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The Aspects of Supply Chain Risk Management in the Healthcare Industry

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Abstract. The healthcare supply chain is a complex and multifaceted entity. A poorly functioning healthcare supply chain can directly affect patient health and facility performance. The task of this paper is to examine the most significant aspects of supply chain risk management in the healthcare industry. The review was carried out by analyzing the literature for keywords in major databases. Based on the authors' literature research, the most important factors related to the supply chain are presented. In addition to supply chain risk assessment, other factors closely related to the supply chain are considered. Since the outbreak of the Covid-19 pandemic, the topic of supply chain risk management has received much more attention from scientists and researchers. Before, the field had not been the subject of much research activity.

Keywords: supply chain, risk, healthcare sector, management, pharmaceutical supply chain

1. Introduction

Supply chain management is becoming increasingly essential to stabilize the stream of goods in terms of time and costs. Supply chain performance is crucial in the healthcare sector. Proper management processes ensure quality of service and patient satisfaction (Beldek et al., 2020).

Supply chain management in healthcare facilities is different from conventional supply chain management. The health sector consists of many different elements. Also, the goods circulating here (medicines and medical devices) are very expensive and require special care and attention. This naturally raises issues relating to effective supply chain management, investment and the quality of the service provided to the consumer (patient) (Alali et al., 2022). Here, errors and inconsistencies cause significant losses. It should also be noted that inefficient services and poor quality products cost money and can affect people's health and lives.

The aim of this paper is to identify and highlight the most important trends, threats, and risks in the healthcare supply chain.

Researchers are studying supply chain processes in the healthcare sector, but the research is sporadic, with a little bit of a piecemeal approach to some of the supply chain processes. The final conclusions are never clear. There are few studies that look at supply chain risks and management characteristics. Researchers are looking at the management and supply of individual diseases (e.g. diabetes, HIV) or vaccines, and there is some work on the impact on the environment and contamination, but there is little research on overall patterns across the health system. The aim of this paper is therefore to provide an overview of the most relevant aspects and trends in healthcare supply chain processes. It also aims to provide an introduction to the patterns of supply chain management in healthcare.

Furthermore, the healthcare industry has been very strongly transformed over the past several years. Many medical institutions know the value of implementing better practice and techniques to implement supply chain management concepts, although these methods and procedures are challenging in an industrial environment. Improving the overall quality of medical services, whether in the free or private sector is critically dependent on the effectiveness of supply chain management.

Hospital supply chain management consists of managing suppliers and ensuring the timely delivery of medications and medical equipment. In this complex process, physical goods and information about products and services travel through independent stakeholders. These include manufacturers, distributors, wholesalers, and hospital pharmacies (Mishra, 2019). A hospital's central supply chain service connects logistics functions

and patient care operations. According to sources, hospitals today face problems such as inefficient supply chain processes, high administrative costs, poor management, and waste of resources. This suggests that proper supply chain management can positively impact hospital performance. According to the researcher, supply chain processes can cost "up to 40% of a hospital's total budget". Therefore, hospitals must take a global view of their supply chain to improve their performance. Key supply chain management actions should include better collaboration with suppliers, better communication with physicians, automation of processes, and the application of improvement methodologies (Moons et al., 2019).

It should be noted that the combination and integration of processes make healthcare services efficient and attractive. Supply, storage, and distribution work seamlessly with the organization's supply chain. As a result, internal coordination will work (Ageron et al., 2018).

Healthcare supply chains are unique because they aim to improve health and save lives, not to generate profits. The service providers are hospitals. These medical institutions work with patients and create demand in the healthcare supply chain. Nevertheless, these service providers must be profitable. The researcher identified the following reasons: (1) it is essential for private healthcare institutions to make a profit in order to ensure their continuity; (2) healthcare providers also need to be cost-effective to align taxpayer money to be well spent (Senna et al., 2021).

