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Review

Knowledge Sharing in the Supply Chain Networks: A Perspective of Supply Chain Complexity Drivers

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Abstract: *Background*: Knowledge transfer has been an important aspect in supply chain systems; however, there are many factors that affect the impact of transfer effectiveness. In previous studies, less attention has been given to the process of knowledge transfer and therefore, this paper highlights the significance of the process of knowledge transfer in supply chain processes. Enhanced supply chain networks have better performance when knowledge sharing is present, and it is important to identify and eliminate any supply chain complexity to improve the supply chain processes. *Methods*: A systematic review on the literature has been conducted to critically identify and evaluate the factors of supply chain complexity which impact knowledge transfer. *Findings*: The findings highlight the key benefits of effective knowledge transfer in supply chain systems by identifying risks associated with supply chain networks. *Conclusion*: The balanced power of facilitating knowledge transfer in supply chain processes helps in supply chain partnerships and reduces the supply chain complexity. This paper has both theoretical and practical contributions as it adds to the literature by identifying the factors of supply chain complexity drivers which are impacting the knowledge transfer.

Keywords: supply chain complexity; supply chain systems; knowledge transfer; supply chain complexity drivers; systematic review

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1. Introduction

Supply chain performance benefits from knowledge transfer and the process of knowledge transfer is essential in supply chain systems. Supply chains are subjected to complexities or disruptions from a variety of sources, which could be related to the amount of knowledge that the firms have [1]. Knowledge transfer can respond to the new issues that supply chain management encounters in today's complicated corporate situations [2]. This study aims to identify the supply chain complexity factors which impact the process of knowledge transfer. When current information is developed and communicated to impact and enhance supply chain functions, firms can compete better in a highly competitive environment [3]. According to [4], knowledge sharing across diverse stakeholders, including customers, suppliers, and partners, can have a substantial impact on a variety of business sectors, including customer service, production cycles, departmental cooperation, and alliance partner connections. As evidenced by the prime quality of product considering uniqueness and innovation, the partnership between various stakeholders that knowledge transfer empowers can improve customer service [5].

While some supply chain risks can be mitigated, there will always be circumstances where present methods and systems do not provide an acceptable planned reaction—non-routine events. Supply chain disruptions are supply chain complexities that affect 75% of all businesses every year [6]. Accepting that supply chain disruptions are unavoidable, businesses must learn to adapt their routines and procedures to foster supply chain resilience, which is defined as the adaptive capability that reduces the impact of a non-routine

event by proactively identifying strategies that enable the supply chain to respond to and recover from such events [7]. This research shows how knowledge transmission across the supply chain and stakeholder network increases learning in all three phases of supply chain systems (preparation, response, recovery). As a result, unlike what has been proposed earlier by [8], learning can take place after the post-disruption stage as well.

The background of the study explains the aim of this research. Furthermore, it highlights the research question for the systematic review being conducted in this paper. It gives an overview of the focus and background of the study and further explains the importance and significance of the systematic review used in this paper.

Knowledge is known to be the fundamental building block of organisations as it allows the firms to develop core competencies, enables them to identify challenges and handle complexities and it helps firms to be competitive. Knowledge transfer is the process in which one unit has an impact on the other through the experience of another [9]. This study primarily focuses on the strategic knowledge sharing in supply chain networks. This is because the study successfully identifies the construct factors of supply chain complexity which impact the process of knowledge transfer in supply chain networks. Knowledge transfer is crucial because it can improve a firm's innovativeness, competitive advantage [10], and performance [11]. External knowledge transferred through collaborative arrangements between external actors (such as customers, suppliers, and research institutes) and firms is one of the central tenets which underpin (inbound) open innovation and one of the key inputs into enterprises' innovation [12]. Knowledge is a valuable resource for a company [13,14] that can be held within the company or through its supply chain [13]. The firm's knowledge-based perspective implies that organisations can synergistically combine individual expertise and can gain long-term competitive advantage [13–16]. This concept was extended by [17], who proposed that corporations exist to coordinate individuals' specialised knowledge. Competitive advantage is strategically dependent on an organization's ability to manage and transmit information, which is driven by originality and the ability to execute and preserve that uniqueness [13,14]. One of the most important challenges in knowledge transfer, according to [18], is the definition and control of the primary factors capable of providing efficacy and efficiency to the entire process in business systems. According to [18], the content of knowledge to be transferred (the complexity, quality, and quantity of information transferred within the organisation) and the speed of the knowledge transfer process determine the maximum effectiveness and efficiency of the knowledge transfer process (the time in which the knowledge transfer can be realized). In addition, Ref. [19] sheds light on complexity management strategies which focuses on the reduction of the complexity in supply chain systems as it increases knowledge sharing.

This systematic review examines and identifies the factors of supply chain complexity which impact the process of knowledge transfer. This study conducts a systematic review because it is a thorough, focused, and rigorous review process which ensures a structured approach in the identification of the factors that influence knowledge transfer in supply chain networks. It is crucial to identify and investigate the factors associated with supply chain complexity as they affect the process of knowledge transfer. Therefore, it is essential to highlight these factors so that researchers and practitioners can benefit from this knowledge and enhance supply chain operations.

Figure 1 projects the three important phases in the process of knowledge transfer between two organisations. The inter-organisational knowledge transfer process takes place when two organisations collaborate; however, there are different interactive dynamics which affect the process. Figure 1 highlights different factors which play a vital role in the inter-organisational knowledge transfer process. The donor firm transfers knowledge as the absorptive capacity of retaining knowledge is quite high and the donor firm already practices the knowledge transfer process within its firm. Therefore, it has the motivation of teaching and spreading knowledge and information to the other firms for collaboration. However, the process of knowledge transfer has its own dynamics and nature as it includes tacitness, ambiguity, complexity, structures, risks associated, power relations and trust.

These dynamics should be taken under consideration when the knowledge is transferred to a recipient firm. This is because the recipient firm should be motivated for learning; however, these dynamics can create hurdles if they are not addressed properly. For instance, if the recipient firm lacks motivation to learn and vice versa, complexities could arise which could be a potential risk to overall knowledge transfer process. On the contrary, such hinderances can be prevented if they are tackled in a systematic and efficient manner.

