

HOW SUPPLY CHAIN DISRUPTIONS AFFECT THE WAY COMPANIES FUNCTION – A CASE STUDY ON THE EXAMPLE OF THE TFL ENTITY GEIS GLOBAL LOGISTICS

JAK ZAKŁÓCENIA ŁAŃCUCHA DOSTAW WPŁYWAJĄ NA FUNKCJONOWANIE FIRM – STUDIUM PRZYPADKU NA PRZYKŁADZIE PODMIOTU TSL GEIS GLOBAL LOGISTICS

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Abstract: The aim of the article is to present the essence of disruptions in the supply chain and assess how they are linked with enterprise resilience. Furthermore, it aims to indicate how company's operations are impacted in the long term. The article has a theoretical and empirical character. It presents the results of empirical research conducted in the third quarter of 2022 at Geis Global Logistics. Here we look to answer three research questions concerning the problems and challenges resulting from the pandemic and geopolitical crisis, their role in creating new development opportunities for the company, and defining key logistics and supply chain strategies to maintain its competitiveness in a turbulent environment. The results show the actions taken by the Transport Forwarding Logistics (TFL) industry entity to survive and be competitive in the market, i.e., building resilience through the ability to absorb, react, and rebuild after disruptions.

Keywords: supply chain, disruption, resilience, adaptability

Streszczenie: Celem artykułu jest przedstawienie istoty zakłóceń w łańcuchu dostaw i ich powiązań z odpornością w działalności przedsiębiorstw oraz wskazanie wpływu na działanie przedsiębiorstwa w długim okresie. Artykuł ma charakter teoretyczno-empiryczny. Zaprezentowano w nim wyniki badań empirycznych, które zostały zrealizowane w III kwartale 2022 r. w Geis Global Logistics, poprzez znalezienie odpowiedzi na trzy pytania badawcze. Dotyczą one: problemów/wyzwań wynikających z pandemii i kryzysu geopolitycznego, ich roli w kontekście tworzenia nowych możliwości rozwoju badanego przedsiębiorstwa oraz określenia kluczowych strategii działań w odniesieniu do logistyki i łańcuchów dostaw, dla utrzymania konkurencyjności Geis Global Logistics w turbulentnym otoczeniu. Wyniki pokazują działania podejmowane przez podmiot branży TSL, by przetrwać i być konkurencyjnym na rynku – budując odporność poprzez zdolność do absorpcji, reagowania i odbudowy po zakłóceniach.

Słowa kluczowe: łańcuch dostaw, zakłócenia, odporność, adaptacyjność

Introduction

The COVID-19 pandemic and its restrictions, as well as the war in Ukraine, have forced enterprises to prioritise supply chain resilience. Awareness has grown that supply chains must be more agile and agile to be able to react quickly and adapt to potential disruptions (Wieland, Durach, 2021). A preventive approach to disruptions in the supply chain demonstrates the market maturity of its participants. The scale of the economic crisis related to COVID-19 has confirmed that developing such an

approach is an extremely difficult yet necessary challenge. According to data from the Institute for Supply Management, only 21% of the enterprises they surveyed had maintained the required level of business continuity in the supply chain (Ambroziak, et al., 2020, p. 9). For over 75% of the entities, increasing resistance to disruptions of cargo flows within the supply chain and the reliability of these supplies were mentioned as priorities over the next three years.

This article focuses on disruptions that have appeared in supply chains and looks at how companies can adapt: in the context of preparing for unexpected events, responding to disruptions, and recovering from them by maintaining operational continuity at the desired level of links and control over the structure and function, treating resilience as its basic pillar. The purpose of the article is to describe supply chain disruptions and their links with enterprise resilience and to indicate how they impact enterprises in the long term. Theoretical considerations are supplemented by the results of empirical research conducted in the third quarter of 2022 in Geis Global Logistics (based in Sosnowiec-Pieńki near Stryków) by answering the following research questions:

- What problems/challenges did Geis face due to the pandemic and geopolitical crisis?
- Did global supply chain disruptions create new development opportunities for the company? If so, how have they been used?
- What long-term logistics and supply chain actions are crucial for maintaining Geis's competitiveness in a turbulent environment?