The effectiveness of the supply chain leads to the ability of the health system to offer quality services at all levels of service access. The supply chain is an integral part of the overall health system. Therefore, it is crucial to realize the importance of investing in reliable and well-functioning supply chains. In many regions of the world, there is a huge amount of attention to improving the functioning of the healthcare supply chain (Subramanian, 2021).

2. Literature Review

Supply chain management is accepted as a key element of strong business and economic growth (Hossain et al., 2020). Supply chain operations have a significant potential to contribute to the quality elements of a healthcare organization due to the efficiency and effectiveness of supply chain management (Golec & Karadeniz, 2020). So what is the healthcare supply chain? The healthcare supply chain is the vast network of components and processes that ensure that medicines, healthcare products, and services are produced and delivered to patients. This complex system is designed with appropriate safeguards to ensure that medicines and services are produced, delivered, and provided on time. The most important of these protections

is the ability of the supply chain to anticipate, plan for and respond to potential disruptions in one or more parts of the chain.

There are many participants in the healthcare supply chain: pharmacies, hospitals, as well as manufacturers, and distributors, are the most important players in the healthcare supply chain. Manufacturers are the first link in the supply chain, producing medicines and medical devices. Manufacturers manage the distribution of their products from the point of manufacture to wholesalers and in some cases directly to the pharmacy or hospital. Distributors are the second link in the healthcare supply chain. Distributors buy medicines and medical devices in bulk from manufacturers and keep careful stocks. Table 1 shows the major players in the supply chain and their role in the overall supply process.

Table 1: Players in the healthcare supply chain (created by authors)

The player	Supply chain role
Manufacturers	Development and creation of new products
Distributors (Logistic partners)	Supply of medicines and medical supplies to service providers Ensuring and maintaining supply and safe transportation of medicines and products
Providers (Hospitals, pharmacies, urgent care)	Obtaining medicines and medical supplies Dispensing medicines and supplies to patients and services Inventory storage
Consumers (Patients)	Satisfying unique medical needs Influencing demand and supply of medicines

As supply chains become more complex, companies and organizations must do more to control and upgrade them. Although more than 40,000 publications and books on supply chain management have been dedicated to the term since its introduction in 1982, a clear view of the new trends, the current knowledge gaps, and the potential directions for further research is needed. A review of the research literature shows that there is still more need for a better understanding of security management, internal sourcing, competition, risk, and people's behavior in supply chains.

The distribution of healthcare services is the supply chain in the manufacture and shipping of medications and medical devices. This chain starts with the supplier chain of the drug manufacturer and aims to meet consumer demand. According to reviews in the literature, the healthcare supply chain has not yet been extensively studied. Only a few aspects of this supply chain have been analyzed, such as strategic issues, the functioning of chain processes, and decision-making (Dixit et al., 2019).

Supply chains in the health system are essential to guarantee access to healthcare services. It can be achieved when the goods and services needed are developed and produced where and when they are needed. A poor supply chain means that essential services cannot be accessed, resulting in wasteful spending and

the loss of people's lives. According to researchers, forecasting demand is a very weak area of the supply chain (Subramanian, 2021).

The supply chain of medicines is constantly faced with perishable goods, and the rate of deterioration of stock in storage during the expiration date must be considered, especially in the healthcare sector. Declining products become defective, spoiled, dried out, and invalid (Timajchi et al., 2019).

Supply chain management in the healthcare sector is a multi-component phenomenon. It involves a number of related factors. Supply is a process that is triggered at any point along the supply chain. In particular, supply is essential for the organization of medicines and medical devices. Pharmaceutical supply is an important element to be analyzed in the entire supply chain of the healthcare sector. Supply and its management are also important in the organization of the core work of medical institutions - the treatment of various diseases, surgeries, transplants, and other procedures related to preserving the health and life of patients.

