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LOGISTICS SUPPLY CHAIN STRATEGIES OF MANUFACTURING AND TRADING ENTERPRISES: IMPACT OF COVID-19 AND WAR IN UKRAINE

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Purpose: The aim of the article is to analyze and assess the influence of the Covid-19 pandemic and the war in Ukraine on the supply chain logistics strategies in the context of shaping the results of enterprises implementing them that form the supply chain on the example of the selected Polish manufacturing and trading enterprises.
Design/methodology/approach: The article is based on the study of literature and own empirical research. The results of own empirical research presented in the study are the effects of more extensive research on the analysis of logistics systems and logistics processes management in Polish manufacturing and trading enterprises in years 2020-2022 in the context of building the competitiveness of the enterprise. The research was being conducted from January 2023 to April 2024 among 459 randomly selected small, medium and large Polish manufacturing and trading enterprises.
Findings: The Covid-19 pandemic and the war in Ukraine had a huge influence on logistics strategies in the vast majority of the surveyed manufacturing and trading enterprises. The most effective logistics managers made changes to logistics strategies that were appropriate to the conditions during the Covid-19 pandemic and the war in Ukraine. The conducted research confirmed that the implementation of a logistics strategy in the supply chain that is appropriate to the conditions enables the reduction in the likelihood of disruptions in the logistics system, quick and effective response to disruptions in logistics processes in the conditions of the Covid-19 pandemic and the war in Ukraine, appropriate response to the market challenges, achievement of the set goals, increase in sales revenues at the same or even better financial liquidity than the competition and reduction in costs, and consequently, creation and maintenance of competitive advantage of the enterprises that form the supply chain.
Research limitations/implications: This article presents only selected aspects of the influence of the Covid-19 pandemic and the war in Ukraine on the supply chain logistics strategies.
Practical implications: The article offers practical suggestions for logistics managers on how to apply supply chain logistics strategies in the conditions of the Covid-19 pandemic and the war in Ukraine.
Originality/value: The article fills the cognitive gap regarding the issue of supply chain logistics strategies. It provides an extensive review of the literature on supply chain logistics strategies in the conditions of the Covid-19 pandemic and the war in Ukraine. The article also fills the empirical gap. It presents the results of author's own research on selected aspects of the influence of the Covid-19 pandemic and the war in Ukraine on supply chain logistics strategies.
Keywords: supply chain, logistics, logistics supply chain strategies, enterprise, Covid-19

Category of the paper: research paper.

1. Introduction

In the conditions of unprecedented dynamics of changes in the contemporary global economy, complexity, uncertainty and high risk, the flows of various types of products, information and money on the scale of the enterprise and the entire market system are particularly susceptible to disruptions (Hohenstein et al., 2015; Snoeck, Udenio, Fransoo, 2019; Zhang et al., 2020; Baghersad, Zobel, 2021; Choi et al., 2023; Adana et al., 2024; Wang, Zhou, Zhao, 2024). Logistics is responsible for managing the streams of physical flows, services and related with them information in the enterprise and between economic entities participating in the delivery of a product or service to the customer in order to ensure the desired level of customer service at the lowest possible costs. In the current circumstances, the key challenge for the logistics managers is to limit the likelihood of disruptions of logistics processes in the entire logistics system, quickly take actions to reduce the severity of the effects of the occurred event, and create and maintain competitive advantages of the enterprise.

Contemporary enterprises increasingly compete with supply chains. In the literature, the term "supply chain" is interpreted ambiguously (Carter, Rogers, Choi, 2015; Wieland, 2020). In this article, it is assumed that the supply chain includes enterprises that cooperate with other companies participating in the process of delivering a product or service to the customer and their customers, between which physical flows, services, information and financial resources flow. The above-mentioned flows in the supply chain are related to one product or a group of products, as a result, particular enterprises can be perceived as participants in many supply chains. The supply chain can include both all flows from the beginning of value creation to the final customer, as well as a smaller scope of flow, e.g. from one entity to another (Gąsowska, 2018, pp. 107-108). Supply chain management refers to the activities of enterprises participating in the delivery of a product or service to the customer of a logistical and non-logistical nature. Logistics plays a key role in the supply chain (Świerczek, 2019; Song et al., 2022).

The Covid-19 pandemic, declared on March 11, 2020 by the World Health Organization, disrupted the flow of materials and products and caused a great number of new challenges in supply chains around the world. This unprecedented situation forced managers and researchers to evaluate the existing supply chain management and search for solutions to deal with these challenges (Handfield, Graham, Burns, 2020; van Hoek, 2021; Raj et al., 2022; Aljuneidi, Bhat, Boulaksil, 2023; Dwivedi et al., 2023; Maharjan, Kato, 2023; Rinaldi, Bottani 2023; Granillo-Macías et al., 2024; Kauf, Pisz, Tłuczak, 2024, Khare, 2024). The Russia's invasion of Ukraine on February 24, 2022, resulted in unprecedented sanctions on Russia and military support for Ukraine, and severe supply chain disruptions, which compounded the negative effects of

the pandemic (Srai et al., 2023; Czupryna-Nowak, Banasik, Bartnicki, 2023; Duong et al., 2024; Haessner P., Haessner J., McMurtrey, 2024; Nugroho et al., 2024). The Covid-19 pandemic and Russia's invasion of Ukraine have resulted in unprecedented and massive changes to the conditions under which supply chains operate.

The supply chain management process has evolved along with the changing market conditions (Brandao, Godinho Filho, 2024). The challenges in the supply chain management caused by the Covid-19 pandemic and the war in Ukraine have many common features. However, it should be emphasized that disruptions in the supply chains during the pandemic were associated with actions that were intended to prevent the spread of the virus. In the case of the war in Ukraine, disruptions in supply chains are caused by armed conflicts and restrictions due to security and political stability (Grondys, Kot, 2023). Conditions related to the Covid-19 pandemic and the war in Ukraine have influenced the strategic and operational decisions made by the supply chain managers (Kumar, Sharma 2021; Mishra, Pande Sharma, Chaudhary, 2024). The impact of the Covid-19 pandemic on supply chain logistics strategies has not been comprehensively described or thoroughly studied so far. The war in Ukraine is ongoing and its influence on supply chain logistics strategies is complex. The aim of the article is to analyze and assess the influence of the Covid-19 pandemic and the war in Ukraine on the logistics strategies of the supply chains in the context of shaping the results of enterprises implementing them that form the supply chain on the example of selected Polish manufacturing and trading enterprises.

2. Literature review

In a constantly changing environment, achieving above-average results by an enterprise is conditioned by the recognition of the change and implementation of the adequate adjustment measures by the enterprise. Changes in the conditions of the functioning of enterprises require strategic and/or operational responses. Strategic decisions concern a long-term horizon, they come down to the selection of some options of action from an incomplete set of possibilities in an imperfectly perceived environment and the accompanying ambiguity and uncertainty (Czakon, 2020). At the strategic level, decisions are made concerning solving the basic problems of the enterprise; first of all, the enterprise's strategy is formulated. At the operational level, managers make short-term decisions resulting from the implementation of strategic decisions and responding to current disruptions and problems.

Currently, the conditions for the functioning of enterprises have changed radically. The synergistic effect of the influence of contemporary economic determinants poses a major challenge in terms of changes in the methods of the enterprise management (Kafel, Ziębicki, 2021; Mishra, Singh, Subramanian, 2022; Paul et al., 2023). This article focuses primarily on

the analysis of the impact of the Covid-19 pandemic and the war in Ukraine on the supply chain logistics strategies.