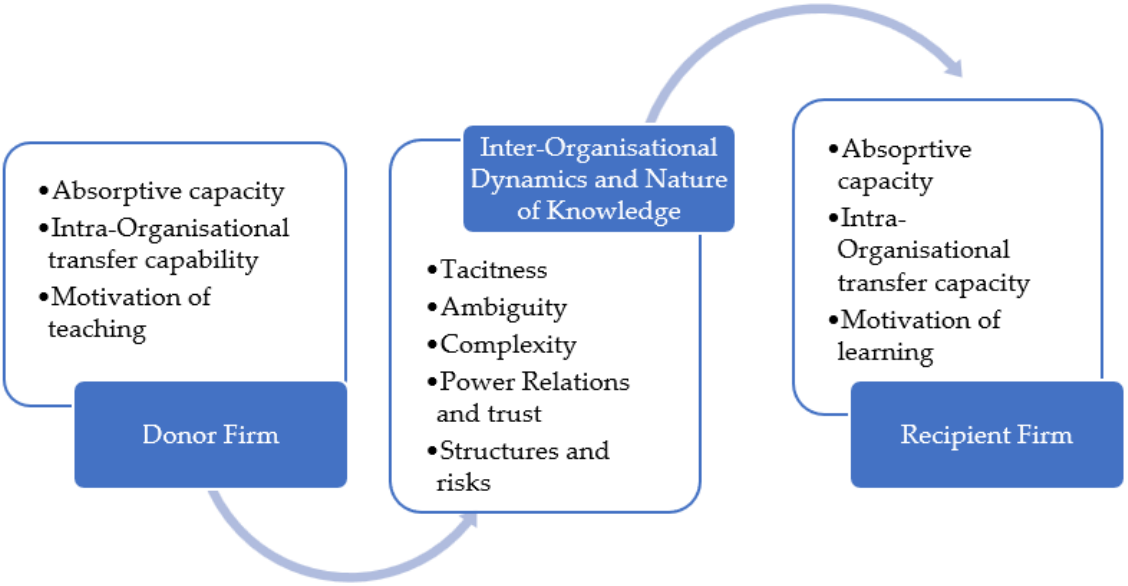

Figure 1. Inter-organisational knowledge transfer and the factors influencing the knowledge transfer (adapted from [20]).

In previous literature, research related to the supply chain complexity drivers is available. However, it lacks attention to the impact of the supply chain complexity drivers on knowledge transfer. Hence, this study addresses this literature gap and focuses on the identification of the supply chain complexity factors affecting knowledge transfer. The knowledge transfer process has its own challenges and supply chains constantly strive to eliminate the potential risks and complexities. The supply chain complexity drivers have various factors which influence the business operations and supply chain processes. Therefore, this paper has gathered the factors of supply chain complexity which have an impact on knowledge transfer. It is essential to identify these factors as it will increase the flow of knowledge transfer and will eventually increase the operations of the supply chain networks.

This paper investigates and identifies the importance of knowledge sharing in supply chain processes. The study has practical implications as it provides firms with relevant information and knowledge related to supply chain complexity drivers and this can enhance supply chain practices within organisations. Mangers and decision-makers within organisations can improve supply chain networks by eliminating supply chain complexity and enhancing supply chain operations. This can help firms to achieve economic and social goals by effective knowledge transfer within supply chain networks.

This paper conducts a systematic review and the research question for this study is:

What are the supply chain complexity factors which are impacting the knowledge transfer process in organisations?

This study uses a systematic review to collect the factors of supply chain complexity which impact knowledge transfer in the supply chain systems. Systematic reviews offer many benefits. The main benefit of conducting systematic review is that it delivers a clear and comprehensive study, and it helps in answering the specific research question in a rigorous and transparent form of literature. The aim of this study is to collect the

factors of supply chain complexity drivers which impact the process of knowledge transfer. This research contributes towards the managerial and practical practices of firms and organisations in supply chain networks. It also facilitates in eliminating the supply chain complexity drivers to increase knowledge transfer and operations of supply chain systems.

Preferred Reporting Items for Systematic reviews and Meta-analysis (PRISMA) in the systematic review is used in this study to enhance the process of research. This study uses PRISMA for its various potential benefits as it provides a clear guideline to this respective study. PRISMA provides the opportunity to conduct a systematic and transparent review process which is comprised of various steps such as eligibility, identification, evaluation, screening, and inclusion. The search process is carried out using online databases. It is a structured and step-by-step process which enhances the search process by deriving relevant articles. In this study, PRISMA helps to ensure that there is a transparent and complete reporting of the systematic review. The complete reporting provides an opportunity to analyse the appropriateness of the method and further authenticates the findings. The PRISMA flow diagram visually summarises the screening process.

In the next section, materials and methods of collecting the data are discussed. This paper will explain all the steps taken to conduct the systematic review. The next section thoroughly explains the benefits of conducting a systematic review and PRISMA. Moreover, the results will be discussed at a later stage.

2. Materials and Methods

This systematic review follows protocols and reporting according to the Preferred Reporting Items for Systematic reviews and Meta-analysis (PRISMA) methods and procedures [21]. Systematic reviews are a transparent form of the literature review, and they are known to be the most reliable as well as detailed work, which involves identification, synthesis and assessment of the available data and evidence. It is used to create a robust and empirically derived answer to a very focused question [22].

Systematic reviews have been conducted and used globally since the 1970s and they were frequency increased in 1980s. However, these reviews were conducted for medical research and natural sciences at that time. Systematic reviews were a useful method to facilitate the evidence base in the best possible way. Systematic reviews rely on a particular objective with clear transparency to reduce bias. In this study, a systematic review is used to collect the factors of supply chain complexity which impact the process of knowledge transfer. In the next section the methodological choice is discussed in detail, followed by the inclusion and exclusion criteria of this study.

2.1. Methodological Choice

The systematic review is a well-documented, repeatable, and transparent process of search based on a theory-based understanding of the phenomenon of interest, and it improves the quality of the review process in the end [23]. Systematic reviews summarize what has been written and discovered about a study issue in an objective manner. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses is the proposed method adopted for this research methodology (PRISMA) [21]. The PRISMA statement is divided into two parts: systematic reviews and meta-analyses. This is especially useful in broad research topics when there are numerous papers, each focused on a certain facet of the field [24].

To make the process objective and repeatable, all review methods must be made apparent prior to the actual conduct of the review. The PRISMA statement's major purpose is to assist researchers and practitioners in completing a clear literature review report. PRISMA has undertaken several previous investigations in a variety of domains in order to compile a thorough literature review [25]. Four primary PRISMA processes are completed in this review study: search and identification, screening, eligibility evaluation, and final selection.

The systematic review approach, according to [23], is often used in modern business research and is a good research process for full analysis. The process of systematic review

facilitates the discovery of the factors that have the greatest impact on knowledge transfer for the purposes of this thesis.