The article has a theoretical and empirical character.

Literature review

Supply chain disruptions

Research on supply chain disruptions continues to generate new areas of theoretical and practical research (Bukowska-Piestrzyńska et al., 2022)¹. The context varies depending on the situation, the complexity of the supply chain, the industry, the area and scope of the impact and people's perception while deepening the understanding of disruptions. Analysis of the literature on supply chain disruptions allows us to conclude that it is difficult to define unambiguously, and there is no single universal interpretation. This is largely due to the diversity of research directions in which the essence of this concept is analysed. Some authors, including Macdonald, Craighead and Hopp, restricted their definition of a supply chain disruption to the assessment of the efficiency of physical flows. Meanwhile, Paulsson pointed to the probability of a negative event destabilising the supply chain. Handfield, McCormack, Melnyk, Rodrigues and Ragatz noted the bottlenecks and uncertainty of achieving goals (Konecka, Romanow, Stajniak, 2019, pp. 13-16).

Finally, Ivanov and Sokolov described disturbances through the prism of 4 levels of disturbances, i.e., the disturbance of one process (a critical situation), several processes (a dangerous situation), more processes (plan disruption) and disturbance of most processes (catastrophic situation).

A review of the literature on identifying the main features that characterise supply chain disruptions shows that the causes and the scope of their impact are a generalization of the described approaches. Sources of interference, e.g., as described by Ivanov, Sokolov and Kaeschel (2010, p. 411), can be treated as the basis for the division into internal and external disturbances. In the last decade, changes in the market environment, functioning in conditions of extreme natural events, and changes in the execution environment of individual activities were the main sources of supply chain disruption for 76.6% of enterprises (Supply Chain, 2023, p. 11). The most common and significant disruptions today, broken down by level of predictability and impact, are presented in Figure 1.

Recent events, such as the COVID-19 pandemic and Russia's renewed invasion of Ukraine, have clearly shown that a disruption in production in one corner of the world can deprive the entire supply chain of essential resources (Manuj, Mentzer, 2008). This is because the increasing number of global interconnections and interdependencies since the 1980s has made it extremely difficult to build resilience by providing alternative production sites throughout the supply chain. Multi-layer manufacturing networks were designed with efficiency, cost, and proximity to markets in mind, not transparency or resiliency (Sharma, Ghosh, Saha, 2020). These entities now operate in a world where disruptions happen regularly. At the same time, as Rutkowski (2015, p. 95) points out, internal disruptions in the supply chain have lost their importance, while the threat of external disruptions has increased disproportionately. This is evidenced by the results of annual reports published by The Business Continuity Institute, the World Bank and the McKinsey Global Institute.

The risk of disruption can be analysed through the prism of unforeseen events that disrupt the continuity of processes in the supply chain (Craighead, Blackhurst, Rungtusanatham, Handfield, 2007). The McKinsey Global Institute (2020) report shows that a significant disruption to supply chains lasting a month or more occurs, on average,

¹ The theoretical part of the article is part of research entitled "Adaptiveness of supply chains in the modern economy. Study on the example of medicinal products and medical devices",

conducted at the Department of Logistics and Innovation at the Faculty of Economics and Sociology of the University of Lodz.

every 3.7 years (Risk, resilience, 2020); shorter disruptions happen even more often. Since 2020, enterprises have struggled to quickly respond to increasingly serious threats and restore their operations to a stable, reliable state. Most faced challenges in all aspects of their business, including shortages of parts and critical materials (75%), delayed deliveries and longer lead times (74%),

difficulties adjusting capacity to respond to fluctuations in demand (69%), and problems with planning for fluctuating levels of customer demand (68%) (Fast forward, 2020, p. 4). At the same time, supply chain disruptions cost the average company 45% of its annual profits over a decade (Alicke, Luchtenberg, 2023).

