply Chain for Clothing are driven by RFID & Analytics.	Understanding engagement of Agile Supply Chain for Clothing industry	Employers along with employee	Survey and mixed methods	5
9	(BERDIK et al. 2021)	ICT acts as an effective tool in enhancing supply chain.	Implications of the constructivist approach in implementing modern technologies with company's distribution chains	Employees	Quantitative survey.	6
10	(HELO and HAO, 2019)	Blended technological advancements is the most suitable component in increasing the efficiency of supply chain.	Highlighting the necessary combinations of information technology into supply chain of an organisation	Employees of various companies	Exploratory approach has been used with triangulation method	8
11	(REJEB et al. 2019)	Technology has been found to be useful for meeting the requirements of supply chain	Identifying the choice for imparting technology system	Employers	Open ended questionnaire.	8
12	(AMMAR et al. 2019)	The nature of the supply chain is changing in terms of instructional methods.	Understanding the ways that pairing educated reacts to Group-based flipped learning (GBFL)	Aspiring professionals	Interviews were conducted	9
13	(CHRISTOPHER et al. 2021)	New insights to the field of IS through the utilisation of conceptions of AI	To understand the various characteristics of AI studied within the context of IS.	Entrepreneurs and staff	Systematic literature review was utilised.	7
14	(ASAMOAH et al. 2020)	Provide initial verification of the effectiveness of the IT artefact in explaining the level of SC performance of firms.	How IOS use impacts an organization's SCM capabilities and SC performance.	Employees of various companies	Questionnaires and using partial least squares structural equation	8
15	(FATORACHIAN and KAZEMI, 2020)	Industry 4.0 can allow for a holistic approach towards SCM and lead to performance improvements through enabling extensive integration and connectivity	Potential impact of Industry 4.0 and its associated technological advances on Supply Chain performance	Previous literature	Systematic literature review was utilised.	6
16	(ALZOUBI and YANAMANDRA, 2020)	Redesigning their supply chains towards agility by using information sharing as a key aspect	Determining the mediating role of Information Sharing Strategy (ISS) on Agile Supply Chain (ASC) practices for achieving Supply Chain Performance (SCP)	Employees of various companies	Systematic literature review and questionnaires	5

Serial No.	Authors	Findings	Aims	Sample	Methods	CASP
17	(MIGUEL et al. 2020)	A strong accumulated effect on efficiency and, ultimately, on the supply chain results	Overview of aspects and implications of the relationships between Information and Digital Technologies (IDT) of Industry 4.0 and Lean Supply Chain Management (LSCM)	Previous literature	Systematic literature review was utilised.	7
18	(BAAH et al. 2022)	Information sharing positively and significantly influenced supply chain visibility, collaboration, agility and performance	Assesses the critical role of information sharing in supply chains through emphasizing its effect on supply chain visibility	Employees of various companies	Survey research design, a quantitative approach and partial least square structural equation modeling (PLS-SEM)	5
19	(ASAMOAH et al. 2020)	The effect of SCM capabilities on supply chain performance was very strong and even larger than the effect of IOS use on supply chain performance	How IOS use impacts an organization's supply chain management (SCM) capabilities and supply chain performance	Employees of various companies	Questionnaires and using partial least squares structural equation	6
20	(CHEGE et al. 2019)	IT innovation influences SME performance and that the entrepreneur plays a role in the relationship between IT innovation and firm performance	Examines the association between technology innovation and firm performance	Managers of SMEs	Quantitative research design and a semi-structured questionnaire	8

Source: Author's own work

Constructive and collaborative application for developing information systems and its advantages