The first outlines of the concept of corporate strategy were created at the turn of the 1950s and 1960s. Since then, the company's strategy has been the subject of numerous scientific studies and debates undertaken by both scientists and practitioners (Drucker, 1954; Krupski, Niemczyk, Stańczyk-Hugiet, 2009; Ronda-Pupo, Guerras-Martin, 2012; Martín-de Castro, Amores-Salvadó, Díez-Vial, 2023; Musilová et al., 2023; Vrontis et al., 2024). The essence of the strategy concept is the dynamics of the enterprise's relationships with its environment, expressed by the necessary actions to achieve goals and/or increase results through the rational use of resources (Ronda-Pupo, Guerras-Martin, 2012). When serious disruptions occur in the environment, such as a pandemic or war, managers should make strategic decisions appropriate to the conditions, regarding the reallocation of resources, reconfiguration of structures and processes, and strategy.

Logistics strategy is most often defined as a composition of long-term, internally and externally coordinated logistics activities and solutions aimed at achieving competitive advantage (Witkowski, 1995, 46). Logistics strategy in the enterprise can be a functional strategy or a key element of the enterprise strategy (Autry, Zacharia, Lamb, 2008; McGinnis, Spillan, Virzi, 2012; Gąsowska, 2018; Rakyta et al., 2022). Logistics as a key element of the enterprise strategy has a significant influence on the management system and subsystems. Nevertheless, a functional logistics strategy must be consistent with the enterprise strategy. Logistics strategies can create the competitive advantage or support building and/or maintaining the competitive advantage (Gąsowska, 2018; Spillan, Mintu-Wimsatt, Kara, 2018; Matwiejczuk, 2021; Dadzie et al., 2023; Flanagan, McGovern, 2023). Logistics strategies that are adequate to the conditions enable contemporary enterprises to achieve the desired economic and market results.

The logistics competition strategy of the enterprise is a method of gaining the selected competitive advantage using coordinated actions and logistics solutions in order to achieve the intended competitive position (Gąsowska, 2018, p. 122). The logistics competition strategy implemented by the enterprise determines the boundaries of the logistics system, relations between its elements and management system and subsystems. In order to win the competitive battle, contemporary enterprises join into groups of two or more partners. This level is referred to as the network or multi-organizational level. Regardless of the nature and scope of cooperation, the strategy developed for a group of enterprises is a network level strategy (de Wit, Meyer, 2007).

The supply chain logistics strategy constitutes a composition of long-term activities and logistics solutions implemented by all enterprises that are the links in the supply chain and are used to achieve the competitive advantage (Gąsowska, 2016). Creating and implementing the logistics strategy in the supply chain is a very complex process as it involves many decision-makers and is associated with complex politics, conflicts, many challenges, pressure in the process of formulating goals and methods of their implementation.

Supply chain strategies are usually competitive strategies. They are focused on the final customer and are demand-driven. They differ in the degree of adaptation to changes in demand and in what attributes and to what extent they are used in the competition (Ciesielski, 2010, p. 42). The logistics competition strategy of the supply chain is a way of gaining the selected competitive advantage through coordinated actions and logistics solutions implemented by all enterprises that are the links in the supply chain in order to achieve the intended competitive position (Gąsowska, 2018, p. 123).

Enterprises can compete with supply chains that consist of companies operating only within a specific country or entities operating in many countries. The Covid-19 pandemic and the war in Ukraine have significantly affected global supply chains and revealed their high vulnerability to disruptions (Roscoe et al., 2022; Colon, Hochrainer-Stigler, 2023; Sheth, Uslay, 2023; Srai et al., 2023). Some researchers indicate that the Covid-19 pandemic and the war in Ukraine may be a turning point for global supply chains. At the beginning of the pandemic, domestic supply chains were more resistant to the crisis than global supply chains. R.B. Handfield, G. Graham, L. Burns (2020) state that contemporary supply chains are undergoing a natural evolution. Currently, many enterprises are creating unique competitive advantages by creating global supply chains.

According to many scientists, in conditions of extreme uncertainty, enterprises should create resilient supply chains (Adobor, McMullen, 2018; Pettit, Croxton, Fiksel, 2019; Aslam et al., 2020; Cinti et al., 2024). The resilient supply chains are ready to respond quickly and effectively to emerging threats, maintaining the continuity of operations at the desired level and control over the structure and functions (Ponomarov, Holcomb, 2009). The attributes of the resilient supply chains are flexibility and adaptability. The most effective factor building the supply chain resilience in the pandemic conditions was innovation (Ozdemir et al., 2022). Building resilience to supply chain disruptions was also made possible by systemic supply chain risk management, strengthening position, building strong relationships with suppliers, recipients and employees, adequate forecasting and product design (Ozdemir et al., 2022; Browning et al., 2023; Gurbuz et al., 2023).

The literature emphasizes that if demand is predictable and the total delivery time is long, conditions for applying the lean management concept are created. On the other hand, when demand is unpredictable and the total delivery time is short, the agile management strategy should be used. Lean management aims to eliminate all waste. The concept of lean management is closely related to the price leadership strategy. Supply chains implementing the lean management concept strive to reduce costs and offer lower prices than competitors. In contrast, supply chains implementing the agile management strategy strive to provide excellent service to the end customer; flexibility and time compression are of a fundamental importance to them. Some supply chains use the lean management and agile management (leagile) concepts together, adopting specific rules for the division of products into those manufactured in accordance with lean management and agile management (Trojahn, 2018; Da˘gdeviren, Erturgut, 2024).

Recent research focuses on how these three strategies can be used synergistically in an increasingly dynamic and complex business environment to provide greater flexibility in dealing with market demand variability and supply chain uncertainty (Riska, 2024).

Supply chain agility is cited by scientists as one of the fundamental features that should characterise contemporary supply chains (Irfan et al., 2020; Patel, Sambasivan, 2022). Agile supply chains respond faster and better to unforeseen changes in the environment due to their better ability to synchronize demand with supply.

The literature indicates that in the current conditions, enterprises should create sustainable supply chains that develop resilience and consider the integration of goals resulting from the concept of sustainable development as a critical success factor and develop resilience (Sarkis, 2021; Sajjad, 2021). Logistics managers in sustainable supply chains strive to achieve the competitive advantage through coordinated actions and logistics solutions, balancing economic, ecological and social goals to achieve the intended competitive position.

More and more companies are competing by creating a socially responsible supply chain. Socially responsible supply chains undertake voluntary actions aimed at combining care for economic interests with care for the natural environment and compliance with ethical standards in relations with stakeholders (Jastrzębska, 2021). Social responsibility focuses on a single organization and concerns responsibility towards society and the environment. The concept of sustainable development presents the directions of actions taken by enterprises. Supply chains implementing the concept of corporate social responsibility, participate in the process of balancing the economy, and thus pursue the goals of sustainable development.

The Covid-19 pandemic has contributed to the acceleration of digital transformation in enterprises and supply chains (Soto-Acosta, 2020; Gavrila Gavrila, De Lucas Ancillo, 2022; Tiwari et al., 2024). Contemporary supply chains use digital technologies to improve customer service, increase efficiency, visibility, resilience, reduce risk and uncertainty, improve performance in terms of achieving sustainable development goals and shape the competitiveness of the enterprises that are their links (Al-Talib et al., 2020; Modgil, Singh, Hannibal, 2022; Zhao, Hong, Lau, 2023; Belhadi et al., 2024; Ivanov, 2024; Atieh Ali et al., 2024). Digitalization has the influence on the strategic and operational management of supply chains (Hanelt et al., 2021; Verhoef et al., 2021; Paul et al., 2024). Research shows that the implementation of digital technologies is primarily related to technological, economic, financial and organizational barriers (Gupta et al., 2022). In the digital supply chain, it is important to manage supply chain processes using a wide range of innovative technologies (Büyüközkan, Göçer, 2018; Yang et al., 2021).

The agile, resilient, innovative and sustainable supply chains can respond quickly and effectively to emerging opportunities, short-term supply chain disruptions and long-term global crises such as the Covid-19 pandemic (Ivanov, 2022).