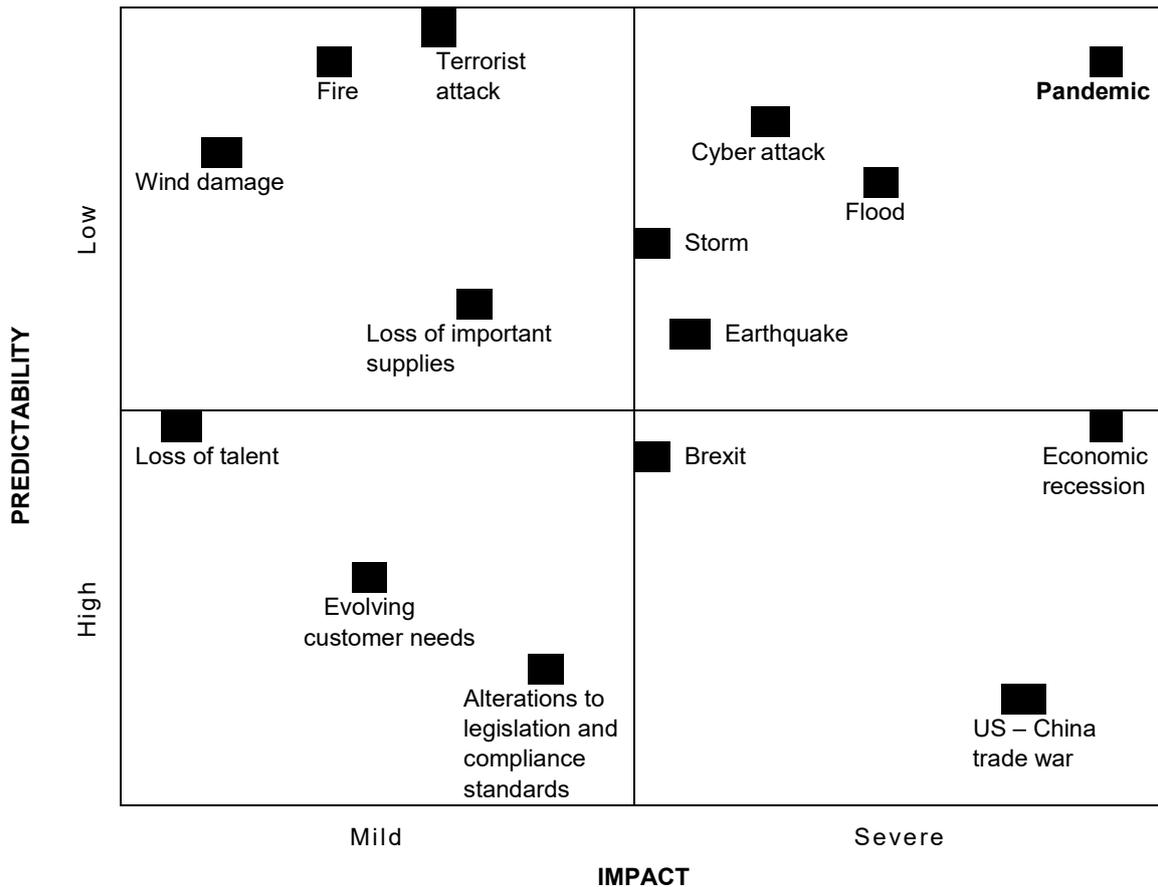


Figure 1. Supply chain disruptions categorised by level of predictability and impact

Source: based on Supply chain resilience report 2023. Industry trends and supply chain strategy for manufacturing, 3D Hubs, 2023, p. 10.

Resilience as a determinant of enterprise adaptability

Supply chain resilience does not mean the ability to overcome the difficulties that arise from unforeseen phenomena and events once. It should be treated as a continuous process of anticipating threats to business continuity or maintaining the current ability to operate. This means improving the supply chain's processes, procedures and structures that determine its adaptability (Azevedo, et al., 2013).

The concept of supply chain resilience, both in organizational and systemic terms, has been of

interest to academics and businesspeople for over three decades. The first extensive research into the origins of supply chain resilience was conducted in the UK in response to the disruption of flows in transport processes caused by the fuel protests in 2000 and the outbreak of foot-and-mouth disease in early 2001. Researchers from the University of Cranfield formulated key conclusions for shaping the concept of supply chain resilience (Creating Resilient, 2003). They concluded that the vulnerability of the supply chain to disruptions is an important issue. However, there is little research in this area, and awareness of the importance of this issue is low, which indicates the need to

develop a methodology for managing supply chain vulnerability.

