



SMART „PLAN B” – IN FACE WITH DISRUPTION OF SUPPLY CHAINS IN 2020

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ABSTRACT. Background: Competitive supply chain management is the ability not only to take corrective actions against the risk occurred, but above all prevents such a situation on a daily basis. Risk management is permanent element of management abilities and one of the most important factor impacting on supply chain resilience. Today managers have access to many tools, i.e. digital technologies, supporting the development of contingency plans (Plan B) for risk mitigation. The aim of the paper is to identify supply chain resilience in terms of risk management during the beginning of the COVID-19/SARS-CoV-2 pandemic spread in 2020. The most important factors impacting on supply chain flows stability are pointed here together with the assessment of their preparation for these flows disruption.

Methods: The theoretical background is based on the literature review on disruption of supply chain management in general. The In-depth individual interview (IDI) method supported with questionnaire was used to conduct research among managers responsible for supply chain operations within the enterprises from the production, trade and services sectors in Poland. Opinions and a number of views on the impact of the coronavirus pandemic on business operations and supply chain management were obtained and analyzed. The survey was conducted in March 2020.

Results: The results obtained show that the first phase of pandemic spread unexpectedly strongly and impacted on disruption in the supply chains. Closed borders, sanitary and administrative restrictions have led to transport delays, additionally the lower number of orders was noted causing many disruptions in the further flow of the goods. Surprisingly the disruption happened even when managers synergistically cooperate and share information among partners.

Conclusions: Results of the research pointed out the critical problem with the lack of “Plan B” helping supply chains quickly react on disruptions occurring in the flows. Also managing risk based on the current way of sharing information is insufficient. Features of digital technologies and digitalization are currently one of the most important solution that might help to build smart “Plan B” for risk mitigation and supply chain competitiveness improvement.

Key words: supply chain risk management, COVID-19/SARS-CoV-2 impact on supply chain, digital technologies in risk mitigation.

INTRODUCTION

Risk management is a key aspect for competency improvement in managing flows within the supply chains. It results in abilities for overcoming disturbances and maintaining stability in business operations. One of the most significant tests for assessing the resilience of supply chains are events that occur in a macroeconomic environment that are difficult to predict [Pérez-González, et al., 2019]. They trigger immediate activities of the

organization that protect it against the uncertainty and negative effects of the emerging risk [Vilko, et al. 2014]. These activities helping to develop so-called “Plan B” impact not only to survive period of crisis, but also they leverage supply chain competitive position during that time and in the further perspective. The ability to manage supply chain risk during a pandemic is subject of a unique test.

Introduced in Poland in mid-March 2020, in connection with the COVID-19/SARS-CoV-2

pandemic, restrictions on population mobility and on gastronomy, entertainment, shops and shopping malls (excluding some outlets), forced changes in consumer behavior and triggered a number of changes in supply chains. The lens-like pandemic phenomenon has shown that demand problems in supply chains are a threat to the functioning of not only the links directly serving final consumers, but also for thousands of companies in the supply chain, among them especially small and medium-sized players who do not have a financial reserve that would allow them to survive the period of crisis [Cichosz, et al. 2020].

These changes show the two-stage process of entering a new phase of the supply chains' development or rather transformation. The first period, quite dynamic and dramatic, made managers aware of the effectiveness of implemented processes and the quality of procedures related to risk management in the event of a sudden change in the rules of market functioning. The second period allows them to diagnose the level of adaptability of the company and its supply chain to changes in the ability to perceive market opportunities. Both of them are the starting point for reviewing supply chain's strategy.

The “Plan B” means having the risk management strategy implemented and being ready to reconfigure resources to overcome uncertainty and mitigate risks. There are several ways helping supply chains in risk mitigation and one of them are the digital technologies that enables protecting supply chains against risks occurrence and its materialization. Therefore they can be base for creating value in the supply chain management. They are also currently one of the most important tools helping managers in sharing information on real-time basis [Nowicka, 2019] and so protect supply chain against risky situations.

However even when these conditions are met the real exam could only be passed when the risk materializes. The pandemic period shows strengths and weaknesses of the supply chains' risk management and mitigation [Poirier, et al. 2020]. It also learns how the

smart “Plan B” should be developed in the future.