Supply chain managers are increasingly implementing the concept of a green supply chain, which emphasizes the environmental protection and minimizing the negative influence

of chains on the environment (Famiyeh et al., 2018; Heydari, Govindan, Basiri, 2020; Rane et al., 2021). Green supply chain management includes all pro-ecological decisions and activities related to synchronizing the main streams of product and information flows in a closed cycle (Banaszyk, Kauf, Szołtysek, 2021). The appropriate use of digital technologies contributes to the improvement of the results of the green supply chain (Feng, Lai, Zhu, 2022). Some researchers emphasize that the implementation of the green supply chain concept strengthens resilience to disruptions.

3. Research methodology

The results of own empirical research analyzed in the article come from more extensive research on the analysis of logistics systems and logistics process management in Polish manufacturing and trading enterprises in years 2020-2022 in the context of building the competitiveness of the enterprise. The research was being conducted from January 2023 to April 2024 using the direct interview method with managers responsible for logistics in the surveyed companies and the computer-assisted interview method using the Internet with logistics managers. During the interviews a detailed survey questionnaire consisting of 38 questions was used.

459 randomly selected small, medium and large Polish manufacturing and trading enterprises (based in Poland) were examined. The study covered enterprises from the following provinces: Masovian, Lesser Poland, Kuyavian-Pomeranian, Lublin, Łódź, Opole, Subcarpathian, Podlaskie, Pomeranian, Silesian, Świętokrzyskie, Warmian-Masurian, Greater Poland and West Pomeranian. In the examined population, the largest group constituted the enterprises from the Mazovian Province. The examined enterprises were characterized by a diversified competitive position on the market.

The largest group among the surveyed companies constituted small enterprises (51.2%). The share of medium-sized enterprises in the surveyed population was 27.5%. The smallest percentage of the surveyed companies constituted large companies (21.3%). Manufacturing and trading companies had a similar share in the surveyed population. Manufacturing enterprises accounted for 52.1% of the surveyed companies (24.0% small manufacturing enterprises, 15.5% medium-sized manufacturing enterprises, 12.6% large manufacturing enterprises), while trading enterprises accounted for 47.9% of the surveyed population (27.2% small trading enterprises, 12.0% medium-sized trading enterprises, 8.7% large trading enterprises).

In the structure of the surveyed enterprises, from the point of view of the sales revenue criterion, the largest group constituted companies achieving sales revenues of up to PLN 10 million in 2022 (45.3%). The second largest surveyed group were enterprises achieving sales revenues from PLN 10 to 50 million (20.0%). The next group constituted enterprises achieving sales revenues from PLN 100 to 500 million (10.7%). Enterprises achieving sales revenues

from PLN 500 million to PLN 1 billion accounted for 8.5% of the surveyed population. 8.1% of the surveyed companies constituted enterprises achieving sales revenues above PLN 1 billion. The smallest share in the surveyed population constituted enterprises achieving sales revenues from PLN 50 to 100 (7.4%).

The majority of the surveyed enterprises (64.9%) conducted international operations in 2022. 73.3% of the surveyed enterprises with a national scope constituted small companies. Among international enterprises, the largest group were companies with an export share in sales value of up to 10% (23.3% of the surveyed sample of the enterprises). The second largest group among international enterprises were companies with an export share in sales value in the range of 10-30% (15.2% of the surveyed sample of the enterprises). Companies with an export share in sales value above 50% constituted 13.5% of the surveyed population. A similar share in the surveyed population constituted enterprises with an export share in sales value in the range of 30-50% (12.9% of the surveyed sample of the enterprises). The surveyed companies with an international scope of operations exported their products primarily to the European Union.

The research results presented in the article concern selected aspects of the supply chain logistics strategies used in practice in the surveyed enterprises in years 2020-2022.

4. Supply chain logistics strategies of the surveyed enterprises and the Covid-19 pandemic and the war in Ukraine – selected aspects

In years 2020-2022, the surveyed enterprises operated in the conditions of the Covid-19 pandemic. The subject of the research were the determinants of logistics strategies used in practice by the surveyed enterprises in years 2020-2022. The analysis of the research results shows that in 2020, in the majority of the surveyed enterprises, the logistics strategy was determined by: constant adaptation of logistics processes to the market conditions related to the Covid-19 pandemic (71.0%), striving to improve customer service (67.8%), building customer trust (53.4%), constant adaptation of logistics processes to the changing market conditions (53.2%).

The analysis of the respondents' declarations allows for the conclusion that in 2021, in over 50% of the surveyed companies, the following aspects significantly influenced the use of the logistics strategy: striving to improve customer service (70.6%), constant adaptation of logistics processes to the market conditions related to the Covid-19 pandemic (69.5%), striving to increase sales revenues (61.0%), constant adaptation of logistics processes to the changing customer wishes and expectations (60.6%), constant adaptation of logistics processes to the changing market conditions (60.3%), constant adaptation of logistics processes to the growing customer requirements (58.8%), building customer trust (55.8%), logistics creates the competitive advantage (51.9%), striving to acquire new customers (51.0%).

The last year of the examined period covers the first months of the war in Ukraine. In 2022, over 50% of the respondents indicated that in the surveyed enterprise, the logistics strategy was determined by: striving to improve customer service (77.1%), constant adaptation of logistics processes to the market conditions related to the war in Ukraine (68.4%), constant adaptation of logistics processes to the changing market conditions (64.9%), striving to increase sales revenues (63.6%), constant adaptation of logistics processes to the growing customer requirements (62.1%), constant adaptation of logistics processes to the changing customer wishes and expectations (61.4%), logistics creates the competitive advantage (59.7%), building customer trust (57.5%), striving to acquire new customers (56.2%), striving to reduce costs – competing with price (54.0%). The analysis of the respondents' declarations shows that in 2022, in almost every fifth surveyed enterprise, the logistics strategy was determined by the market conditions related to the Covid-19 pandemic (19.8%).

In order to check whether there are significant differences in frequency distributions between subsequent periods in the case of responses concerning determinants of logistics strategies used in the surveyed enterprises, chi-square tests were performed. The limit of statistical significance was assumed to be $p < 0.05$. In the subsequent years, a statistically significant increase in the frequency of selecting the following response variants concerning the logistics objectives of the surveyed enterprises: striving to increase sales revenues ($p < 0.001$), constant adjustment of logistics processes to the growing customer requirements ($p < 0.001$), constant adjustment of logistics processes to the changing customer wishes and expectations ($p < 0.001$), striving to acquire new customers ($p < 0.001$), logistics creates the competitive advantage ($p < 0.001$), striving to reduce costs – competing with price ($p < 0.001$), striving to respond faster and better than competitors to the changes in the environment – agility ($p < 0.001$), striving to increase resistance to disruptions ($p < 0.001$), striving to increase sensitivity to the customer needs ($p < 0.001$), striving to increase the innovativeness of the enterprise ($p < 0.001$), balancing economic, social and ecological goals – sustainable development ($p < 0.001$), constant adaptation of logistics processes to the changing market conditions ($p = 0.001$), striving to increase the enterprise adaptability ($p = 0.004$), optimization of logistics personnel management ($p = 0.006$), striving to increase the enterprise flexibility ($p = 0.02$), the logistics strategy is in a constant stage of creation and formation and is characterized by a quick response to the changing customer requirements, environmental conditions and competitors' operations ($p = 0.02$), reducing uncertainty and risk of the conducted business ($p = 0.026$). The answer 'constant adaptation of logistics processes to the market conditions related to the Covid-19 pandemic' had $p < 0.001$. In years 2020-2021, there was an increase, and in 2022, a decrease in the frequency of choosing this response option. The answer 'striving to improve customer service' had $p = 0.05$.