Researchers from the Massachusetts Institute of Technology, who analysed numerous case studies, showed a direct relationship between the risk of disruption and enriching the management strategy with features such as flexibility, redundancy, security, and cooperation (Svensson, 2004). They demonstrated that disruptions can also be an unexpected source of success. According to Knemeyer, Corsi and Murphy (2003), preventing disruptions in the supply chain from amplifying means modeling cooperation between entities, and it can be an opportunity to gain customer trust and maintain their loyalty. According to Rice Jr. and Caniato (2003), the ability to effectively return to the state before the disruption and adapt to new market conditions can strengthen a company's competitive advantage. The need to survive in the face of disruptions and the ability to further develop was noted in foreign and domestic literature on shaping the concept of supply chain resilience. As pointed out by Boin, Kelle and Whybark and Sheffi (2010), a resilient supply chain is focused on aligning strategies and operations to avoid or mitigate disruptions (if they occur). Meanwhile, Rice Jr and Caniato (2003, p. 25) defined supply chain resilience as the ability to recover quickly from a disruption. A broader understanding of immunity was presented by Pettit, Fiksel and Croxton (2010, p. 17). They referred not only to returning to the state before the disturbance, but also to the ability to learn and transition to a new state. They stated that resilience is necessary for a supply chain to survive in the short term, but it also ensures the ability to adapt to change and grow in the long term. Brandon-Jones, Squire, Autry and Petersen (Ali, Mahfouz & Arisha, 2017, p. 18) pointed out that immunity consists of two critical but complementary components of the system: the capacity to resist and the capacity to regenerate. They defined resilience as the ability of a supply chain to both resist disruptions and recover from them. They argued that understanding the concept of resilience and where to invest in resilience will shape supply chains that respond quickly and recover from costly disruptions.

Resilience is now becoming a supply chain property that managers can shape and influence with the right investments. Assuming that the ability to resist is the first step in the company's adaptability to changing conditions, and the next step is the ability to rebuild the system, one can wonder how much Geis Global Logistics – one of the leading entities in the Transport Forwarding Logistics (TFL) industry – adapted to the change caused by

the COVID-19 pandemic and the war in Ukraine and then made decisions to allow for market-appropriate activities. Resilience should be seen as a derived property of the system. That is, it is the result of investments made by the enterprise over time, not a "free" benefit of existence (Macdonald, et al., 2017).

Geis Global Logistics in the face of changes in supply chains caused by the COVID-19 pandemic and the war in Ukraine – the empirical aspect

Methodology and theoretical basis

Enterprises in the TFL industry are highly exposed to the effects of any economic threats. A poor economic situation has a quick and often devastating impact on companies from the forwarding and logistics industry because, as providers of specific types of services, they are directly dependent on the turnover generated by customers. Disrupted supply chains or lower demand for individual products also reduce the demand for transport services, which is why it is difficult to talk about positive effects from the perspective of global supply chain disruptions (Craighead, Ketchen Jr., Darby, 2020). Assuming that more than half of Polish companies experienced problems due to supply chain disruption, this undoubtedly means a significant decrease in sales of a given product, and a decrease in sales means fewer deliveries to end users. When, during the pandemic, there was a problem with the supply of semiconductors necessary for the production of individual car parts, the automotive industry experienced a huge crisis. At the same time, transport companies, which had mostly customers from the automotive industry in their portfolios, experienced a significant decrease in executed orders (Rogers, et al., 2022). When there is reduced demand for specific products, it is possible to simultaneously increase demand for contract logistics or warehousing services if a batch of goods has been produced, but the manufacturer has not yet found a buyer. However, in the long-term, the possible development of domestic suppliers of individual products, and thus an increase in demand for domestic or European transport and logistics services, is positive (Dube, Li, Selviaridis, Jahre, 2022).

COVID-19, the war in Ukraine, and, consequently, interrupted supply chains are external factors that destabilised the economy. However, in 2020, the transport industry also suffered from significant shortages of drivers. According to analysts, Poland lacked over 100,000 drivers (Transport drogowy w Polsce 2021+, 2022, p. 88). Market requirements,

on the one hand, and destabilizing factors on the other, such as unfavorable legislation, pandemics, or wars, make managing operations in a TFL company a process of continuous improvement.