It is worth noting that the effectiveness of supply chain management has received increased interest since the Covid-19 pandemic. The number of research papers and themes shows that the impact of Covid-19 on the supply chain has been examined from a variety of perspectives. This paper will not deal with the impact of Covid-19, but due to the relatively high number of papers, this aspect cannot be omitted. Supply chain activities are clearly linked to environmental preservation. Also, sustainability aspects should not be overlooked when looking at the health sector. Harmful waste is generated in the medical supply chain and its infectious impact is a stimulus for addressing this issue (Alizadeh et al., 2020). Recently, researchers have investigated the link between treatment costs and the performance of supply chains in Asian countries. The results showed that greater environmental sustainability has a positively impacts on population health and economic growth. And renewable energy sources should be used to improve environmental sustainability (Khan et al., 2020).

The supply chain involves many smaller processes interacting with each other. Every action or interaction has a risk of something going wrong. Errors can be human, equipment, or unforeseen environmental influences. In this section, we will try to look at and identify the most important risks studied in scientific work. The researchers Getele and their team in their study provide insights into risk management in the healthcare sector. Their research has shown the need to find new and modern approaches to supply chain management. The results also demonstrate the role of cross-sector collaboration in service distribution (Getele et al., 2019). It is worth mentioning a new study in Brazil assessing risk management in Brazilian healthcare supply chains. The results of the study were a little surprising, as there is no risk assessment in the health system. There is not even a known concept such as risk assessment. The study also showed that working professionals and managers

lack the knowledge, skills, and strength to make important decisions (Senna et al., 2022).

As in any other sector, it is important to ensure adequate conditions for the storage of products and stocks in the health sector. It is well known that failure to provide the right conditions shortens the useful life of a product and increases the risk of losing money and not providing a service to the consumer. Therefore, every actor in the supply chain needs to have the right policies in place to ensure that products are not lost (Ahmadi et al., 2022).

Access to healthcare and medicines is another global issue. One example is China, which has set a target of equal access to medicines for all by 2020 (Diao et al., 2019). The issue of accessibility is also being addressed in the Iranian pharmaceutical sector (Fardazar et al., 2019).

In their study, researchers examine the impact of outsourcing on the supply processes of the health system by comparing two alternatives: the public and private sectors. The study aimed to analyze and review the impact of logistics and procurement outsourcing on supply chain performance. The study shows that the centralization of public procurement through outsourcing significantly saves suppliers' costs, regardless of whether the procurement is carried out by a public or private organization (Skipworth et al., 2020).

Jordanian researchers conducted a study to determine the influence of trust in providers on hospital-supplier integration and supply chain functioning. The study confirmed that trust is the most critical factor for cooperation and coordination in health care.

Maintaining such relationships requires ongoing effort, dialogue, and time to maintain. Confidence can be a powerful instrument for solving problems. It should also be noted that specific cultural values and norms influence the building of trust. Trust is a minor element in business dealings in countries with stable institutional conditions, while confidence and close personal relationships are more significant in countries where institutional arrangements are weak (Barghouth et al., 2021). In conclusion, trust is crucial and can be a decisive determinant for improving supply chain operations.

Recent studies have emphasized the importance of quality processes and good governance in all supply processes (Alves da Silva Martins et al., 2020). Much of the literature suggests that healthcare supply chains lack quality management procedures. S. Alves da Silva Martins and his team studied the role of governance arrangements and their position on the quality of the healthcare supply chain. The study shows that the integration and combination of formal and informal management instruments can benefit the supply chain.

Counterfeiting and counterfeiting are other emerging risks in health supply chains. A model is being sought to help manage the risk of counterfeiting and

thereby improve the performance of the whole health system. So far, the study has only been carried out in the United States, but many countries around the world are facing this health system challenge (Falasca et al., 2022).

Turning to the delivery of specific healthcare services, there are many risks associated with the internal supply chain of an institution. Examples include complex procedures such as chemotherapy or blood transfusions. Delays in ordering and delivering blood lead to social and financial losses (Gilani et al., 2022).