It is critical for researchers to determine the correct keywords and search strings in relation to the study topic or questions when it comes to finding papers [26]. On the other hand, Ref. [27] proposes that researchers efficiently conduct conceptual exploration through a systematic review and conceptual analysis of academic literature which contains these two constructs. A systematic review, according to [27], can be completed in four steps as shown in Figure 2. First, the researcher should create a repository of identified articles by conducting a thorough and systematic search to discover and extract all relevant literature published in academic papers about the research issue [27]. Second, the researcher may create a template for assessing each journal article, which is an iterative process involving the development of theoretically derived and empirically developing themes [27]. Finally, the researcher must analyse the findings and integrate them in the most meaningful way possible. This study uses PRISMA which has various potential benefits to business stakeholders and decision-makers. Use of PRISMA has provided a clear guideline for this respective study in terms of reporting the systematic review. Figure 2 illustrates the four stages used in this systematic review.

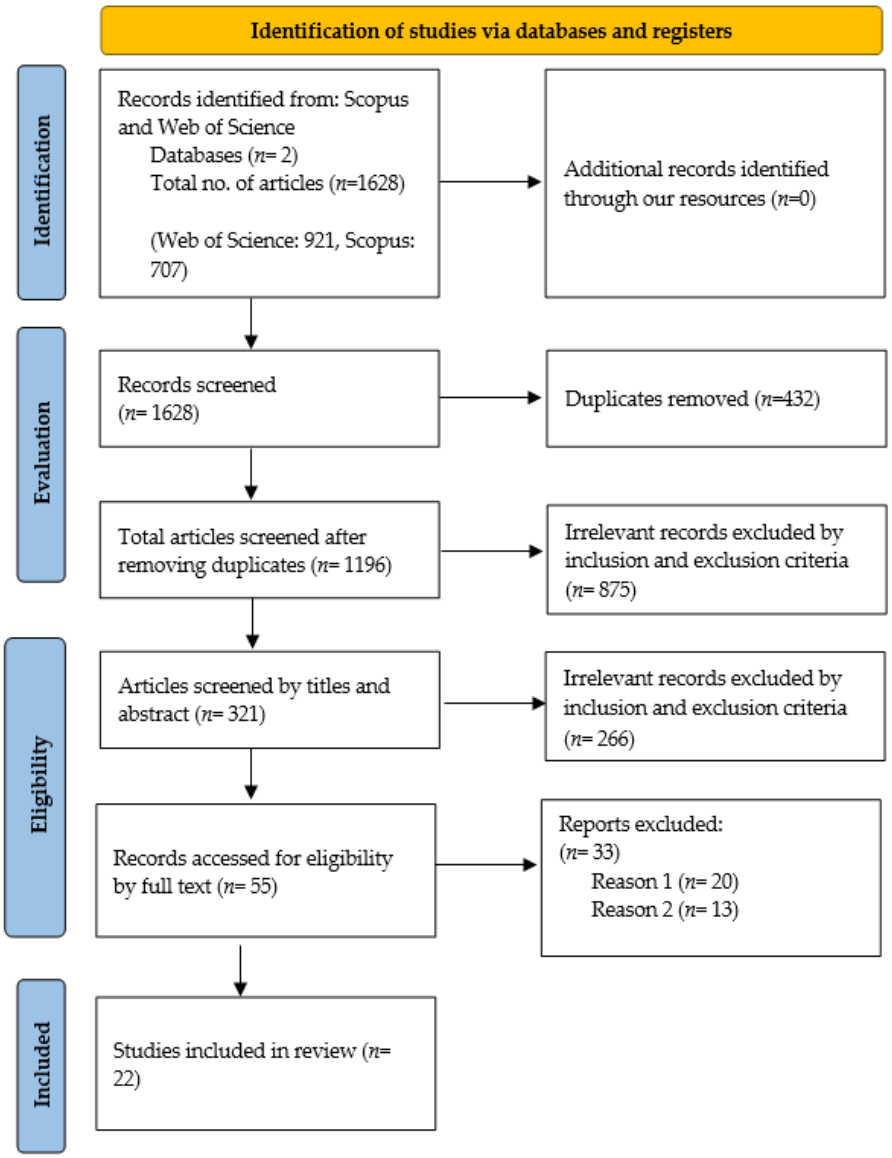

Figure 2. PRISMA flow diagram illustrating the stages in the systematic review.

2.2. Scope of the Review

In prior systematic review studies, exclusion keywords were employed to meticulously restrict the search results to match the scope [28]. In this review, the papers that did not fit within the scope were deleted. Papers that are clearly different from the study's subject were chosen and properly analysed to recognize the possible exclusion keywords. The exclusion terms were mostly in reference to forecasting areas that were deemed out of scope.

2.3. Searching Relevant Literature

Two well-known databases were chosen as shown in Table 1, the Web of Science and Scopus, to extract all publications relating to supply chain complexity and its impact on knowledge transfer. However, there was a limited access available to Scopus; therefore, some of the articles could not be accessed in full. The literature search was conducted using keywords such as "supply chain complexity drivers, supply chain complexity, supply chain disruptions, sustainable supply chain systems, knowledge transfer, sustainable logistics networks, sustainable supplier selection, green supplier selection, reverse logistics, supplier evaluation, Supply Chain performance, Supply Chain sustainability, purchasing and supply management and supply chain network design". However, three keywords were eliminated because the scope was too wide. An initial examination of the literature was conducted to aid in the identification of keywords to include in search strings. The search strings were then finalized as shown in Table 1 below.

Table 1. Search strings used for collecting the studies from the databases.

Search Strings	
Web of Science	**Scopus**
"Knowledge transfer" OR "Impact of knowledge transfer on supply complexity drivers" OR "Supply chain complexity drivers" OR "Supply chain complexity" OR "sustainable supply chain systems" OR "Supply chain disruptions"	"Supply chain complexity" OR "Supply chain disruptions" OR "Knowledge sharing" OR "sustainable supply chain systems" OR "sustainable logistics networks" OR "Knowledge transfer" OR "Impact of knowledge transfer on supply chain systems"

The aim was to gather the most recent published papers, which covered papers from 1 April 2003 to 1 March 2022. The lower limit is set for the year 1 April 2003 and the upper limit is set for 1 March 2022 as this research aims to gather all the relevant and up to date papers. The papers were screened thoroughly based on titles and abstracts, and papers that were irrelevant were eliminated. Finally, possibly related papers were left for this review to be conducted.

The rationale for this study is the impact of supply chain complexity drivers on the process of knowledge transfer as it is an under researched area. Existing literature talks about the supply chain complexity drivers however, this study sheds light on the identification of factors of supply chain complexity which impact knowledge transfer. There are many supply chain complexity factors which hinder the process of knowledge transfer and influence supply chain operations. Hence, this study identifies the factors in order to improve knowledge transfer in supply chain networks and overall supply chain operations.