Firms have implemented a number of information technologies, such as electronic data exchange, manufacturer-managed supplies, and stakeholder engagement, to facilitate clear interaction and strategic planning with supplier partners. Information systems enable organizations to maintain operations in a coordinated and cohesive way in order to achieve a competitive advantage (ALI et al. 2022). For better supply chain performance, some mechanisms are investigated, including the information system's external consumption of its globally connected collaborators. This has really been advantageous. Another mechanism includes the enhancement of the information system's overall organisational management systems in supply chain operations. To manage resources efficiently and successfully, these implementations and their use should be associated with the firm's supply chain management. The research on IT management has primarily concentrated on different aspects of the orientation between information management strategy and corporate strategy (ZEKHNINI et al. 2021). To control the supply chain system, organisations have to introduce a process management strategy and suitable supply chain management practices. Moreover, different supply chain strategies necessitate the use of adequate information technology.

To save the environment, it is essential to completely remove certain causes or driving obstacles. New technological progress, improved customer perception, and regulatory assistance are all required for the impactful adoption of environmentally friendly supply procedures. Several blockchain-based modelling tools, including as a multi-chain framework, a descriptive statistical model, and a brick restriction model, are incorporated into the complete blockchain-based supply chain performance evaluation framework from an e-commerce production chain viewpoint (LIU et al. 2020). Numerous core techniques and algorithms, such as information alignment, key generation, and data encryption, are also being developed. The information system also secures personal data in a supply chain system and prevents any type of information leakage in the industry. New systems are implemented in the supply chain industries for better productivity as well.

Problems that are found due to this constructive and collaborative application

There are several factors that have an influence on supply chain technology and digital transformation, such as cost and competitiveness, supply forecasting and planning, talent shortages, and more. Due to the stringent guidelines needed to maintain the accuracy of data obtained and the transfer of information throughout supply chains, it could be challenging to create and use important information efficiently. As per (TYAGI et al. 2021), even while contemporary organisations possess access to information, telecommunication, and technology that makes it feasible to gather and store large volumes of data, some of these enterprises may not be properly utilising the creation of information systems that facilitate better decision-making using this plethora of data. If data is not transferred both horizontally and vertically across the value chain to inform decisions about inventory, customer service, transportation, and other concerns, it is essentially meaningless to collect and keep data. If it is delivered in a timely, precise, and controlled manner, information appears to have the potential to be a fatal weapon.

Limitations and Recommendations

The study has stated that various published journals about information system impact on supply chain management have discussed about the efficiency of internal and external factors of the organisations, from heading to a new journey to delivering products in the hands of consumers. However, analysing the research pacers, it can be stated that few journals have lacked in addressing the impacts transparently by which few journals discuss sustainable management strategies. Assessing different papers which are conducted by accumulating data from different audiences, approaches and discussions has led to making different perspectives about a certain topic. Another flaw has been noticed here in surveying the data from different parts of the world. Every country has its own rules and guidelines about every sector which is somewhere missing in a few papers while conducting the research. Thirdly, as the researchers are more into finding the data which provides the impacts of Information System on SCM, they somewhere missed out on enlightening how the technology and software system has helped the distribution network to attain the business goal within time.

Recommendation 1

Companies are required to form a supply chain council-The council's job is to provide guidance and connect the supply chain strategy to the main objectives of the business. Consequently, when supply chain technology is introduced, the council will help to dissolve organisational barriers.

Recommendation 2

Reviews must be produced regularly- To guarantee effectiveness and compliance, the organisation must assess its policies and processes. Operations will become simpler, bottlenecks in the supply chain will be avoided, and the likelihood of fraud and theft will be decreased.

CONCLUSION

The performance of the organisation and the supply chain may be enhanced with the help of an information management system. Supply chain management (SCM) may benefit from information technology since it enables a shorter time to value, greater sales, and more production. However, the implementation of information technology poses several concerns as well. One of the most common information management issues is the lack of planning. Other common issues include the digitisation of records, automation of processes, management of the expanding volume, protection of information access, elimination of information silos, integration with legacy systems, and erasure of low-quality data. The results of the CASP instrument were utilised to evaluate the effectiveness of cooperative and supportive interventions.

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