Appropriate governance mechanisms can significantly strengthen supply chain efficiency indicators in the healthcare industry by improving the participation of multiple parties in the supply chain. This leads to better service quality, which is crucial to building and maintaining long-term partnerships (Alves da Silva Martins et al., 2020).

Pohjosenpera (2018) analyzed how modularity generates value in the management of healthcare logistics systems. One of the ideas that have evolved in the production industry is modularity, which is used as a tool for delaying and massive customization strategies. Based on the results of their study, the financial benefits, modularity offers a wide range of nonmonetary benefits, such as opportunities for progression through specialization and the chance for nursing staff to focus on their work with patients. Therefore, the modification of healthcare logistics services can have a social impact on the development of healthcare processes and changes in healthcare interventions. More broadly, modularization helps health systems achieve service levels and cost-effectiveness (Pohjosenpera et al., 2018).

Moons (2019) looked at the hospital's internal supply chain. The internal medical institution supply chain is characterized by its complexity, originality, and operational challenges, such as high-cost products and equipment used in operating areas, complex inventory tracking due to emergency procedures, and unpredictable demand for medical items. The workflow and integration of processes provide a positive input to the success of the healthcare supply chain. The fields of Industrial Engineering (IE), Operations Research (OR), or Operations Management (OM) provide (analytical) methodologies to support the supply chain or logistics operations of clinics (Moons et al., 2019).

We see that there are different risks at each stage of the supply chain. There is a need for a governance or decision-making structure to ensure the operational and continuous operation of the supply chain. This should be a governing body that takes policy decisions. It could also be a preventive policy to avoid undesirable events in advance (Immonen et al., 2022). Collaboration in the distribution system can potentially impact cost savings, supply chain risk management, and performance improvement (Niemsakul et al., 2018).

There is still a shortage of medicines around the world. It is often related to

supply chain breakdowns. This hurts health systems and puts consumers at risk. Duong (2019) and his team studied how key stakeholders' roles (researchers, hospitals, suppliers) facilitate access to essential medicines. The results of the study show that stakeholders separately managed the general management and decision-making of the supply. In particular, hospital pharmacists' roles in decision-making on patient care and supply chain performance overlapped, indicating their relevance as supply chain leaders. Additionally, despite the significant role of wholesalers/distributors in the management of supply disruptions and shortages, they were not involved in the decision-making process (Duong et al., 2019).

Competence and skills could be another group of hazards in the healthcare delivery system. Analyzing the effectiveness of supply chain management in healthcare institutions has become particularly important as healthcare institutions have begun to strive for operational efficiencies and cost reductions. Process management in healthcare settings is a fundamental issue because it adds value to processes and can improve the quality of customer lives (Golec & Karadeniz, 2020). Supply chain governance is critical in the quality of care hospitals and clinics offer due to its efficiency and monitoring.

Having the right competencies and resources is essential for the proper performance of supply chain functions. In northern Ghana, a study was conducted to assess the skills and competencies of employees to perform the assigned tasks. The study's result showed that the employees' weak knowledge and competencies were due to the lack of opportunities to train the staff. A lack of infrastructure and operational resources was also identified, affecting service quality assurance (Atinga et al., 2020).

In summarizing this section, it should be emphasized that only trained and knowledgeable professionals can guarantee effective and uninterrupted operations. It should also be mentioned that the smooth work of employees requires the right equipment and tools. The amount of academic literature suggests that despite the importance of competent operations in the supply chain, there is very little research on this aspect. Furthermore, a collaboration between partners, with appropriate and timely governance mechanisms, can ensure the functioning of an efficient and resilient healthcare service supply chain. According to Ali and Kannan (2022), there is plenty of potential for future research on employee attitudes. Research could explore employees' adaptive behavior and productivity, as well as the consequences of their behavior (Ali & Kannan, 2022).