The search was performed on two main databases known as Scopus and the Web of science. A total of 1628 articles resulted from the search of keywords. Based on that search, 432 duplicate articles were found, and they were removed so as to match the protocols set for eliminating the unwanted articles. After elimination, the selection from these articles resulted in peer-reviewed articles and the total number of those articles was 1196. Moreover, 707 papers were found published up until 1 March 2022 using the Scopus search engine's 'title, abstract, and keywords' search fields and by restricting our search to peer-reviewed journal articles published in English. Furthermore, 921 papers were found published until 1 March 2022 using the Web of Science search engine's title, abstract and keywords search fields. The same restrictions were applied to these articles as well.

The grey literature was not examined and considered in this respective study. This is because this study conducts systematic review to obtain results and findings. The low quality of such articles lacking relevant information, absence of peer review and lack of validation were some of the important reasons to exclude grey literature from this study. Therefore, the authors have decided not to include any grey literature as part of this study.

2.3.1. Eligibility of Articles

All the papers were read independently with the full text of each paper retrieved from the previous step in this level of review for the purpose of determining eligibility. The final step was to carefully identify the linked articles in order to reach a consensus. Book chapters, unpublished working papers, editorial notes, master's theses and doctoral dissertations, textbooks, and non-English papers were also omitted. Finally, 22 publications related to supply chain complexity drivers and their impact on knowledge transfer that matched our inclusion criteria from different scholarly international journals and conferences published between 1 April 2003 and 1 March 2022 were selected.

Searching for relevant studies in peer-reviewed journals is part of the research strategy to gain a better understanding of the present status of research on supply chain complexity and its impact on knowledge transfer. Relevant studies and their sub fields are subject to a rigorous review. A primary search of the Scopus and Web of Science databases for publications published between 1 April 2003 and 1 March 2022 was conducted as part of this study. The next section explains in detail the inclusion and exclusion criteria of this study.

2.3.2. Inclusion and Exclusion Criteria

This study follows an inclusion and exclusion criteria explained in Table 2 which helps in determining the papers that are selected for this systematic review. The selected studies for the systematic review can be empirical studies i.e., qualitative, or quantitative studies. In addition to this, theoretical and conceptual studies are also acceptable for this research. The databases which are used include Web of Science and Scopus. However, limited access was available for Scopus. All the studies included are in the English language and papers in other languages are excluded. The upper limit of the studies included is 1 March 2022 and the lower limit set for the included studies is 1 April 2003. This timeframe has covered most of the important aspects of the subject and recent papers are preferred. All the papers included fall under the criteria of answering the research question of this systematic review and therefore, this is a major inclusion criterion. The following Table 2 explains the criteria in detail:

Table 2. Inclusion and Exclusion criteria (author's work).

Criteria	Inclusion	Exclusion
Type of study	Empirical studies selected: Qualitative and quantitative OR theoretical and conceptual studies	None
Databases	Limited access to Scopus and Web of Science	Other databases
Language	English	Other languages
Time span	1 April 2003–1 March 2022	Any papers before 1 April 2003
Relevance	1. It should directly link with the research question 2. Identification of any companies involved in supply chain management and have gathered factors for supply chain disruptions 3. Studies discussing the supply chain complexity drivers and supply chain complexity 4. Studies indicating the importance of knowledge transfer and companies practicing knowledge transfer 5. Analysis level: Organizational level practices and procedures.	1. Not directly linked with the research question 2. Studies without any clear information available 3. Studies not containing any relevant information towards the collection of factors 4. Analysis level: Not firm-level practices and processes.

2.3.3. Data Pool Formation and Extraction

The required information was gathered in the final step, and 22 papers were examined and summarized. All the articles were then categorized into the following categories: supply chain complexity, sustainable supply chain, supply chain complexity drivers, knowledge transfer and other related subject areas. Furthermore, articles were reviewed based on a variety of criteria, including the name of the author(s), publication year, the technique, the country, the scope, the study purpose, the research gap and contribution, the results and outcomes, and the journals and conferences in which they appeared. Reviewing, summarizing, and categorizing articles assists in achieving the different important hints. As a result, certain comments and recommendations for future research were also taken into consideration. The most difficult aspect of applying the PRISMA method was implicitly stating methodologies in the abstract and method section of the selected papers. As a result, the entire content of the articles was read thoroughly to dig deeper into the details to determine the exact factors which affect knowledge transfer in the firms. Even though the selection process took a long time, it assisted in selecting the best publications for finding the right factors [29,30]. The process of gathering and refining the literature pool is explained in detail in the Figure 3 below.