All the surveyed companies in years 2020-2022 had clearly defined logistics goals. The logistics goals of the enterprise should be supported by an appropriate logistics strategy. The analysis of the research results allowed for the conclusion that in 2020, in the majority

of the surveyed enterprises the logistics goals were: improving customer service (68.6%), building customer trust (65.8%), maximizing sales revenues (57.5%), shaping the enterprise's competetive advantage (53.9%), shortening the order processing time (51.4%).

In 2021, the respondents most often indicated that the logistics goals of the enterprise were: improving customer service (73.4%), building customer trust (66.9%), shaping the enterprise's competitive advantage (62.3%), maximizing sales revenues (59.7%), shortening the order processing time (52.5%), faster and better response to the changes in the environment – agility (51.9%), building the effective information system (50.8%).

The analysis of the respondents' declarations allows for the assumption that in 2022, in the vast majority of the surveyed enterprises, the logistics goals were: improvement of customer service (80.4%), shaping the enterprise's competitive advantage (77.8%), building customer trust (70.1%), maximizing sales revenues (68.2%), reduction in logistics costs (65.4%), reliability of deliveries (63.4%), shortening the order processing time (63.2%), faster and better response to the changes in the environment – agility (62.1%). The majority of the participants of the survey indicated that the logistics goals of the enterprise were: increasing the enterprise flexibility (56.9%), building the effective information system (56.4%), increasing the enterprise adaptability (53.6%), building resistance to disruptions (52.3%), increasing sensitivity to customer requirements (50.8%), reducing uncertainty and risk of the conducted business (50.3%).

In the following years, a statistically significant increase in the frequency of selecting the following response options regarding the logistics objectives of the surveyed enterprises in 2020-2022 were: improving customer service ($p < 0.001$), shaping the competitive advantage of the enterprise ($p < 0.001$), shortening the order processing time ($p < 0.001$), reducing logistics costs ($p < 0.001$), increasing the enterprise flexibility ($p < 0.001$), building the effective information system ($p < 0.001$), increasing the enterprise adaptability ($p < 0.001$), increasing sensitivity to customer requirements ($p < 0.001$), faster and better response to the changes in the environment – agility ($p < 0.001$), building resistance to disruptions ($p < 0.001$), developing distribution channels ($p < 0.001$), supporting the process of shaping the enterprise's competitive advantage ($p < 0.001$), increasing the number of distribution channels ($p < 0.001$), increasing resource productivity ($p < 0.001$), increasing logistics innovation ($p < 0.001$), making logistics sustainable ($p < 0.001$), maximizing sales revenues ($p = 0.021$), optimizing logistics personnel management ($p = 0.03$), increasing financial liquidity ($p = 0.04$).

The research shows that not all the surveyed enterprises supported their logistics goals with the appropriate strategy. In years 2020-2022, not all the surveyed enterprises, whose goals included improving customer service, building customer trust, maximizing sales revenues, shaping the enterprise's competitive advantage, shortening the order processing time, reliability of deliveries, reducing uncertainty and risk of the business operations, reducing logistics costs, increasing the enterprise flexibility, building the effective information system, increasing the enterprise adaptability, increasing sensitivity to customer requirements, responding faster and better to the changes in the environment – agility, building resistance to disruptions and

making logistics sustainable, took those goals into account to a sufficient extent in their logistics strategy.

The key barriers in the process of building enterprise competitiveness were examined. The largest number of the respondents indicated that the key limitation in the process of building the enterprise competitiveness in years 2020-2021 were unfavourable conditions related to the Covid-19 pandemic (74.9% in 2020, 74.1% in 2021). In 2022, the largest number of the survey participants indicated that the key barrier in the process of building the enterprise competitiveness were unfavourable conditions related to the war in Ukraine (72.8%). According to the majority of the respondents, the key barriers in the process of building the enterprise competitiveness in years 2020-2022 were: dynamically changing market conditions (70.8% in 2020, 71.5% in 2021, 69.9% in 2022), unfavourable market conditions (69.1% in 2020, 70.1% in 2021, 65.1% in 2022), demand fluctuations (65.8% in 2020, 64.7% in 2021, 64.3% in 2022), insufficient competitive potential of the enterprise (64.9% in 2020, 66.0% in 2021, 64.5% in 2022), supply fluctuations (62.5% in 2020, 63.2% in 2021, 61.2% in 2022), inability to respond quickly to the emerging opportunities (57.3% in 2020, 60.1% in 2021, 59.9% in 2022), inconsistent priorities (53.6% in 2020, 54.9% in 2021, 53.8% in 2022), high costs of running business (51.2% in 2020, 57.5% in 2021, 63.2% in 2022).

In subsequent years, a statistically significant increase in the frequency of selecting the following response options was observed regarding key barriers in the process of building the enterprise competitiveness in years 2020-2022: high costs of running business ($p < 0.001$), problems with maintaining financial liquidity ($p = 0.007$). The response to the unfavourable conditions related to the Covid-19 pandemic had $p < 0.001$. In years 2020-2021, there was an increase, and in 2022, a decrease in the frequency of selecting this response option.

The subject of the study were the logistics strategies used in practice by the surveyed enterprises in years 2020-2022. The analysis of the research results showed that in 2020, 75.2% of the surveyed companies had a formalised logistics strategy thus they had developed a coherent concept of systemic action in the area of logistics, whose implementation was to achieve the competitive advantage. In the analyzed period, the percentage of the surveyed enterprises with a formalised logistics strategy increased year by year (79.9% in 2021, 81.2% in 2022). In years 2020-2022, the percentage of the surveyed enterprises without a formalised logistics strategy was definitely higher in small enterprises than in medium and large enterprises.

The analysis of the respondents' declarations allows for the assumption that in years 2020-2022, less than half of the surveyed companies had a formalised global logistics strategy (41.0% in 2020, 42.9% in 2021, 44.4% in 2022). In 2020, 27.0% of the surveyed companies had a formalised supply chain management strategy (69 manufacturing enterprises, 55 trading enterprises). In 2021, the number of the surveyed manufacturing enterprises with a formalised supply chain management strategy increased to 76, and trading companies to 60. In 2022, 32.9% of the surveyed companies implemented a supply chain management strategy (85 manufacturing enterprises, 66 trading enterprises). In years 2020-2022, in the majority of the surveyed

medium and large manufacturing and trading enterprises in which logistics created the competitive advantage implemented a supply chain management strategy that was in a constant stage of creation and formation, characterized by a rapid response to the changing customer requirements, environmental conditions and competitors' operations.

The results of the conducted research gave the bases for the conclusion that in years 2020-2022, more than the third of the surveyed enterprises did not have a formalised global logistics strategy, but had developed partial strategies regarding procurement, production and distribution (18.7% in 2020, 20.3% in 2021, 19.8% in 2022), partial strategies regarding procurement and distribution (12.4% in 2020, 13.7% in 2021, 14.0% in 2022), partial strategies regarding distribution (2.4% in 2020, 1.7% in 2021 and 2022), partial strategies regarding procurement and production (0.7% in 2020, 0.4% in 2021 and 2022) or partial strategies regarding procurement (0.9% in 2021 and 2022).

The largest number of the surveyed enterprises used the agile management strategy in the supply chain management in the analyzed period. In 2020, 66 out of 124 surveyed companies with a formalised supply chain management strategy (53.2%) implemented the agile management strategy (37 manufacturing enterprises and 29 trading enterprises). In 2021, the agile management strategy was implemented by 71 surveyed companies (39 manufacturing enterprises and 32 trading enterprises, which constituted 52.2% of the surveyed enterprises with a formalised supply chain management strategy), and in 2022, this strategy was implemented by 61 surveyed companies (35 manufacturing enterprises and 26 trading enterprises, which constituted 40.4% of the surveyed enterprises with a formalised supply chain management strategy).