Supply chain disruptions and consumer uncertainty caused by COVID-19 also had a major impact on fluctuations in the amount of goods handled by the TFL industry. While there was a noticeable decrease in the international exchange of goods, the e-commerce market saw dynamic growth. One of the most difficult operational elements in logistics companies is finding the “golden mean” between ensuring a high-quality service and the level of cost-effectiveness, which is even more complicated when there is market instability. Using a case-study approach, we examine how Geis operated in these conditions. The entity has been operating in Poland since July 1, 2013. It is a logistics operator that provides pallet transport and individual transport, full truckload transport, sea and air transport, contract logistics, and packaging development, production and delivery. It has a network of 21 field branches in Poland, guaranteeing efficient deliveries of goods. In 2021, it delivered almost two million parcels, with drivers traveling approx. 60 million km.

In order to determine what problems arose in the company as a result of COVID-19 and the war in Ukraine and how they impacted the way Geis functions (in the context of resilience) in the third quarter of 2022, a two-stage study was conducted.

The first stage, based on the literature on the subject and personal observations, served to identify key factors, i.e., problems/challenges resulting from the pandemic and the geopolitical crisis faced by TFL companies; it was the basis for implementing the second stage.

The second stage, related to studying Geis, focused on assigning weights² to the factors that disrupted Geis' supply chains and determining whether (and how) they created opportunities to develop the company (now and in the long term).

The practical side of the study was manifested in answering the following research questions:

- What problems/challenges did Geis face due to the pandemic and geopolitical crisis?
- Did global supply chain disruptions create new development opportunities for the company? (if so, how were they used?)
- What long-term logistics and supply chain activities are crucial for maintaining Geis's competitiveness in a turbulent environment?

Primary research was conducted through a combination of indirect survey methods and in-depth direct interviews with the management staff responsible for operational activities in Geis. The indirect survey utilised a questionnaire presented as a table, and it contained detailed closed questions, with answers given on a 5-point Likert-like scale. This made it possible to omit the neutral point in the answers and obtain more precise answers. Due to the short measurement period and the inability to determine quantitative relationships and build an algorithm, the study used a qualitative approach, looking for interdependence and consistency between the undertaken and planned activities and building resilience in Geis.

Results and discussion

The answers to the first research question characterise the crises in which Geis operated. The list (Table 1) includes four items with the highest level of significance of activities related to COVID-19 and the war in Ukraine. The main problems (weighted 5) that resulted from the pandemic and the geopolitical crisis included information chaos and increased transport and warehouse service costs. At the same time, the dynamic development of the e-commerce market was a positive sign of the company's activity during the disruption, despite the operational challenges related to order fulfillment. The study confirmed that reliable information, which is the most important resource in the 21st century, makes it possible to function more effectively, introduce appropriate changes, or adapt to emerging challenges in advance, and not act mainly reactively, responding to events that have occurred. The observed dependencies between Geis's cost structure and the situation in the fuel and energy market indicate that the TFL industry is highly sensitive in terms of rising prices of raw materials. As transport costs have the largest share in Geis's total costs, higher fuel prices generate higher fuel adjustment allowances for carriers. Generally speaking, an increase in fuel prices increases the prices of virtually all products. Thus, there is an increase in total maintenance costs and, consequently, a decrease in profits. At the same time, the benefits associated with the development of the e-commerce market were noted. For the TFL industry, which is represented by Geis, the development of this market is one of the key factors in the growth of demand for logistics services.

² The importance of a given issue was rated from 1 (not very important) to 5 (key).