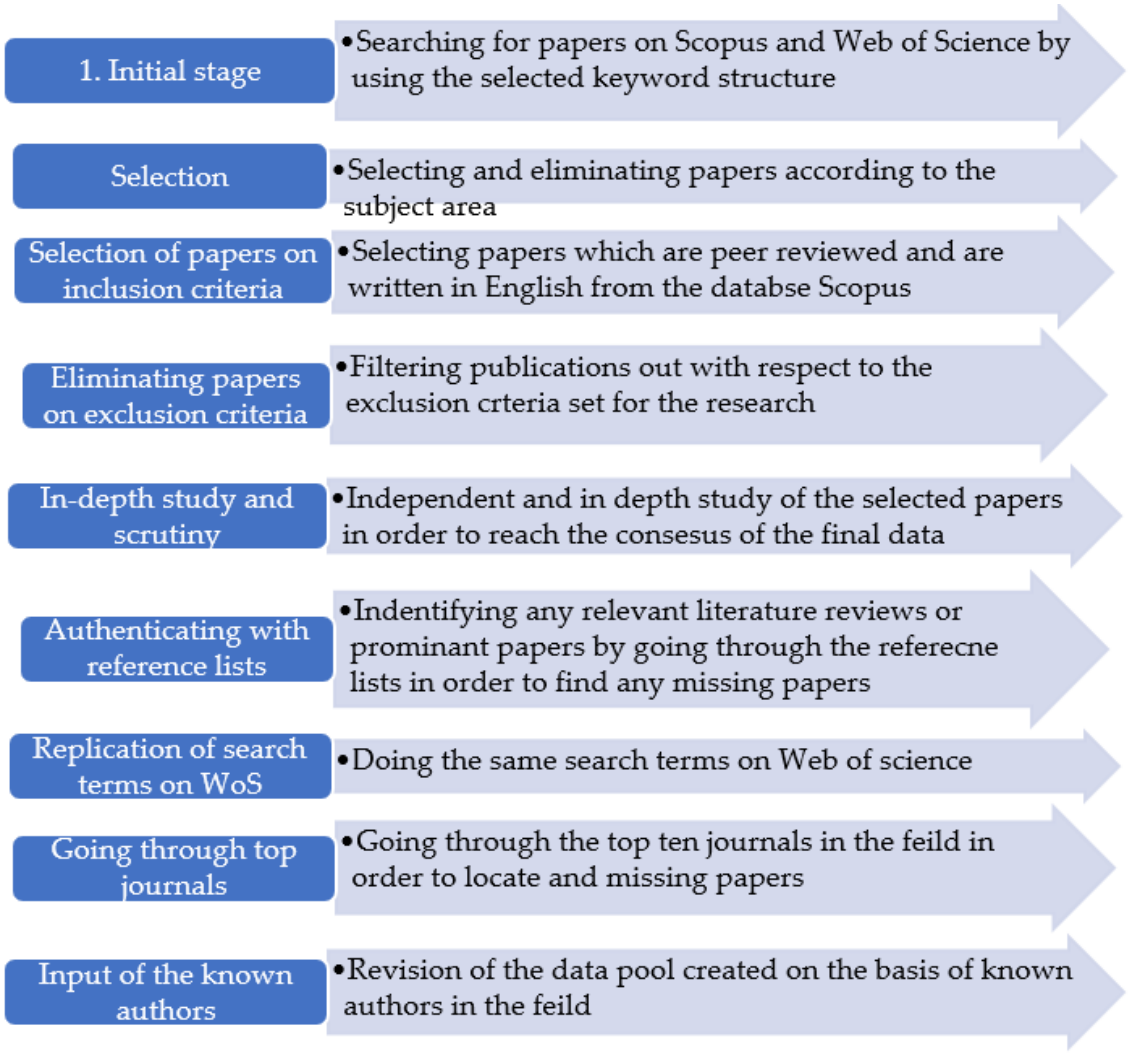

Figure 3. Process of gathering and refining the literature pool (adapted from [28]).

3. Results

Generic Observation

The increasing interest in supply chain complexity and the role of knowledge transfer in it can be seen from the following Figure 4. The publication date reflects the rapid growth of complexity management in firms and organizations. As the technological advancements increased, so did the complexities; therefore, more interest developed throughout the years in different parts of the world; Europe and Asia being at the top.

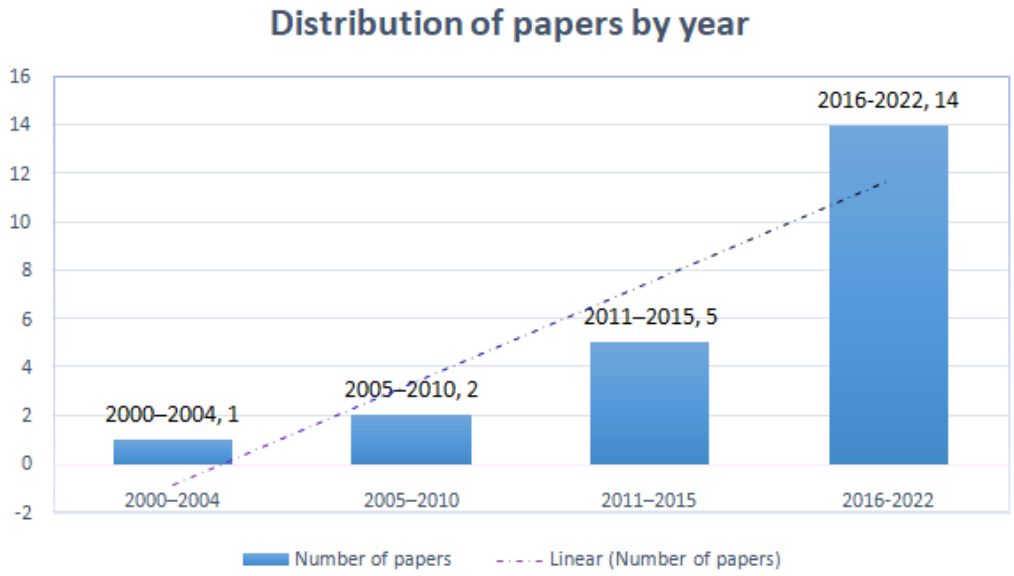

Figure 4. Distribution of the selected papers by year (author's work).

This study focuses on the exploration of different factors which affect the knowledge transfer; therefore, a systematic review was conducted of the extant literature to identify the factors and understand the associated patterns. Moreover, this study considers the factors beyond the identified supply chain drivers which may impact the process of knowledge transfer in firms. It is important to eliminate supply chain complexities to facilitate the knowledge transfer process. There are different factors which have an impact on knowledge transfer. These factors have been identified from the systematic review. The papers gathered are listed in Appendix A and these are used to identify and collect the factors. Many papers have identified factors which affect knowledge transfer:

- Decision making complexity
- Process complexity
- Customer complexity
- Product complexity

According to [31], product complexity factors have a direct effect on the organisational performance. The results are gathered by testing the hypothesis and an ARENA simulation model has been used for the testing. The results show that if the product complexity is higher, it decreases the efficiency and effectiveness which directly impacts the organisational performance. Moreover, Ref. [32] investigated five business organisations of Argentina to identify the factors which influence knowledge transfer and supply chain partnerships. The results show that knowledge transfer occurred in the selected organisations; however, the factors which allow the organisations to transfer knowledge are social trust, attitude and the understanding of the importance of internationalization. The results also focus on the importance of collaboration and the elimination of decision-making complexity for better supply chain systems and increased competitiveness. Furthermore, Ref. [33] studied knowledge sharing behaviour and examined supply chain complexity factors that affect it. Meta analysis was conducted, which concluded that one of the factors is process complexity,

which directly impacts the knowledge sharing process; the results demonstrated there is a significant association between innovative performance and process complexity in supply chain partnerships.

Moreover, Ref. [34] have created a conceptual framework of the advantages and disadvantages of digital supply chain systems and the risks associated with it. The results illustrate that the benefits of digitalizing the supply chain systems have a positive effect on knowledge sharing process and it also decreases the customer complexity in supply chain systems. Ref. [35] used Complex Adaptive System (CAS) modelling to gather the factors and strategies to overcome process complexity. The results explain that complexity management is important to increase knowledge sharing.

A conceptual model by [36] was developed for testing product complexity. The results were gathered by testing the interrelationships of product design and product demand. The results suggested that it is essential to establish interrelationships for better alignment of the design and demand aspects of products. This is to avoid supply chain disruptions and minimize supply chain risks. In addition, Ref. [37] examined the concepts of knowledge sharing applied to achieve innovation and competitiveness in organisations and to increase supply chain collaborations. The results were that interactions support knowledge sharing flows and organisations succeed in terms of efficiency and effectiveness.