In 2020, the lean management strategy was applied by 38 surveyed enterprises, including 21 manufacturing enterprises and 17 trading enterprises (30.7% of the surveyed enterprises with a formalised supply chain management strategy). In 2021, the lean management strategy was applied by 40 surveyed enterprises (24 manufacturing enterprises and 16 trading enterprises, which constituted 29.4% of the surveyed enterprises with a formalised supply chain management strategy). In 2022, 53 surveyed enterprises applied the lean management strategy (33 manufacturing enterprises and 20 trading enterprises, which constituted 35.1% of the surveyed enterprises with a formalised supply chain management strategy).

The analysis of the research results allowed for the conclusion that some of the surveyed enterprises used the lean management and agile management (leagile) concepts together in years 2020-2022. In 2020, 20 surveyed enterprises used the lean management and agile management concepts together (11 manufacturing enterprises and 9 trading enterprises, which constituted 16.1% of the surveyed enterprises with a formalized supply chain management strategy). In 2022, 25 surveyed enterprises implemented lean management (13 manufacturing enterprises and 12 trading enterprises, which constituted 18.4% of the surveyed enterprises with a formalised supply chain management strategy), and in 2022, 37 surveyed enterprises used

lean management (17 manufacturing enterprises and 20 trading enterprises, which constituted 24.5% of the surveyed enterprises with a formalised supply chain management strategy).

On the basis of this study it has been assumed that in years 2021-2022, in nearly 70% of the surveyed enterprises, the logistics strategy was determined by the constant adaptation of logistics processes to the market conditions related to the Covid-19 pandemic. In 2022, in approximately 70% of the surveyed companies, the logistics strategy was determined by the constant adaptation of logistics processes to the market conditions related to the war in Ukraine. In almost every fifth surveyed company, the logistics strategy was determined by the market conditions related to the Covid-19 pandemic in 2022. The logistics strategies used in the surveyed companies were adapted to external and internal conditions. During the Covid-19 pandemic and the war in Ukraine the most effective logistics managers made changes in logistics strategies that were appropriate to the conditions. The enterprises achieving the best economic and market results implemented the supply chain management strategy. In the analyzed period, 27 surveyed enterprises implemented the supply chain management strategy (7 manufacturing enterprises and 5 trading enterprises in 2021, 9 manufacturing enterprises and 6 trading enterprises in 2022). The majority of the enterprises achieving the best results in the analyzed period implemented the supply chain management strategy that was in a constant stage of creation and formation, and was characterized by a rapid response to the changing customer requirements, environmental conditions and competitors' operations, respecting, at the same time, the principles of sustainable development. The supply chain logistics strategies enabled the best enterprises to incessantly adapt logistics processes to the market conditions related to the Covid pandemic and the war in Ukraine, changing market conditions, changing customer wishes and expectations, and growing customer requirements, improve customer service, increase flexibility, adaptability, resilience to disruptions and innovation, respond to the changes in the environment faster and better than competitors, and reduce costs, respecting, at the same time, sustainable development goals, and consequently, achieve above-average economic and market results.

5. Conclusion

The Covid-19 pandemic and the war in Ukraine had a huge influence on logistics strategies in the vast majority of the surveyed manufacturing and trading enterprises. The examined enterprises had to face many challenges related to logistics in the analyzed period, which resulted in a significant increase in the influence of logistics on their economic and market results. The logistics strategies used in the surveyed companies were adapted to external and internal conditions. The majority of the enterprises achieving the best results in the analyzed period implemented the supply chain management strategy that was in a constant stage of creation and

formation, and was characterized by a rapid response to the changing customer requirements, environmental conditions and competitors' operations, respecting, at the same time, the principles of sustainable development. The supply chain strategies and other global logistics strategies implemented by the examined enterprises constituted competitive strategies. The largest number of surveyed companies in the analyzed period used the agile management strategy in the supply chain management. In years 2020-2022, the percentage of the enterprises that combined the concepts of lean management and agile management (leagile) increased the most. A large group constituted enterprises in which, during the pandemic and the war in Ukraine, logistics goals were defined adequately to the conditions, but they were not supported by the appropriate logistics strategy.

During the Covid-19 pandemic and the war in Ukraine the most effective logistics managers made changes in logistics strategies that were appropriate to the conditions. The conducted research confirmed that implementing the logistics supply chain strategy that was appropriate to the conditions allowed for a greater adaptation of operations to the conditions related to the Covid-19 pandemic and the war in Ukraine. The enterprises that were links in the agile, resilient, innovative and sustainable supply chains reduced the likelihood of disruptions in the logistics system, responded quickly and effectively to disruptions in logistics processes during the Covid-19 pandemic and the war in Ukraine, responded appropriately to the market challenges, achieved the set goals, increased sales revenues with the same or better financial liquidity than the competition, reduced costs, and consequently, created and maintained competitive advantages.

References

1. Adana, S., Manuj, I., Herburger, M., Cevikparmak, S., Celik, H., Uvet, H. (2024). Linking decentralization in decision-making to resilience outcomes: a supply chain orientation perspective. *The International Journal of Logistics Management, 35(1), 256-280.* Retrieved from: https://doi.org/10.1108/IJLM-07-2022-0308.
2. Adobor, H., McMullen, R.S. (2018). Supply chain resilience: a dynamic and multidimensional approach. *The International Journal of Logistics Management, 29(4), 1451-1471.* Retrieved from: https://doi.org/10.1108/IJLM-04-2017-0093.
3. Aljuneidi, T., Bhat, S.A., Boulaksil, Y. (2023). A comprehensive systematic review of the literature on the impact of the Covid-19 pandemic on supply chains. *Supply Chain Analytics, 3, 100025.* Retrieved from: https://doi.org/10.1016/j.sca.2023.100025.
4. Al-Talib, M., Melhem W.Y., Anosike A.I., Garza-Reyes J.A., Nadeem S.P., Kumar, A. (2020). Achieving resilience in the supply chain by applying IoT technology. *Procedia CIRP, 91, 752-757.* Retrieved from: https://doi.org/10.1016/j.procir.2020.02.231.

5. Aslam, H., Khan, A.Q., Rashid, K., Rehman, S.-u. (2020). Achieving supply chainresilience: the role of supply chain ambidexterity and supply chain agility. *Journal of Manufacturing Technology Management, 31(6), 1185-1204.* Retrieved from: https://doi.org/10.-1108/JMTM-07-2019-0263.
6. Atieh Ali, A.A., Sharabati, A.A.A.; Allahham, M., Nasereddin, A.Y. (2024). The Relationship between Supply Chain Resilience and Digital Supply Chain and the Impact on Sustainability: Supply Chain Dynamism as a Moderator. *Sustainability, 16, 3082.* Retrieved from: https://doi.org/10.3390/su16073082.
7. Autry, C.W., Zacharia, Z.G., Lamb C.W. (2008). A logistics strategy taxonomy. *Journal of Business Logistics, 29(2), 27-51.* Retrieved from: https://doi.org/10.1002/j.2158-1592-.2008.tb00086.x.
8. Baghersad, M., Zobel, C.W. (2021). Assessing the extended impacts of supply chain disruptions on firms: An empirical study. *International Journal of Production Economics, 231, 107862.* Retrieved from: https://doi.org/10.1016/j.ijpe.2020.107862.
9. Banaszyk, P., Kauf, S., Szołtysek, J. (2021). *Logistyka jako czynnik dobrostanu*, Warszawa: PWE.
10. Belhadi, A., Kamble, S., Subramanian, N., Singh, R.K., Venkatesh, M. (2024), Digital capabilities to manage agri-food supply chain uncertainties and build supply chain resilience during compounding geopolitical disruptions, *International Journal of Operations & Production Management, 44(11), 1946-1982.* Retrieved from: https://doi.org/10.-1108/IJOPM-11-2022-0737.
11. Brandao, M.S., Godinho Filho, M. (2024). Changing terms, evolving strategies: the tailoring of supply chain management terms and its implications. *Supply Chain Management*, *29(4), 778-793.* Retrieved from: https://doi.org/10.1108/SCM-01-2024-0049.
12. Browning, T., Kumar, M., Sanders, N., Sodhi, M.S., Thürer, M., Tortorella, G.L. (2023). From supply chain risk to system-wide disruptions: research opportunities in forecasting, risk management and product design. *International Journal of Operations & Production Management, 43(12), 1841-1858.* Retrieved from: https://doi.org/10.1108/IJOPM-09-2022-0573.
13. Büyüközkan, G., Göçer F. (2018). Digital Supply Chain: Literature review and a proposed framework for future research. *Computers in Industry, 97, 157-177.* Retrieved from: https://doi.org/10.1016/j.compind.2018.02.010.
14. Carter C.R., Rogers, D.S., Choi, T.Y. (2015). Toward the Theory of the Supply Chain, *Journal of Supply Chain Management, 51(2), 89-97.* Retrieved from: https://doi.org/-10.1111/jscm.12073.
15. Choi, T.Y., Hofmann, E., Templar, S., Rogers, D.S., Leuschner, R., Korde, R.Y. (2023). The supply chain financing ecosystem: Early responses during the Covid-19 crisis. *Journal of Purchasing and Supply Management, 100836.* Retrieved from: https://doi-1org-10000-93cp61f2.han.buw.uw.edu.pl/10.1016/j.pursup.2023.100836.