LITERATURE REVIEW

The scope of literature analysis in the article is delimited to one year (2020) due to the period of global pandemic. Nevertheless, the problem raised in the article had many studies mainly in the area of considerations regarding Covid-19 and human health. It can be concluded that this has a direct impact on supply chain management in the era of pandemic risk. To develop the article, available databases such as Web of Science, Scopus, Emerald and Ebsco were analyzed. However, the review was performed using keywords – the most important was the combination of the words "supply chain risk management" and "COVID-19 / SARS-CoV-2 impact on supply chain". Due to the short period of analyzing the occurrence of a pandemic and its impact on the supply chain in the context of risk management, the feedback of query results is low. Both the Web of Science database and Scopus showed only one result in response to a query about the indicated keywords. This is a publication about the impact of a pandemic on global supply chains [Ivanov, 2020], also cited in further considerations. The Emerald and Ebsco databases also showed only one study, but the journal was not a scientific type. The mentioned combination of keywords also in Google Scholar does not give a satisfactory feedback. However, it is worth pointing out the scope of the literature that includes the keywords "COVID-19 / SARS-CoV-2". The Web of Science database shows 76 studies in 2020. They mainly concern the area of health and medicine [Ankarali et al. 2020, Ziegler et al. 2020]. For combinations of the words "COVID-19 / SARS-CoV-2" with the word "management" or "economy", the result is below 10 and there are still areas related to the social sphere [Volpert et al. 2020]. SCOPUS database finds much more literature items. In response to the keyword "COVID-19 / SARS-CoV-2" there are about 5,000 articles and other studies. Again, the vast majority of considerations concern health and social issues, but there are also items related to mathematical modeling [Tang, Wang, 2020] or the environment [Chakraborty, Maity, 2020].

The popular Google Scholar database also has a lot of feedback on articles related to Covid-19 - there are over 2,000. However, there are few studies on the problem considered in the article and (apart from one article already cited) one article on the food supply chain can be mentioned [Hobbs, 2020]. It is difficult to find a wide range of literature when less than one year is analyzed – the year of the pandemic. However, due to the fact that the article is empirical in nature, extensive analysis of literature from other areas has been excluded. At the same time, in some of the considerations regarding basic and broadly described issues, i.e. management, risk and supply chain, primary literature (older than the last 10 years) has been used.

GENERAL APPROACH TO RISK MANAGEMENT IN SUPPLY CHAINS

During the COVID-19/SARS-CoV-2 coronavirus pandemic, any supply chain management activity appears to be exposed to risk factors. Moreover, for obvious reasons, difficulties arise in estimating the effects of a global pandemic. From this perspective, it is difficult to talk about the possibility of verifying the effectiveness of management actions taken in the supply chain. This raises a number of threats in terms of maintaining business. The pandemic situation caused disturbances, which on the one hand limited the activity of enterprises, but on the other hand forced the companies to search for new solutions or adapt existing technical and technological possibilities not used in the enterprise so far. It should be assumed that the risk in a pandemic does not differ in terms of the general definition. It has a distinctly different but still predictable impact on the supply chain [Ivanow, 2020]. Pandemic is a source of risk. It is difficult to assess the effects, because threats and disruptions will be industry-specific [Stephany F, et al., 2020].

In general, risk should be considered through the prism of the supply chain itself but also from the perspective of the environment in which the supply chain and enterprises operate. The basic risk sharing is as follows [Kaczmarek, 2005]:

1. Macroeconomic risk - from the environment of the enterprise's operation.
2. Microeconomic risk - resulting from the business operations.
3. Risk of potential loss.
4. Speculative risk - related to the implementation of the plan.
5. Risks with a source in the environment have the greatest impact on management.

It becomes extremely important for supply chain managers to anticipate the future as a result of decisions and actions limiting the impact of risk factors on supply chain management. We are talking about the short and medium term. However, anticipating the future, forecasting phenomena and events is part of risk management but only when [Marzantowicz, 2019]:

- all factors are quantifiable,
- effects can be estimated,
- there is repeatability of reactions in the way decisions are made,
- there is appropriate instrumentation and competences to enable its proper use,
- one can encapsulate management processes or partially absorb external events.