Furthermore, Ref. [38] came across different drivers of supply chain complexity which includes decision making complexity. The results explained that technological advancements are essential and play a huge role in eliminating decision making complexity. There is a positive and significant collaboration between technology and knowledge transfer as it is important for organisations to actively share knowledge and information for competitiveness and innovativeness. The factors that came forward in knowledge sharing behaviour were trust, attitude, and commitment. In [39], the impact of COVID-19 on the supply chain systems was studied as it clearly impacted the supply chain networks in a drastic manner. Furthermore, the existing literature and models could not stop the supply chain disruptions caused by the coronavirus pandemic; hence, Ref. [39] put forward some of the factors which had an influence on supply chain networks. Developing a culture of collaboration, synchronizing strategic processes, diversifying supply chain systems, technological advancements, flexibility and proactivity of supply chains and the demand–supply match is some of the factors. The results gathered show that an increase in the knowledge transfer process increases system clarity and strengthens the relationships between the elements of a supply chain system.

In [40], the complexity drivers in global supply chain systems were investigated. The results pointed out the cultural barrier in supplier and customer relationship which is one of the biggest complexity drivers and a hurdle in the knowledge transfer process. According to [41], collaborative supply chain partnerships facilitate leadership development and increase knowledge sharing in organisations. The factors determined are leadership development and collaborative learning and these factors play a vital role in the process of knowledge transfer within the organisations. There is a significant association between collaborative learning and knowledge-sharing behaviour.

In [42], a conceptual model is used to gather factors which include product variety, supply chain complexity and studied the relationship between the two factors. The results show that an increase in the product variety creates product complexity as it has an impact on the increasingly complex networks which are involved in the process of exchange of raw materials and information flow. Study [43] highlights the factors which have a direct impact on supply chain partnerships. Four factors which were identified through an empirically tested model of complexity transfer are sink, source, equilibrium, and boom. The highlight of the paper is that it discusses the representation of complexity transfer and its impact on supply chain partnerships. These factors are internally generated and are accepted externally in organisations. Moreover, these factors are used to manage the developed complexities in organisations to identify structural and operational changes. Furthermore, these factors also contribute to reducing the costs incurred through systematic supply chain

complexities. In [44], customer behaviour towards supply chain complexity and its impact on knowledge transfer in organisations are studied. Three main factors have been identified which contribute towards the process of knowledge transfer in organisations. These factors are technical skills, trust, and services availability in supply chain systems. The results illustrated that it is important to address the technical skills for customers and the increase in the level of trust directly increases the innovativeness and capability of firms, which maximise the benefits for supply chain partnerships. Furthermore, it is important for firms to collaborate and have partnerships, which increase knowledge transfer. The results also play a vital role in eliminating customer complexity by providing different strategies for maximum collaboration. Consequently, high-level of complexity with regards to materials, information and funds also leads to supply chain disruptions and impacts efficiency [45].

An elaborate illustration of the results is tabulated below in Table 3, and focuses on the product complexity factor. Product complexity plays a significant role in supply chain networks as it can greatly impact the process of knowledge transfer. The construct factors derived from systematic review in results are technological advancements and digitalisation. It has been recognised from the results that innovative trends and supply chain integration improves the process of knowledge transfer in supply chain networks. Moreover, supplier and customer collaboration and relationship also decrease product complexity in supply chain systems. Enhanced understanding of product design and demand also reduces the product complexity. The Table 3 explains in detail the impact of construct factors on the process of knowledge transfer. The table also highlights product complexity factors in detail.

Table 3. Construct Factors gathered for product complexity (author's work).

Factor	Author	Journal	Method	Construct Factors
Product complexity	[46]	International Journal of Production Economics	Testing the developed hypotheses of holistic framework using data of 931 manufacturing companies obtained from the sixth version of the International Manufacturing Strategy Survey	Ref. [46] empirically tested a holistic framework. The factors identified are internal integration, technological advancements, suppliers, and customer integration. These factors have a positive effect on the supply chain risk management
	[40]	International Journal of Physical Distribution & Logistics Management	Case study design which consists of 41 interviews and 81 documents.	Ref. [40] investigated the complexity drivers in global supply chain systems. Pointed out the cultural barrier in supplier and customer relationship. Knowledge transfer process is affected by the cultural barrier.
	[36]	International Journal of Engineering, Science and Technology	Testing of a conceptual model	Tested the interrelationships of product design and product demand. Better alignment of the design and demand aspects of products. Avoids supply chain disruptions and minimizes supply chain risks.

Table 3. *Cont.*

Factor	Author	Journal	Method	Construct Factors
	[31]	Journal of Operations Management	ARENA simulation used for creating the model and hypothesis testing of the model created	Identified product complexity factors which have a direct effect on the organisational performance. The product complexity is higher, it decreases the efficiency and effectiveness which directly impacts the organisational performance.
	[42]	Operations and Supply Chain Management: An International Journal	Studied structured literature review and created a conceptual framework based on it.	Used conceptual model to gather factors: product variety, supply chain complexity. Increase in the product variety creates product complexity as it has an impact on the increasing complex network which are involved in the process of exchange of raw materials and information flow.
	[47]	Decision Sciences (Journal compilation)	Conceptual framework created by secondary data	Ref. [47] brought forward the application of the complexity theory. Suggested real word application of it in the supply chain management. The research emphasized on generating, validating, and refining new theories.

Table 4 describes the construct factors of process complexity. It also highlights the author, journal, and method from which each factor has been extracted. Process complexity has its significant influence on the knowledge transfer process in supply chain networks. The construct factors that are identified and enhance the process of knowledge transfer in supply chain systems include social trust, reliability and supply chain collaboration and coordination. It is important to overcome the cultural barriers of knowledge transfer in supply chain systems. The Table 4 gives an in-depth explanation of the construct factors of process complexity that impact knowledge transfer.

Table 4. Construct factors collected for process complexity (author's work).

Factor	Author	Journal	Method	Construct Factors
Process complexity	[48]	Supply Chain Management: An International Journal	Conceptual model and case study	Supply chain collaboration and supply chain coordination increase knowledge transfer and many firms have different strategies for complexity management. Mass customization is a strategy used by many firms for complexity management.
	[49]	Supply Chain Management: An International Journal.	Case study and interviews	Factors which came forward are variety reducing, decoupling, coordination, collaboration, decision support and knowledge sharing.

Table 4. *Cont.*

Factor	Author	Journal	Method	Construct Factors
	[45]	Journal of Operations Management	Model testing from existing literature	Three factors were identified: horizontal, vertical, and spatial complexity. These factors increase the frequency of supply chain disruptions.
	[32]	Strategic Change Special Issue: Global Value Chains in a Digitalised Era	Case study analysis and semi-structured interviews	Different business organisations are studied which explained that these factors increase knowledge transfer: social trust, attitude, and internationalization.

The Table 5 explains the construct factors of the customer complexity in supply chain networks. The customer complexity is an important factor consider as it has a huge impact on knowledge transfer in supply chain systems. The construct factors of customer complexity include building knowledge and trust within customers, technical skills, and efficient service availability. Complexity management methods and effective information flow can reduce customer complexity and enhance the process of knowledge transfer in supply chain systems. The Table 5 gives an insight of the author, journal, method, and its construct factor derived in detail.