16. Ciesielski, M. (2010). Strategiczna rola łańcuchów dostaw. In: Ciesielski, M., Długosz, J. (Eds.) *Strategie łańcuchów dostaw* (32-48). Warszawa: PWE.
17. Cinti, A., Marcone, M.R., Sabatini, A., Temperini, V. (2024). Enhancing supply chain resilience through the supply network approach. *Journal of Business & Industrial Marketing*. Retrieved from: https://doi.org/10.1108/JBIM-02-2023-0106.
18. Colon, C., Hochrainer-Stigler, S. (2023). Systemic risks in supply chains: a need for system-level governance. *Supply Chain Management, 28(4), 682-694.* Retrieved from: https:-//doi.org/10.1108/SCM-03-2022-0101.
19. Czakon, W. (2020). *Krótkowzroczność strategiczna menedżerów.* Kraków: Uniwersytet Jagielloński.
20. Czupryna-Nowak, A., Banasik, A., Bartnicki, M. (2023). Data concerning Covid-19 cases in Poland at the end of the pandemic. *Scientific Papers of Silesian University of Technology. Organization and Management Series, 186, 61-71.* Retrieved from: http://dx.doi.-org/10.29119/1641-3466.2023.186.5.
21. Dadzie, K., Dadzie, C., Johnston, W.J., Winston, E., Wang, H. (2023). The integration of logistics and marketing practice into baseline supply chain practices in the emerging markets. *Journal of Business & Industrial Marketing, 38(2), 367-383.* Retrieved from: https://doi.org/10.1108/JBIM-01-2022-0002.
22. Da˘gdeviren, I.E.; Erturgut, R. (2024). The Mediating Role of Supply Chain Integration in the Relationship Between Supply Chain Strategy and Logistics Performance, *Sustainability, 16, 9514.* Retrieved from: https://doi.org/10.3390/su16219514.
23. de Wit, B., Meyer, R. (2007). *Synteza strategii*. Warszawa: PWE.
24. Drucker, P.F. (1954). *The practice of management,* New York: Harper & Row.
25. Duong A., Duy Tran Le, A., Huong Le Thi, C., Rajkishore N., Majo G., Loan Bui Thi, C., Nhu-Y Ngoc, H., Duy Tan, N., Huy Truong, Q. (2024). Navigating global supply networks: a strategic framework for resilience in the apparel industry. *Operations Management Research, 17(2), 523-543.* Retrieved from: https://doi.org/10.1007/s12063-024-00495-z.
26. Dwivedi, A., Chowdhury, P., Paul, S.K., Agrawal, D. (2023). Sustaining circular economy practices in supply chains during a global disruption. *The International Journal of Logistics Management, 34(3), 644-673.* Retrieved from: https://doi.org/10.1108/IJLM-04-2022-0154.
27. Famiyeh, S., Kwarteng, A., Asante-Darko, D., Dadzie, S.A. (2018). Green supply chain management initiatives and operational competitive performance. *Benchmarking: An International Journal, 25(2), 607-631.* Retrieved from: https://doi.org/10.1108/BIJ-10-2016-0165.
28. Feng, Y., Lai, K.H., Zhu, Q. (2022). Green supply chain innovation: Emergence, adoption, and challenges. *International Journal of Production Economics, 248, 108497.* Retrieved from: https://doi.org/10.1016/j.ijpe.2022.108497.

29. Flanagan, J., McGovern, C. (2023). A qualitative study of improving the operations strategy of logistics using radio frequency identification. *Journal of Global Operations and Strategic Sourcing, 16(1), 47-68.* Retrieved from: https://doi.org/10.1108/JGOSS-04-2021-0030.
30. Gavrila Gavrila, S., De Lucas Ancillo, A. (2022). Entrepreneurship, innovation, digitization and digital transformation toward a sustainable growth within the pandemic environment. *International Journal of Entrepreneurial Behavior & Research, 28(1), 45-66.* Retrieved from: https://doi.org/10.1108/IJEBR-05-2021-0395.
31. Gąsowska, M.K. (2018). *Logistyka a konkurencyjność przedsiębiorstwa.* Warszawa: Difin.
32. Gąsowska, M.K. (2016). *Logistyczne problem decyzyjne w zarządzaniu łańcuchem dostaw w XXI wieku.* In: Cichosz, M., Nowicka, K., Pluta-Zaremba A. (Eds.) Zarządzanie łańcuchem dostaw i logistyką w XXI wieku (73-93). Warszawa: Oficyna Wydawnicza SGH.
33. Granillo-Macías, R., Rivera-Gómez, H., González-Hernández I.J., Santana-Robles F. (2024). Reconfiguration of Agrifood Supply Chain Management in Latin America during Covid-19: *A Brief Literature Review. Sustainability, 16(9), 3743.* Retrieved from: https://doi.org/10.3390/su16093743.
34. Grondys, K., Kot, M. (2023). The global supply chains management against future risks a post-pandemic vision during the ongoing war. *Entrepreneurship and Sustainability Issues, 10(4), 10-25.* Retrieved from: https://doi.org/10.9770/jesi.2023.10.4(1).
35. Gupta, H.Y.A.K., Kusi-Sarpong, S., Khan, S.A., Sharma, S.C. (2022). Strategies to overcome barriers to innovative digitalisation technologies for supply chain logistics resilience during pandemic. *Technology in Society, 69, 101970.* Retrieved from: https://doi.org-/10.1016/j.techsoc.2022.101970.
36. Gurbuz, M.C., Yurt, O., Ozdemir S., Sena, V., Yu, W. (2023). Global supply chains risks and Covid-19: Supply chain structure as a mitigating strategy for small and medium-sized enterprises. *Journal of Business Research, 155, Part B, 113407.* Retrieved from: https://doi.org/10.1016/j.jbusres.2022.113407.
37. Handfield, R.B., Graham, G., Burns L. (2020). Corona virus, tariffs, trade wars and supply chain evolutionary design. *International Journal of Operations & Production Management, 40(10), 1649-1660.* Retrieved from: https://doi.org/10.1108/IJOPM-03-2020-0171.
38. Haessner, P., Haessner, J., McMurtrey, M. (2024). Trends & Challenges in the Food Supply Chain. *Journal of Strategic Innovation and Sustainability, 19(1), 115-124.*
39. Hanelt, A., Bohnsack, R., Marz, D., Antunes Marante, C. (2021). A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change. *Journal of Management Studies, 58(5), 1159-1197.* Retrieved from:10.1111/joms.12639.
40. Heydari, J., Govindan, K., Basiri, Z. (2020). Balancing price and green quality in presence of consumer environmental awareness: a green supply chain coordination approach. *International Journal of Production Research, 59(7), 1957-1975.* Retrieved from: https://-doi.org/10.1080/00207543.2020.1771457.