Table 1. Assessment of the significance of Geis Global Logistics' problems related to the COVID-19 pandemic and the war in Ukraine

Scales	Factor	Effect	
		Type	Direction
5	Information chaos (disruptions in the flow of information, inconsistency of information, lack of information, etc.)	D	↓
	Increase in transport costs (increase in fuel and energy prices, alternative delivery routes, reduced port capacity, increase in freight prices, mobility package, etc.)	D	↓ _c
	Increase in storage costs (increase in fuel, energy and tax prices)	D	↓
	Development of the e-commerce market	D	↑
4	Fast-changing regulations (legislative instability in logistics operations)	I	↓
	Problems with human and social capital (social (employee outflow, remote work, social relations, etc.)	D	↓
	Rising prices of raw materials and materials	P	↓
3	There are no products on the market	I & D	↓
	Extended delivery times for individual product groups	I	↓
2 & 1	Increase in packaging costs	I	↓
	Timeliness of order processing	D	↑
	Problems with inventory management and their consequences	D	↓
	Claims for late deliveries	D	↓

Legend: D – direct impact; I – indirect impact; Scales: 5 – very important; 4 – important; 3 – medium importance; 2 – not important; 1 – not relevant.

Source: own elaboration based on the results of the study.

The following were considered important; but of slightly less importance (weighted 4): rapidly changing regulations, problems with human and social capital, and an increase in the prices of raw materials and materials resulting in a decrease in Geis's margins. Experts responsible for managing logistics operations agreed with the statement that "only change is certain". However, the company would expect these changes not to be additionally stimulated by often incomprehensible regulations (sometimes created without any logical justifications), which may have a direct negative impact on the functioning of the TFL market and industry. At the same time, this industry has been struggling with employee availability for several years. This problem mainly concerns employees in warehouses. The war in Ukraine has further magnified the scale of the phenomenon, as it led to the outflow of labour and reduced access to foreign workers. On the other hand, remote work, e.g., videoconferencing, makes it possible to perform some tasks without incurring costs.

Factors of medium importance (weighted 3) included the lack of products on the market and extended delivery times for individual product groups. The former affected the company both directly and indirectly, stimulating disruptions in the functioning of supply chains. The study shows that as a shipping company, Geis Global Logistics is not directly affected by the lack of specific products on the market. However, the lack of products in some

branches of the economy means reduced production or no production at all, and thus a reduced demand for logistics services. The immediate problem was and may still be the lack of availability of operational materials, e.g., foil and pallets. The comparative analysis showed that there are similarities between the extended delivery times of individual product groups and a company's portfolio. In the case of a large number of customers, e.g., from the automotive industry, disrupted deliveries have a very negative impact on the demand for transport services, and thus on revenues of a given company. However, this factor did not directly affect Geis since, as a logistics company, it ensures the continuity of the supply chain if a given product is available.

Phenomena of little or no importance (weighted 2 and 1) include increased packaging costs, timely handling of orders, problems with inventory management and their consequences, and claims for late deliveries.

The identified problems in the functioning of Geis' supply chains made it possible to formalise the classification of practices in terms of the ability to act in a crisis (Table 2). The second question, on the resilience and adaptability of supply chains, focused on finding out the following:

- Did disruptions in global supply chains create new development opportunities for Geis?
- If so, how have they been used?

Table 2. Characteristics of Geis Global Logistics practices in crisis situations

Scales	Investment strategies	Strengthening existing practices/relationships	Investing in new practices/relationships
5	Flexibility of activities	Increased flexibility, especially in logistics operations.	Customer diversification.
4	Speed of decision-making Effectiveness of actions	Improving the speed of information flow in the supply chain. Increased effectiveness of activities through remote work. Efficient and efficient contract logistics and warehousing. Strengthening cooperation between current partners.	Offering new services based on experience/expert intuition. Implementation of new communication technologies. Support for technological innovations. Building relationships with new partners.
3	Diversification of activities	Improving order handling in B2C models. Development of transport processes.	Entering new markets of activity. Extending the offer / new services for e-commerce.
2 & 1	Supply chain design	Reorganisation of routes, types of transport, and organisation of transport processes. Improving inventory management. Use of substitutes for complex/unique solutions.	Implementing innovative transport packaging. Diversifying supply sources. Selecting new regional and local suppliers. New inventory management solutions.

Legend: weights as in Table 1.

Source: own study based on the results of the survey.

Geis developed its ability to cope with crises by strengthening existing practices and investing in new relationships and activities. Taking into account resource constraints and competition factors, as well as the unique nature of the company's activities, the increased flexibility of activities was indicated as the main investment strategy (weighted 5). In general, the TFL industry is exposed to disturbances – both from the demand and supply side. Responding quickly to disruptions, flexibility, and adapting to conditions, especially in operations, are critical. The problems resulting from COVID-19 forced the company to focus more on customer diversification to function more effectively in crises.