In the event of incidental, unique and simply unpredictable phenomena, changes occur that affect the management process in a way that partially prevents making decisions based on a quantifiable set of effects. In this situation, one should talk about unpredictable factors creating conditions of uncertainty. Here, not only a set of factors is important, but also "... a set of effects that can create many options that make up the results portfolio ..." and that "... the effects of uncertainty create scenarios that can partly be subject to future forecasting ..." [Marzantowicz, 2017]. It should be stated that risk is the determinant of the effectiveness of the measures taken - so it results from uncertainty. However, from the perspective of supply chain management, the following systematic risk sharing can be distinguished (Table 1).

Table 1. Risk sharing in the supply chain

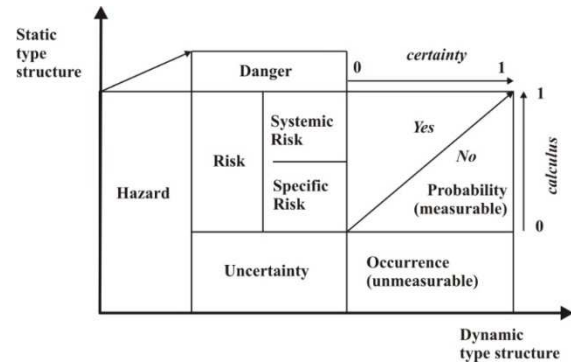
Risk of macroenvironment	Risk of an extended value chain	Operational risk	Functional risk (related to support processes)
<ul style="list-style-type: none"> - economic, - ecological, - social, - technology, - political. 	<ul style="list-style-type: none"> - purchases, resources, - logistics operators, - distribution links, - demand. 	<ul style="list-style-type: none"> - planning, design, - supply, purchases, - production, - distribution, - returns. 	<ul style="list-style-type: none"> - human resources, - information technology, - finance, - law.

Source: elaboration based on [Rutkowski, 2015]

For many reasons, risk management in a pandemic era becomes difficult due to uncertainty conditions. From this perspective, the key factor in the effectiveness of supply chain management is the ability to at least partially forecast the effects of a pandemic and the efficiency of ongoing response to interference.

ASSESSMENT OF THE IMPACT OF THE EMERGING CORONAVIRUS PANDEMIC RISKS ON SUPPLY CHAINS

Supply chains and logistics management are always accompanied by danger and hazard. However, any threat (hazard) is less reliable than danger. Although we can deal with it in case of risk – it is measurable, but we cannot talk about measurability in the case of uncertainty. According to E.W. Deming, it can be assumed that, depending on the extent of the impact, the general nature of risk is both systemic and specific. Systemic risk in its essence concerns the whole of society, and although it exerts a direct impact on individuals, it is independent of them, therefore it cannot be controlled by any single person. Only central institutions, such as parliament, government, central institutions, but only to a certain extent, may influence to the level of this risk with their administrative decisions. However, specific (individual) risk is associated with future events that one person can predict and partially control (reduce). The threat (hazard) carries the danger. But as long as there is a control measure, a security threat does not have to lead to actual danger [Toma, et al. 2012]. The probability of measurability increases when the risk changes from specific to systemic. Hence its level depends on individual decisions aimed at taking or abandoning future actions [Fig.1].



Source: own study

Fig. 1. Relationship between hazard, danger, risk and uncertainty

Coronavirus pandemic undoubtedly has diffusive nature, combining the above two types of risks. In addition, this combined nature highlights the critical role of social infrastructure (production workers, managers at various levels and the organizational structures in which they operate or manage) in the potential of supply chains. It also determines its logistics potential, which in essence is the ability of the logistics system (enterprise or supply chain) to do some work that requires the use of a certain resources and at a certain time. It is therefore the ability of the company's logistics forces to perform the maximum production of the logistics service in the required time. This time is the most often required time set by the customer and is a compromise between the time expected by him and declared by the system (responsible for compliance with time). However, this work is the sum of the work done for the needs of the logistics process, as well as for the system's own needs, so that it can do the first one. The deficit of the human factor involved in the supply chain and logistics process results in numerous limitations. At the same time, own potential can be considered in two dimensions, i.e. endogenous, as an enterprise / supply chain system (e.g. material, personal, financial and information resources) and exogenous (which

is primarily influenced by: the region, line and point infrastructure, local and national government administration).