41. Hohenstein, N.O., Feisel, E., Hartmann, E., Giunipero, L. (2015). Research on the phenomenon of supply chain resilience: A systematic review and paths for further investigation. *International Journal of Physical Distribution & Logistics Management, 45(1/2), 90-117.* Retrieved from: https://doi.org/10.1108/IJPDLM-05-2013-0128.
42. Irfan, M., Wang, M., Akhtar, N. (2020). Enabling supply chain agility through process integration and supply flexibility: Evidence from the fashion industry. *Asia Pacific Journal of Marketing and Logistics, 32(2), 519-547.* Retrieved from: https://doi.org/10.1108/-APJML-03-2019-0122.
43. Ivanov, D. (2024). Digital Supply Chain Management and Technology to Enhance Resilience by Building and Using End-to-End Visibility During the Covid-19 Pandemic. *IEEE Transactions on Engineering Management, 71, 10485-10495.* Retrieved from: https://-doi.org/10.1109/TEM.2021.3095193.
44. Ivanov, D. (2022). Viable supply chain model: Integrating agility, resilience and sustainability perspectives – lessons from and thinking beyond the Covid-19 pandemic. *Annals of Operations Research, 319(8), 1411-1431.* Retrieved from: https://doi.org/10.1007/-s10479-020-03640-6.
45. Jastrzębska, E. (2021). Społeczna odpowiedzialność biznesu w Polsce w czasie pandemii Covid-19 a Cele Zrównoważonego Rozwoju ONZ. *Annales Universitatis Mariae Curie-Skłodowska, sectio H–Oeconomia, 55(3), 51-65.* Retrieved from: 10.17951/h.2021.55.3.51-65.
46. Kafel, T., Ziębicki, B. (2021). Dynamics of the evolution of the strategic management concept: From the planning school to the neostrategic approach. *Journal of Entrepreneurship, Management and Innovation, 17(2), 7-28.* Retrieved from: https://doi.org/10.7341/-20211721.
47. Kauf, S., Pisz, I., Tłuczak, A. (2024). Risk management in the supply chain in the light of the enterprises' experiences during the Covid-19 pandemic. *Scientific Papers of Silesian University of Technology. Organization and Management Series, 195, 249-270.* Retrieved from: http://dx.doi.org/10.29119/1641-3466.2024.195.15.
48. Khare, P. (2024). Global Resilience in Transport and Logistics: Navigating Disruptions with the GRIT Framework. *International Journal of Applied Logistics, 14(1), 1-28.* Retrieved from: https://doi.org/10.4018/IJAL.357650.
49. Krupski, R., Niemczyk, J., Stańczyk-Hugiet E. (2009). *Koncepcje strategii organizacji.* Warszawa: PWE.
50. Kumar, B., Sharma, A. (2021). Managing the supply chain during disruptions: Developing a framework for decision-making. *Industrial Marketing Management, 97, 159-172.* Retrieved from: https://doi.org/10.1016/j.indmarman.2021.07.007.
51. Maharjan, R., Kato H. (2023). Logistics and Supply Chain Resilience of Japanese Companies: Perspectives from Impacts of the Covid-19 Pandemic. *Logistics, 7(2), 27.* Retrieved from: https://doi.org/10.3390/logistics7020027.

52. Martín-de Castro, G., Amores-Salvadó, J., Díez-Vial, I. (2023). Framing the evolution of the "environmental strategy" concept: Exploring a key construct for the environmental policy agenda. *Business Strategy and the Environment, 32(4), 1308-1333.* Retrieved from: https://doi-1org-1000093fp0078.han.buw.uw.edu.pl/10.1002/bse.3190.
53. Matwiejczuk, R. (2021). *Logistyka w zarządzaniu strategicznym.* Warszawa: PWE.
54. McGinnis, M.A., Spillan, J.E., Virzi N. (2012). An empirical study comparing Guatemalan and United States logistics strategies. *The International Journal of Logistics Management, 23(1), 77-95.* Retrieved from: 10.1108/09574091211226939.
55. Mishra, N.K., Pande Sharma, P., Chaudhary, S.K. (2024). Redefining agile supply chain practices in the disruptive era: a case study identifying vital dimensions and factors. *Journal of Global Operations and Strategic Sourcing.* Retrieved from: https://doi.org/10.1108/-JGOSS-04-2023-0031.
56. Mishra, R., Singh, R.K., Subramanian, N. (2022). Impact of disruptions in agri-food supply chain due to Covid-19 pandemic: contextualised resilience framework to achieve operational excellence. *The International Journal of Logistics Management, 33(39), 926-954.* Retrieved from: https://doi.org/10.1108/IJLM-01-2021-0043.
57. Modgil, S., Singh, R.K., Hannibal, C. (2022), Artificial intelligence for supply chain resilience: learning from Covid-19. The *International Journal of Logistics Management, 33(4), 1246-1268.* Retrieved from: https://doi.org/10.1108/IJLM-02-2021-0094.
58. Musilová, I., Dvořák, J., Jánský, J., Bolek, V. (2023). Trends in Performance Research in Relation to Business Strategy: Bibliometric Analysis and Text Mining. *Central European Business Review, 12(3), 143-174.* Retrieved from: 10.18267/j.cebr.323.
59. Nugroho, B.F., Nazaruddin, L.O., Syamil, A., Nurhasan, H.M., Fatma, E., Noor, M.M., Soeharsono, I.P.F.M., Sarasi, V., Fekete-Farkas, M., Balázs, G. (2024). A pattern of collaborative logistics during multiple crises. *International Journal of Disaster Risk Reduction*, *108, 104499.* Retrieved from: https://doi.org/10.1016/j.ijdrr.2024.104499.
60. Ozdemir, D., Sharma, M., Dhir, A., Daim T. (2022). Supply chain resilience during the Covid-19 pandemic. *Technology in Society, 68, 101847.* Retrieved from: https://-doi.org/10.1016/j.techsoc.2021.101847.
61. Patel, B.S., Sambasivan M. (2022). A systematic review of the literature on supply chain agility. *Management Research Review, 45(2), 236-260.* Retrieved from: https://doi.-org/10.1108/MRR-09-2020-0574.
62. Paul, J., Ueno, A., Dennis C., Alamanos E., Curtis, L., Foroudi, P., Kacprzak, A., Kunz W.H., Liu J., Marvi, R., Nair S.L.S., Ozdemir, O., Pantano E., Papadopoulos T., Petit O., Tyagi, S., Wirtz, J. (2024). Digital transformation: A multidisciplinary perspective and future research agenda. *International Journal of Consumer Studies, 48(2), e13015.* Retrieved from: https://doi.org/10.1111/ijcs.13015.
63. Paul, S.K., Chowdhury, P., Chowdhury, M.T., Chakrabortty, R.K., Moktadir, M.A. (2023). Operational challenges during a pandemic: An investigation in the electronics industry. *The*

International Journal of Logistics Management, 34(2), 336-362. Retrieved from: https://doi.org/10.1108/IJLM-05-2021-0307.