Faster decision-making and more effective actions were considered important investment strategies (weighted 4). The actions taken by Geis show that the sooner a company adapts to a crisis, the less likely it is to incur losses. At the same time, the importance of expert experience/intuition was emphasised because decisions made and changes implemented stay with the company for some time and affect how it operates. The resilience and adaptability of logistics operations were also improved by increasing the effectiveness of remote working and warehouse processes. The study shows that remote work continues as a legacy of the pandemic; additionally, in the era of the energy crisis, it is one of the ways to reduce operating costs. Technological development also allows for

the effective implementation of some operational tasks in the sphere of warehouse processes. Reduced demand for certain products, resulting from the economic downturn, often requires companies to use warehousing services to a greater extent than before. Effective contract logistics and warehousing are the answer to changes in the market.

Given the importance of supply chain problems faced by TFL companies on a daily basis, the study identified two investment strategies considered to be of medium or low importance in a crisis. The average level of importance (weighted 3) was assigned to the diversification of activities, while activities related to the design of the supply chain were considered to be of little or no importance. Geis's experience shows that entering new markets, e-commerce development, and above all, the increase in B2C deliveries means that services must be effectively distributed. At the same time, B2C models that are more difficult to use may be less susceptible to market disruptions, such as a pandemic. The study also confirmed that a number of activities related to supply chain design, e.g., route reorganisation, implementing innovative transport packaging, or diversifying supply sources, are always present and cannot be associated only with a pandemic or war. In operational activities, companies should constantly strive for optimisation (and not only during a crisis), but also consider external conditions, e.g., the structure of customers or shipments.

In addition to exploring the influence of various factors that disrupt the smooth functioning of supply chains, an extended inquiry was conducted to ascertain their significance in shaping Geis's strategic decisions regarding logistics and supply chains. The answers indicate that building supply chain resilience is generated through implementing many different types of investments. Of these, internal proactive practices prevail, which do not require the active involvement of stakeholders (Table 3). They include process practices, such as continuously researching the supply market,

risk-oriented audits and monitoring cooperation models, and designing services based on the flexibility, efficiency and effectiveness of activities. Internal practices are less costly and easier to implement than external practices aimed at creating risk-sharing mechanisms and sharing information with key stakeholders in the supply chain. At the same time, the practices favoured by Geis foster supply chain resilience. They are characterised by the ability to minimise disruptions, respond to changes, and facilitate recovery if necessary.

Table 3. Strategies of Geis Global Logistics activities and their impact on the possibilities of shaping the resilience of the supply chain

Type	Scales	Operation	Pillars of shaping immunity		
			Absorption	Response	Reconstruction
Internal practices	5	Implementing new business models	xx	xx	x
		Focus on last mile logistics	xx	xx	x
		Implementing risk management procedures	xx	xx	xx
		Developing monitoring tools based on risk analysis criteria	xx	xx	xx
	4	Implementing storage process innovations	xx	xx	x
	3	Implementing transport process innovations	xx	xx	x
		Taking into account the principles of the circular economy	xx	x	x
		Implementing order handling innovations	xx	xx	x
		Improving the security of supply chains	xx	xx	x
		Developing "risk maps"	xx	xx	xx
2 & 1	Appointing crisis teams	xx	xx	xx	
	Implementing packaging and package processing innovations	xx	xx	x	
External practices	2 & 1	Increasing inventory	xx	xx	x
		Taking into account the principles of the economy / shared logistics	xx	xx	x
		Implementing new communication strategies with suppliers	xx	xx	xx
		Sharing knowledge in the development of supply chain mapping	xx	xx	xx

Legend: Weights as in Table 1; Effect: x – impact; xx – enhanced impact.

Source: own elaboration based on the results of the study.

Recognising that disruptions are a permanent feature of supply chains in the TFL industry, Geis invested in action strategies that focused on absorbing disruptions and quickly responding to changes. At the same time, risk management practices strengthen recovery capacities.