Pharmaceuticals are a large and integral part of the healthcare industry. It is the manufacture, ordering, transport, storage, and, if necessary, disposal of medicines and medical devices. It is one of the most complex supply chains as it involves human life and health, high risk, uncertainty, and a high flow of information throughout the chain. The pharmaceutical supply chain connects thousands of

different stakeholders with different objectives. Stakeholders include raw material manufacturers, distributors, medical institutions, doctors, retailers, and customers/patients (Viegas et al., 2019). The pharmaceutical supply chain is looking for ways and models to deliver medicines and medical devices at the right time, in the right place, and to ensure a timely supply of products to consumers (patients). One of the problems mentioned is the distribution of medicines. Pharmacies may not keep stocks of all medicines, due to the price and expiry date of medicines. It is therefore necessary to organize distribution routes to guarantee the provision of this service (Kose et al., 2022). In the medicines supply chain, timing and accuracy are crucial to achieving the end goal. Researchers are therefore working to develop models to deliver medicines in the shortest possible time. Operational costs should also be minimized (Riekabi et al., 2022).

If we talk about the global pharmaceutical industry, the Indian pharmaceutical industry should be highlighted. It supplies a large part of the global demand for medicines. For this process to be uninterrupted, the supply chain needs to function with extreme precision and speed. How quickly demand is met depends on these factors. The results of the study show that the pharmaceutical industry needs to adopt new technologies and techniques to maintain the supply chain's responsiveness and service level (Kale et al., 2022).

According to Sabouhi (2018), modern supply chains seek to minimize risks to the supply chain. It also focuses on reducing costs, maintaining the market, and satisfying stakeholders (Sabouhi et al., 2018).

The trade in pharmaceuticals in the European Union has been growing steadily, reaching more than 156 billion in exports and 76.7 billion in imports in 2017 (EFPIA, 2018). More commerce leads to more parcels around the world. As a result, the risk of transportation of pharmaceutical products has increased and has become a significant challenge for pharmaceutical producers and logistics providers (Faghih-Roohi et al., 2020).

Another relatively new challenge in pharmacy distribution is supply chain security. This problem has arisen as several counterfeit drugs have appeared on the market. In response to this situation, the researchers proposed a supply chain management model with integrated blockchain technology. The testing of the proposed model has shown that the new technology has helped secure, automate, and anonymous the traditional supply chain (Jamil et al., 2019).

In summary, the supply of medicines is critical in any health system. Pharmaceutical organizations, essential players in the supply chain of medicines, are exposed to various risks. Consequently, it is essential to identify the risks involved so that effective measures can be taken to mitigate them.

Information networks aim to provide and regulate all stages of the supply chain support of the organization and control the entire distribution of products within the

organization. Unique technological solutions create line plans that specify precisely what to produce when to produce it, and in what order. These instructions are based on available capacity, raw materials, and existing constraints. The use of such technologies helps optimize process costs and ensure the functioning of the supply chain. A well-oiled supply chain improves the planning and optimization of warehouse inventory, guarantees timely delivery, matches supply and demand, minimizes costs, and thus increases the company's market position (Boiko et al., 2019).

Information technology is advancing rapidly and its applications are expanding in many areas. Here, researchers Omar with team (Omar, 2021) look at the automation of purchasing contracts in the healthcare supply chain (Omar et al., 2021). A smart contract is a digital transaction that is automatically triggered, executed and recorded in a ledger (Sharma et al., 2022). This process uses a blockchain. The study showed that the blockchain made the contracting process easier, faster, and more cost-effective ((Omar et al., 2021).

Recent research papers address how artificial intelligence could be applied to supply chain processes. The business sector argues that artificial intelligence could help reduce the amount of misinformation. It would also boost business relationships. At the same time, it represents a new challenge for the health sector to strengthen collaboration and innovation between healthcare players (Cannavale et al., 2022).