64. Pettit, T.J., Croxton, K.L., Fiksel, J. (2019). The evolution of resilience in supply chain management: a retrospective on ensuring supply chain resilience. *Journal of Business Logistics, 40(1), 56-65.* Retrieved from: https://doi.org/10.1111/jbl.12202.
65. Ponomarov, S.Y., Holcomb M.C. (2009). Understanding the concept of supply chain resilience. *The International Journal of Logistics Management, 20(1), 124-143.* Retrieved from: https://doi.org/10.1108/09574090910954873.
66. Raj A., Mukherjee, A.A., de Sousa Jabbour A.B.L., Srivastava S.K. (2022). Supply chain management during and post-Covid-19 pandemic: Mitigation strategies and practical lessons learned. *Journal of Business Research, 142, 1125-1139.* Retrieved from: https://-doi.org/10.1016/j.jbusres.2022.01.037.
67. Rakyta, M., Bubenik, P., Binasova, V., Micieta, B., Staffenova, K. (2022). Advanced Logistics Strategy of a Company to Create Sustainable Development in the Industrial Area. *Sustainability, 14, 12659.* Retrieved from: https://doi.org/10.3390/su141912659.
68. Rane, S.B., Thakker, S.V., Kant, R. (2021). Stakeholders' involvement in green supply chain: a perspective of blockchain IoT-integrated architecture. *Management of Environmental Quality, 32(6), 1166-1191.* Retrieved from: https://doi.org/10.1108/MEQ-11-2019-0248.
69. Rinaldi, M., Bottani, E. (2023). How did Covid-19 affect logistics and supply chain processes? Immediate, short and medium-term evidence from some industrial fields of Italy. *International Journal of Production Economics, 262, 108915.* Retrieved from: https://-//doi.org/10.1016/j.ijpe.2023.108915.
70. Riska, M.M. (2024). Supply Chain Strategy Trends: Lean, Agile, Leagile. International *Research Journal of Multidisciplinary Scope, 5(4), 82-97.* Retrieved from: https://-doi.org/10.47857/irjms.2024.05i04.01156.
71. Ronda-Pupo, G.A., Guerras-Martin, L.A. (2012). Dynamics of the evolution of the strategy concept 1962–2008: a co-word analysis. *Strategic Management Journal, 33(2), 162-188.* Retrieved from: https://doi-1org-1000093fp0078.han.buw.uw.edu.pl/10.1002/smj.948.
72. Roscoe, S., Aktas, E., Petersen, K.J., Skipworth, H.D., Handfield, R.B., Habib, F. (2022). Redesigning global supply chains during compounding geopolitical disruptions: the role of supply chain logics. *International Journal of Operations & Production Management, 42(9), 1407-1434.* Retrieved from: https://doi.org/10.1108/IJOPM-12-2021-0777.
73. Sajjad, A. (2021). The Covid-19 pandemic, social sustainability and global supply chain resilience: A review. *Corporate Governance, 21(6), 1142-1154.* Retrieved from: https://-doi.org/10.1108/CG-12-2020-0554.
74. Sarkis, J. (2021). Supply chain sustainability: Learning from the Covid-19 pandemic. *International Journal of Operations & Production Management, 41(1), 63-73.* Retrieved from: https://doi.org/10.1108/IJOPM-08-2020-056.

75. Sheth, J.N., Uslay, C. (2023). The geopolitics of supply chains: Assessing the consequences of the Russo-Ukrainian war for B2B relationships. *Journal of Business Research, 166, 114120.* Retrieved from: https://doi.org/10.1016/j.jbusres.2023.114120.
76. Soto-Acosta, P. (2020). Covid-19 Pandemic: Shifting Digital Transformation to a High-Speed Gear. *Information Systems Management, 37(4), 260-266.* Retrieved from: https://-doi.org/10.1080/10580530.2020.1814461.
77. Snoeck, A., Udenio, M., Fransoo, J.C. (2019). A stochastic program to evaluate disruption mitigation investments in the supply chain. *European Journal of Operational Research, 274(2), 516-530.* Retrieved from: https://doi.org/10.1016/j.ejor.2018.10.005.
78. Song, M., Ma, X., Zhao, X., Zhang, L. (2022). How to enhance supply chain resilience: a logistics approach. *The International Journal of Logistics Management, 33(4), 1408-1436.* Retrieved from: https://doi.org/10.1108/IJLM-04-2021-0211.
79. Spillan, J.E., Mintu-Wimsatt, A. Kara, A. (2018). Role of logistics strategy, coordination and customer service commitment on Chinese manufacturing firm competitiveness. *Asia Pacific Journal of Marketing and Logistics, 30(5), 1365-1378.* Retrieved from: https://-doi.org/10.1108/APJML-09-2017-0224.
80. Srai, J.S., Graham, G., Van Hoek, R., Joglekar, N., Lorentz, H. (2023). Impact pathways: unhooking supply chains from conflict zones—reconfiguration and fragmentation lessons from the Ukraine–Russia war. *International Journal of Operations & Production Management, 43(13), 289-301.* Retrieved from: https://doi.org/10.1108/IJOPM-08-2022-0529.
81. Świerczek, A. (2019). *Zarządzanie łańcuchem dostaw w ujęciu zintegrowanym.* Warszawa: PWE.
82. Tiwari, M.K., Bidanda, B., Geunes, J., Fernandes, K., Dolgui, A. (2024). Supply chain digitisation and management. *International Journal of Production Research, 62(8), 2918-2926.* Retrieved from: https://doi.org/10.1080/00207543.2024.2316476.
83. Trojahn. S. (2018). Logistics Strategies for Resource Supply Chains. *Transport and Telecommunication, 19(3), 244-252.* Retrieved from: 10.2478/ttj-2018-0021.
84. van Hoek, R. (2021). Larger, Counter-intuitive and Lasting – the PSM role in responding to the Covid-19 pandemic, exploring opportunities for theoretical and actionable advances. *Journal of Purchasing and Supply Management, 27(3), 100688.* Retrieved from: 10.1016/-j.pursup.2021.100688.
85. Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong J.Q., Fabian N., Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research, 122, 889-901.* Retrieved from: https://doi.org/10.1016/j.jbus-res.2019.09.022.
86. Vrontis, D., Shams, R., Thrassou, A., Kafouros, M. (2024). Global strategy evolution, devolution or revolution: Disruptions to globalization and international business introversion. *Journal of International Management, 30(5), 101188.* Retrieved from: https://-doi.org/10.1016/j.intman.2024.101188.

87. Wang, Q., Zhou, H., Zhao, X. (2024). The role of supply chain diversification in mitigating the negative effects of supply chain disruptions in Covid-19. *International Journal of Operations & Production Management, 44(1), 99-132.* Retrieved from: https://doi.-org/10.1108/IJOPM-09-2022-0567.
88. Wieland A. (2020). Dancing the Supply Chain: Toward Transformative Supply Chain Management. *Journal of Supply Chain Management, 57(1), 58-73.* Retrieved from: https://doi.org/10.1111/jscm.12248.
89. Witkowski, J. (1995). *Strategia logistyczna przedsiębiorstw przemysłowych.* Wrocław: Wydawnictwo Akademii Ekonomicznej we Wrocławiu.
90. Yang, M., Fu, M., Zhang Z. (2021). The adoption of digital technologies in supply chains: drivers, process and impact. *Technological Forecasting and Social Change, 169, 120795.* Retrieved from: https://doi.org/10.1016/j.techfore.2021.120795.
91. Zhang, F., Wu, X., Tang, C.S., Feng, T., Dai, Y. (2020). Evolution of Operations Management Research: from Managing Flows to Building Capabilities. *Production and Operations Management, 29(10), 2219-2229.* Retrieved from: https://doi.org/10.1111/poms.-13231.
92. Zhao, N., Hong, J., Lau, K.H. (2023). Impact of supply chain digitalization on supply chain resilience and performance: A multi-mediation model, *International Journal of Production Economics, 259, 108817.* Retrieved from: https://doi.org/10.1016/j.ijpe.2023.108817.