Table 5. Construct factors gathered for customer complexity (author's work).

Factor	Author	Journal	Method	Construct Factor
Customer complexity	[43]	The Management of operations	Empirically tested model	Four factors which were identified: sink, source, equilibrium, and boom. Factors are used to manage the developed complexities for identifying structural and operational changes.
	[35]	Procedia CIRP	Complex Adaptive System (CAS) modeling	Complexity management strategies increase knowledge sharing and reduces customer complexity
	[50]	Knowledge Management Research & Practice	Model testing with hypothesis formation	Factors identified: exchange of knowledge and trust-building process within customers. These factors create sustainable food consumption patterns.
	[34]	Computers in Industry	Conceptual framework	Positive effect of digitalizing the supply chain on knowledge sharing process Decrease in customer complexity in supply chain systems
	[44]	Polish Journal of Management Studies	Data collected by Structural Equation Modeling (SEM)	Three main factors which contribute towards the implementation of information flow in organisational supply chain systems: technical skills, trust, and services availability

The Table 6 explains the construct factors for decision-making complexity in supply chain systems. The decision-making complexity plays an important role in the process of

knowledge transfer in supply chain networks. The construct factors for decision-making complexity include organisational collaborative culture, supply chain strategies, innovation, technology, and organisational behaviour (trust, attitudes, and commitment). Efficient leadership, collaborative learning and positive knowledge sharing behaviour can enhance the overall process of effective knowledge transfer in supply chain networks and lessen decision-making complexity. The Table 6 details about the construct factors of decision-making complexity and how they can influence the knowledge transfer process.

Table 6. Construct Factors for Decision-Making complexity (author's work).

Decision Making Complexity	Author	Journal	Method	Construct Factors
	[41]	European Journal of Information Systems	Research model and hypothesis testing	Some of the factors discovered are leadership development and collaborative learning for increasing knowledge transfer among organisations. Collaboration, leadership, and technological advancements are main factors identified.
	[38]	International Journal of Physical Distribution & Logistics Management	Conceptual framework	There is a positive and significant relationship between technology and knowledge transfer. The factors that came forward in knowledge sharing behaviour were trust, attitude, and commitment
	[33]	Journal of Supply Chain Management	Meta-analysis	Complexity management is highly essential to promote knowledge transfer and some of the factors collected are cultural diversity, language barriers and emotion transfer. It is important to understand that different firms have different methods of collecting knowledge: horizontal and vertical.
	[37]	Management science	Conceptual framework	Concepts of knowledge sharing applied achieve innovation and competitiveness and increase supply chain collaborations.
	[9]	International Journal of Production Economics	Hypothesized model and testing	It is essential to have interrelationships and some of the gathered factors are Trust, Reliability, Product variety and Leadership development. It is important to identify the factors affecting the decision making of firms.
	[51]	International Journal of Logistics Research and Applications	Interpretive structural modelling (ISM)	Factors identified which increase customer complexity: customer need, competitor action, and government regulations. These drivers are to be addressed by organisations for eliminating supply chain complexity.
	[39]	Journal of Business Research	Data analysis from NASDAQ 100 firms (text analysis)	The following factors were identified which had an influence on supply chain networks: developing a collaborative culture, coordinating strategic processes, expanding supply chain systems, technological and innovative advancements in supply chain systems, flexibility and proactivity of supply chains and demand–supply match are some of the factors.

4. Discussion

In various research and practices, supply chain complexity issue has been raised and is gaining a lot of acknowledgements [52]. Technological advancements and innovations play significant role in effective supply chain management and reduce supply chain risks thus ensuring efficient business activities and knowledge transfer [53]. It is vital to discuss and investigate the supply chain complexity and disruptions to identify the potential risks in supply chain management [54]. The factors of supply chain complexity have been identified in this research through a rigorous process of systematic review of the literature. A systematic review has been used to collect the relevant evidence related to supply chain complexity and factors that influence the process of knowledge transfer. The relevant evidence is based on the four main factors and the research goal. It further helps to answer the specific research question in an effective manner in this study. The benefit of conducting a systematic review includes minimising bias to achieve the research aims. It is a focused study where there is minimum bias in recognition, selection, analysis, and review of the studies. Other advantages of systematic review include the process of selecting the relevant studies which come under the eligibility criteria. The key attributes of systematic review are (1) a clear research question with a focused set of objectives, (2) reproducible methodology, and (3) a critical examination and validation of the included studies [55]. This study uses PRISMA in the systematic review to improve the overall process of this research. The use of PRISMA provides systematic searching process for example eligibility, identification, analysation, screening, and inclusion to enhance the search process via online databases. Moreover, it is a step-by-step process which improves the comprehensive searching to identify and attain the relevant articles. The PRISMA also gives a clearer picture of the overall process to the reader. It further helps the reader to observe easily and identify the connection between the sources used and information gathered through recording and evaluation of systematic reviews [56].

The complete reporting carried out through PRISMA gives an opportunity to evaluate the appropriateness of method used and validates the findings. Furthermore, it allows the summarising of the attributes of the study conducted and allows policy makers to analyse the applicability of findings according to their needs and settings. The implications of findings further help decision makers, policy makers and managers to appropriately use them for policy or practice. Complete and successful reporting also facilitates review updates and replication along with providing guidelines and overview of systematic reviews. Hence, business teams can consult the work that has already been completed and this reduces research waste [57].

This study has both theoretical and practical contributions. From a theoretical perspective, this study identifies the factors of supply chain complexity, which are highly crucial for effective knowledge transfer. Previous studies have discussed the significance of knowledge transfer; however, less attention has been given to the identification of factors of supply chain complexity which play an important role in process of knowledge transfer. From a methodological point of view, this study focuses on the construct factors of supply chain complexity in supply chain networks and systematic review is conducted for enhanced analysis. Hence, the identification of the supply chain complexity factors will contribute to research from a holistic perspective and enhance the understanding of the process of knowledge transfer in supply chain networks. This research also contributes to practical aspects as it identifies the supply chain complexity factors and discusses them for effective process of knowledge transfer. The identification of the construct factors also provides insight of these supply chain complexity factors and analyse its impact in efficient knowledge transfer. This information is beneficial for organisations, practitioners, and stakeholders to enhance the process of knowledge transfer in supply chain networks.