These days, researchers are already looking at information sharing in the cloud and its impact on supply chains (Kochan et al., 2018), (Yu et al. 2021). Cloud computing is being explored as a tool for electronic supply chain management systems (e-SCM). Research results highlighted that by sharing information in the cloud, inventory tracking performance was improved, and essential information reached supply chain actors faster and more quickly, resulting in better customer (patient) service quality (Kochan et al., 2018).

Blockchain is an unprecedented agent for driving and stimulating business process innovation, particularly in the healthcare sector. Nevertheless, its power of transformation has not yet been fully realized due to the challenges of digitization for business process management and the typical complexity of healthcare processes (Aloini et al., 2022). With the increasing use of various applications in all healthcare settings, it is important to adapt this technology in a way that does not cause human health problems. Recent research has promoted the use of blockchain in healthcare management because it can reliably store and process records in an appropriate database (Schinckus, 2022). According to Mamun (2022), Blockchain technology could have many benefits in healthcare: improved data security and privacy, transparency, efficient distribution of medicines, securing payments, and optimizing the circulation of staff information (Manum, 2022).

However, it should be noted that little work has been done on the risks associated with blockchain in healthcare. The latest information and communication technologies have accelerated the smartness of different organizations. Unfortunately, advances have brought new challenges. Cybersecurity risks have emerged and need to be managed. This is a new niche for future research, industry, and society to address the issue of cyber security (Kumar & Mallipeddi, 2022). Therefore, this topic requires more detailed consideration.

In order to respond quickly to changes in the supply chain, particularly as the fragmentation of the supply chain grows, it is essential to ensure the reliable exchange of accurate and relevant data with supply chain partners. Healthcare supply chains are complicated. Failure to provide timely and accurate information on demand and supply in healthcare supply chains can have dramatic consequences, even resulting in mortality. IT-enabled supply chain interoperation provides a platform for effective information exchange.

3. Methodology

This article focuses on a systematic review of the literature. The aim of this paper was to study the most significant factors affecting the health system supply chain In order to search for the research terms, it was chosen the Scopus and Web of Science databases, which are the largest databases of peer-reviewed literature. The search term was “Supply chain risk management in healthcare”. Article search period 2018-2022 because the aim was to analyze the most recent articles, so the time period was chosen as 2018. Keyword and citation network analysis and visualization on VOSviewer (Fig. 3). The literature review has also made use of articles from previous publications to validate some of the concepts. The publications were screened for relevant keywords. The types of publications were articles, review articles, proceeding articles, early access, book chapters, and conference articles. The article selection scheme is shown in Figure 1 and Figure 2.

As can be seen in the figures, a total of 176 articles were retrieved from the Web of Science database and 146 articles from the Scopus database based on keywords. This review is intended to provide an overview of supply chain processes and the risks involved, so side topics have only been mentioned. It is necessary to mention side topics because they are related in one way or another to supply chain processes.

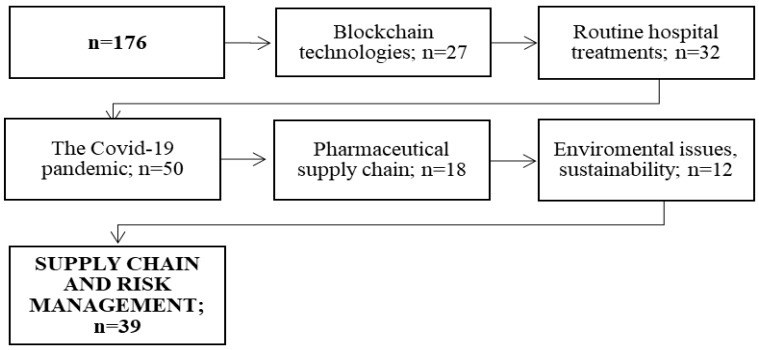

Fig. 1: Articles search algorithm the web of science database (created by authors)

The figures show that the number of articles published in the Web of Science database is much higher in terms of the time period and topic chosen, but the number of articles with the relevant phrase "Supply chain and risk management" is lower than the number of articles found in the Scopus database.