In Geis, implementing new business models and risk management tools and procedures and focusing on last mile logistics were key (weighted 5) to maintaining the competitiveness of enterprises in a turbulent environment. The challenge is to choose business models (B2B and/or B2C), and to define the appropriate stakeholder structure

(industry, types of commodity markets) and price negotiation procedures. At the same time, in taking responsibility for the services provided, the company focuses on improving transport processes, including last mile deliveries. Designing a framework for resilient supply chains prioritised risk management practices, which are seen as the dynamic ability to rebuild supply chains after disruptions.

As the company strives to strengthen the resilience of its supply chains, an important role (weighted 4) was assigned to warehousing innovations. Implementing new systems that make warehousing easier, safer, and faster is key to providing

high-quality services to Geis's customers. Customers must know in real time what is happening with their goods and be sure that they are safe.

Subsequently, several actions were indicated that may help to improve immunity. Transport innovations were considered to be of medium importance (weighted 3). Innovations are being implemented in every branch of the economy, and it is no different in transport. Although it seems that the TFL industry is not as susceptible to new technologies as production, for example, innovation also means automatic planning and settling transport, which is constantly being improved by Geis. Another example of improving supply chain resilience is the establishment of crisis teams that can react quickly and make decisions. Such teams should include the most competent people from the relevant departments of the company.

Factors of little importance (weighted 1 and 2) included implementing new communication strategies with suppliers, developing supply chain maps that present the structure of connections (geographical, financial, logistic), and considering the principles of the shared economy. According to Geis, it is difficult to talk about a shared economy in the TFL industry. The only possibility is to share services, e.g., combining individual transports to minimise empty runs.

The TFL industry, referred to as the "blood of the economy", is susceptible to all kinds of factors that shape the economy. The state of this industry largely reflects a country's economic situation. This is especially true in Poland, where transport is a key sector of the economy. In logistics and transport operations, the key to success is having a flexible approach to the conditions in which the enterprise operates. Adapting quickly to a situation often determines the continued success of the organisation.

Since the outbreak of COVID-19, logistics and supply chains have faced new disruptions on an unprecedented scale. In order to survive and be competitive, enterprises should learn from the last three years. At Geis, responses to disruptions were carefully analysed in order to minimise the effects of negative stimuli in the future. They realised the importance of crisis management, quick response to changes, as well as making and, above all, implementing the right decisions. The experience gained over the last three years has shown how important it is to respond flexibly to changes and diversify activities from the point of view of maintaining the relative stability of the organisation.

The period from the outbreak of COVID-19, i.e., the beginning of 2020, can be described in one word: uncertainty. Constant changes in legislation and the opening and closing of the economy are not conducive to running a business, which is why the ability to react quickly, effectively, and efficiently to changes is extremely important. A flexible approach to managing an organisation is crucial in today's uncertain times. Quickly making difficult decisions and implementing them can now determine a company's competitiveness. A diverse portfolio of clients and servicing various industries that are susceptible to external factors to varying degrees can limit the effects of the unpredictable events that we have been dealing with over the last three years.

The period of the COVID-19 pandemic and the related restrictions on running a business resulted in a significant change in the structure of deliveries between B2C and B2B in favour of a significant increase in deliveries of goods to private recipients. Of course, deliveries to companies are easier to make, but as the pandemic showed, the diversification of shipments between B2B and B2C was also of great importance. By diversifying their focus beyond just the turnover of goods between companies, organisations can mitigate the risk of significant decreases in turnover. This is particularly crucial when considering industries that heavily rely on specific services, as they are more vulnerable to the effects of pandemic restrictions. Ignoring this reality could potentially create a recipe for a crisis within the company.

Conclusions

This article has indicated the actions that were taken by Geis Global Logistics, an entity of the TFL industry, to make its supply chains resistant to potential crises and perturbations and give them the ability to adapt. In our view, this is a particularly important issue because resilient supply chains are complex adaptive systems. Such supply chains can emerge unscathed from a market threat, navigate a period of unfavorable socio-economic phenomena, quickly rebuild their potential and – often strengthened – return to the market to compete for the client. Disruptions in Geis' supply chains that resulted from the COVID-19 pandemic and the war in Ukraine have helped to make their operations more flexible and allowed them to activate mechanisms that create resilience. Consequently, they created an adaptive operational strategy.

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