In this study, the results in the above section highlight the four main factors which influence and impact the process of knowledge transfer in supply chain systems. The four main factors identified are product complexity, customer complexity, decision making complexity and process complexity. In today's globalised world it is highly essential for

supply chain networks to respond and tackle the challenges in an efficient manner and from a practical perspective. It is not possible to eliminate the supply chain complexity; however, preventive measures can be taken to reduce the complexity faced within supply chain systems. However, to reduce the supply chain complexity, it is highly essential to understand what kind of complexity has a bigger impact and on which part of the supply chain. Hence, it is vital for managers and decision makers to identify the factors of supply chain complexity to ensure smooth business processes. It is important to understand that a decrease in the decision-making complexity reduces supply chain challenges and potential risks associated with them. Reduction in decision-making complexity allows sustainable business processes, affects organisational performance and behaviour and enables sound decision making. The factors which influence the decision-making complexity in organisations are social trust, a positive attitude and understanding the importance of internationalization. This overall not only encourages the process of knowledge transfer; it also speeds up the process of knowledge transfer.

Another element of supply chain complexity which impacts the process of knowledge transfer is process complexity. As identified and evaluated from the results section, it is very clear that process complexity greatly impacts the processes and operations of supply chain systems. Innovative performance and competitiveness are the two important factors which were identified to be of high value in reduction of the process complexity in a supply chain network. Furthermore, product complexity also plays a significant role in supply chain systems. The factors identified are technological advancements and digitalisation as these have a positive impact on organisational performance. Digital supply chain networks play a vital role in the reduction of product complexity. Enhanced product supply chain networks show better performance in organisations when knowledge sharing is present, and it is important to identify and eliminate any supply chain complexity to improve the supply chain processes. Additionally, customer complexity also impacts the supply chain operations and processes, and thus, it is highly important to reduce it to gain supply chain benefits. The results highlight that a decrease in customer complexity can benefit the supplier and customer relationship and it enhances the overall process of knowledge transfer. The smooth process of knowledge transfer in supply chain networks ensure well-coordinated, sustainable, and well-integrated supply chain systems which enhance business output. To summarise, the results demonstrate that effective knowledge transfer in supply chain networks not only strengthens the different stages of a supply chain, but also clarifies the overall business processes for better functioning.

5. Conclusions

The study findings investigate both the theoretical and practical aspects as it helps the managers to understand the importance of factors that influence knowledge transfer in supply chain systems. It helps them to improve their managerial practices in increasing knowledge transfer whilst timely identifying the supply chain complexities. This helps in enhancing supply chain operations and business performance of the supply chain networks. Effective transfer of knowledge also leads to financial and social gains and help to alleviate supply chain complexities for a well-structured, sustainable supply chain system in practical aspects. Identification of the factors of supply chain complexity also adds to the literature and contributes to academia. A crucial lesson for managers is the necessity to determine the specific procedures that best allow supply chain collaboration and hence knowledge transfer in the context of their supply chain partnership. Another important aspect is that managers should carefully consider what type of knowledge is mutually valuable in the partnership's specific environment, or the content of knowledge transfer. The relevance of knowledge exchange as well as the content of the knowledge are emphasized within this section, and clearly, both are critical. Future study can evaluate the learning theory with the goal of expanding the knowledge transfer area of supply chain partnerships to include both exploration and exploitation of knowledge.

As this research is in a specific direction and has a study focus therefore, there are certain limitations associated with the research. A limitation of this study is that it focuses on supply chain complexity in general and its impact on knowledge transfer within organisations. However, future studies could potentially explore and research on specific supply chains like automotive supply chain, manufacturing supply chain, food supply chain etc. Moreover, this study lacks full access to some of the articles as the full text was not available. Furthermore, this study is limited to two databases: the Web of Science and Scopus. Researchers in future could use other databases to broaden the horizon of their research on collecting and identifying other factors which could potentially impact the process of knowledge transfer in supply chain systems. Moreover, it is important to highlight that this study is limited to identifying and focusing on four main factors of supply chain complexity that can influence the knowledge transfer process. However, future researchers can assess and identify other important factors that influence the process of knowledge transfer in supply chain systems, and this can help in reducing supply chain complexity.

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Appendix A

No.	Article Name	Author Name	Year	Factor Relevance
1	The differential impact of product complexity, inventory level, and configuration capacity on unit and order fill rate performance	Closs et al.	2010	Product complexity
2	A case of trust-building in the supply chain: Emerging economies perspective	Manfredi and Capik	2021	Process complexity
3	Order from chaos: A meta-analysis of supply chain complexity and firm performance	Akın Ateş et al.	2022	Decision making complexity
4	Digital supply chain: literature review and a proposed framework for future research	Büyüközkan and Göçer	2018	Customer complexity
5	Managing complexity in supply chains: a discussion of current approaches on the example of the semiconductor industry	Aelker et al.	2013	Customer complexity
6	A modelling framework for the analysis of supply chain complexity using product design and demand characteristics	Hashemi et al.	2013	Product complexity

No.	Article Name	Author Name	Year	Factor Relevance
7	Managing knowledge in organizations: an integrative framework and review of emerging themes	Argote et al.	2003	Decision making complexity
8	Structural drivers of upstream supply chain complexity and the frequency of supply chain disruptions	Bode and Wanger	2015	Process complexity
9	COVID-19′s impact on supply chain decisions: strategic insights from NASDAQ 100 firms using Twitter data	Sharma et al.	2020	Decision making complexity
10	Supplier development for sustainability: contextual barriers in global supply chains	Busse et al.	2016	Product complexity
11	Interorganizational dependence, information transparency in interorganizational information systems, and supply chain performance	Cho et al.	2017	Decision making complexity
12	Supply chain risk management and operational performance: the enabling role of supply chain integration	Munir et al.	2020	Product complexity
13	An approach for analysing supply chain complexity drivers through interpretive structural modelling	Piya et al.	2020	Decision making complexity
14	To eliminate or absorb supply chain complexity: a conceptual model and case study	Aitken et al.	2016	Process complexity
15	The impact of knowledge transfer and complexity on supply chain flexibility: A knowledge-based view	Blome et al.	2014	Decision making complexity
16	Knowledge transfer driving community-based business models towards sustainable food-related behaviours: a commons perspective	De Bernardi et al.	2021	Customer complexity
17	The complexity of collaboration in supply chain networks	Huang et al.	2020	Process complexity
18	A model of supply chain and supply chain decisionmaking complexity	Manuj and Sahin	2011	Decision making complexity
19	Complexity and adaptivity in supply networks: Building supply network theory using a complex adaptive systems perspective	Pathak et al.	2007	Product complexity
20	Transformative supply chain drivers during COVID-19: a customer perspective	Alsmairat	2021	Customer complexity
21	Complexity transfer in supplier-customer systems	Huaccho Huatuco et al.	2021	Customer complexity
22	Product Variety, Supply Chain Complexity, and the Needs for Information Technology: A Framework Based on Literature Review	Huddiniah and ER	2019	Product complexity

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