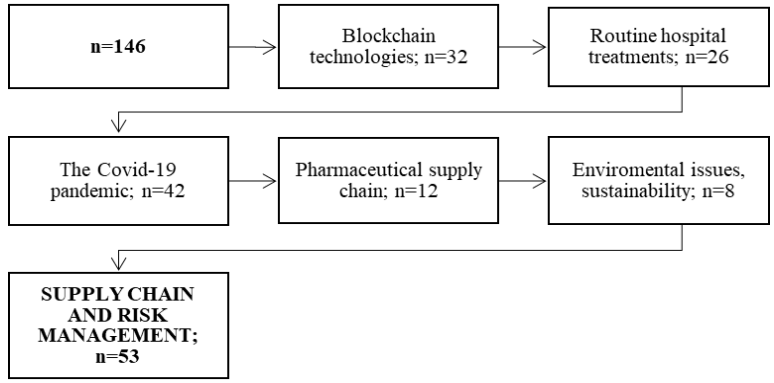

Fig. 2: Articles search algorithm the scopus database (created by authors)

A comparison of these databases shows that the Web of Science database has a higher number of publications. Bibliometric analysis was conducted to identify the key research topics. The search was defined in supply chain management, the healthcare sector, and sustainability fields. Also, articles are available in English.

4. Results

The risk factor analysis provides an overview of the various factors that influence the supply chain. The findings of the analysis are illustrated in Figure 3.

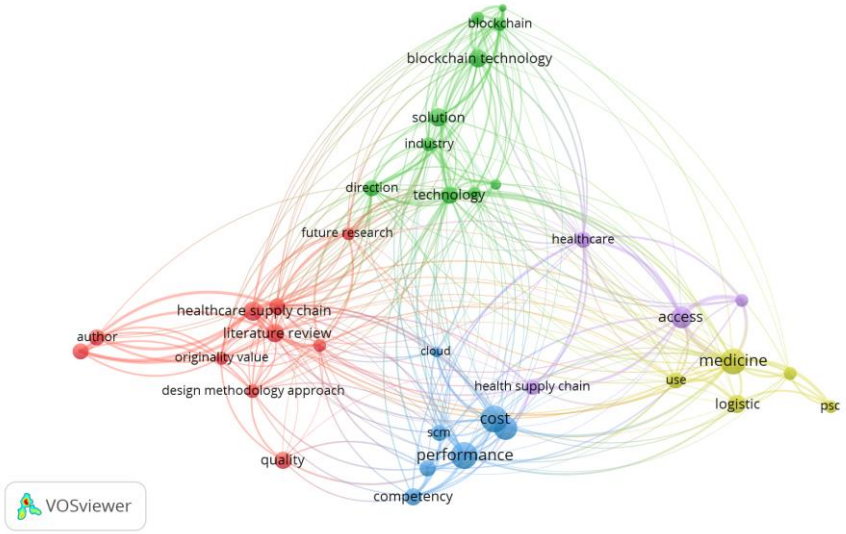

Fig. 3: Bibliometric analysis (created by authors)

For Figure 3, publications were selected from the Web of Sciences and Scopus databases. The distribution of terms shows which terms are related, so are considered together. The more distant points indicate that the terms are treated more separately.

In summary, the bibliometric method of common word parsing was used in this article. The primary objective of this review was to clarify the most significant aspects of supply chain management in the healthcare sector. The literature analysis shows that the supply chain is not a separate single entity. A supply chain is a process without which other activities are indispensable. As can be seen from the number of articles, the interaction between the supply chain and the Covid-19 pandemic is particularly actively researched. The influence and impact are examined from all sides. This is shown by the relatively large number of publications in the selected period.

Looking at the number of articles, one cannot fail to mention the examined impact of smart technologies in health system supply chains. From the discussed topics, it can be seen that innovation and blockchain technology is already applied in the supply chain. Scientists are already looking for the most efficient models so that all activities take place promptly and safely for both chain processes and users.

When it comes to medical facilities, supply chain processes, larger or smaller, are ongoing. It can be said that the human factor intervenes here. Relevant competence, knowledge, abilities, and cooperation skills are very important here. This is important to evaluate because the recipient must receive quality and timely services.

Also worth mentioning is the pharmaceutical supply chain. It is a large and important part of the supply chain of the entire health system. When evaluating the research of scientists, it can be concluded that it is not only the supply and storage of medicines. Now, these are modern technological solutions that guarantee quick and efficient actions.

After all, the healthcare supply chain itself is not being looked at as actively as it would like. Its interactions with the previously mentioned aspects are mostly studied. When explaining the risks arising in the supply chain in the literature, several of them can be distinguished: 1) risks arising in the pharmaceutical supply chain; (2) risks arising from human resource errors; (3) risks arising from unknown or uncertain processes; (4) the impending risks of the use of technology.

In terms of future research, there are several important points to note:

- The articles selected for the review show that the supply chain is not widely covered in healthcare. The literature shows that there is a lack of information to clarify the contribution of the human factor to supply chain performance.
- On the other hand, one of the most researched topics in healthcare from a supply chain perspective is the supply of medicines. Here, it is already possible to find models of solutions to improve that performance.
- It can also be noted that the healthcare sector is keeping pace with technological advances and the supply chain is becoming sufficiently innovative and digitized. The analysis of the literature shows that this area is also beginning to address emerging risks.
- In summary, Understanding supply chain principles and processes and adopting new technologies opens the way for new research. Moreover, this knowledge can also be useful for healthcare institutions and collaborating bodies to solve problems and improve the quality of their work.

5. Conclusions

A supply chain risk management strategy is critical and important to sustain the success of businesses. Previous research results show that big data analytics is useful for forecasting and decision-making and can therefore be a powerful tool to improve healthcare supply chains (Alotaibi & Mehmood, 2018). In the supply chain literature, the issue of supplier evaluation and selection is one of the most researched topics due to the important role of suppliers in terms of sustainability and profitability of the supply chain. It is therefore important for organizations to adopt a systematic way to evaluate and select the best supplier according to the relevant criteria in today's competitive environment (Akcan & Guldes, 2019).

The purpose of this publication is to conduct a literature review and provide an answer to the research question – What are the aspects of supply chain risk

management in the healthcare industry? Based on the reviewed literature, we see that the supply chain is influenced by many factors: technology, unforeseen situations, drug supply, and environmental aspects. In order to have a supply chain that functions promptly and efficiently, we must ensure that all ongoing processes work harmoniously. Identifying the biggest hazards allows you to see the weakest areas in the supply chain and makes it mandatory to find ways of avoiding these bottlenecks and disruptions. However, some trends can be observed in articles dealing with supply chain risks. Concerning the novelty of publications, the pharmaceutical supply chain and its associated risks stand out among the groups of risks presented. It can be assumed that the Covid-19 pandemic has had an impact on this increase in coverage. It should be noted that the potential of supply chain technologies has also been analyzed. The articles show that this is the most frequently addressed area.

In terms of practical input, the findings can be helpful for the heads of institutions and organizations to strengthen internal processes and thus create a quality service. Moreover, the results of the study could be useful for improving the internal processes of hospitals. Communication and collaboration should be involved between administrators, managers, and healthcare specialists.

When examining the literature, there were not many articles on the specific topic of "supply chain risk management in the healthcare sector". Some of the related publications were only briefly discussed. There was also a lack of a more comprehensive examination of the risks in the health system, excluding the topic of Covid-19. A small number of articles were on the topic of the interaction between environmental protection and the supply chain. This could be a direction for other research.

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