The supply chain risks that occurred at the beginning of 2020 proved that any supply chain can be unconcerned to the risk associated with COVID-19/SARS-CoV-2, but also none of the risk levels can be voluntarily accepted. Therefore, it is no longer enough to focus solely on traditional business risk. The negative effects of a pandemic risk on other aspects of the supply chain should also be considered (especially social). Pandemic is definitely not a traditional source of risk [Ramelli, Wagner, 2020]. This risk has only negative associations with the following characteristics of the supply chains:

- they are not ready to take this risk voluntarily (they become hostage to the pandemic situation),
- they cannot remain indifferent to this risk because they are aware of it (subject to administrative restrictions),
- they do not have instruments (i.e. adequate technologies) for influencing the environment to minimize this risk.

This situation causes that the most resistant are those supply chains that are first of all reactive, because they are able to quickly introduce internal instruments that increase their resilience. Secondly, the shorter the supply chain, the more effective with introducing safe solutions for customers. Thirdly, the smarter the supply chain, the lower the possibility of making mistakes in the operational transmission of information, and the greater the potential for building smart "Plans B" in terms of their flexible configuration. The smartness of the supply chain could be reflected by usage of digital technologies helping to manage risk and prevent its negative impact on flows. This situation can be reflected on the changes in the fundamental requirements so-called The "Golden Logistics Triangle" – that can also represent supply chain priorities – and is shown in Table 2.

Table 2. Changes of logistics priorities within the “Gold Triangle Logistics”

	Regular priority	Pandemic priority
<i>Time</i>	The shortest	As possible
<i>Cost</i>	The lowest	Adequate
<i>Quality</i>	The best	The safest

Source: own study

CORONAVIRUS AS A SET OF FACTORS DISRUPTING SUPPLY CHAIN MANAGEMENT – MANAGERS ASSESSMENT OF THIS ISSUE’S SIGNIFICANCE

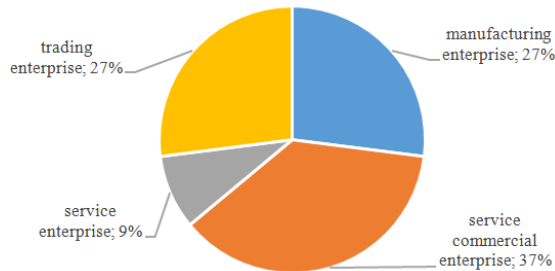
Research methodology and characteristics

The main advantage of qualitative research is the possibility of a better, more accurate understanding of a given phenomenon. Qualitative research allows finding the causes, views, effects and diversified interpretations of phenomena than just the number of phenomena occurring. In addition, thanks to the so-called a naïve attitude makes it easier for respondents and researchers to be open. It cannot be said for obvious reasons that qualitative research shows some superiority (they are better) over quantitative research because the method of selecting the type of research depends primarily on the nature of the phenomena studied, the hypothesis and the subject of the study. Among the many qualitative research methods are e.g. observations, interviews or the so-called desk research [Eisenhardt, Graebner, 2007].

In-depth individual interview (IDI) is a classic tool for qualitative research conducted on a small group of study participants. This tool is based mainly on the analysis of opinions respondents on a specific topic. The results obtained with the help of the IDI tool constitute a set of opinions and views creating a plane of reflection on the features, impact, impact strength and development directions of a given phenomenon.

The IDI method supported with questionnaire was used to conduct research among managers of Polish enterprises, obtaining opinions and a number of views on

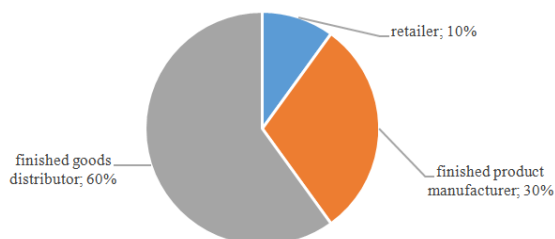
the impact of a coronavirus pandemic on the functioning of enterprises and supply chain management. The survey was conducted among enterprises from the production, trade and services sectors, as illustrated in Fig. 2.



Source: own elaboration based on the IDI study results

Fig. 2. Share of enterprises by sectors of activity

IDI interview, although by its very nature is a method whose results cannot be applied to the entire population, it also allows you to explore many sides of the problem. In this case, it was possible to analyze the opinions of supply chain managers from both the supply and demand side. The survey was attended by 11 managers of enterprises producing finished goods, distributing finished goods and retailers. Share by location in the supply chain is presented in Fig. 3.



Source: own elaboration based on the IDI study results

Fig. 3. Share of enterprises by place in the supply chain

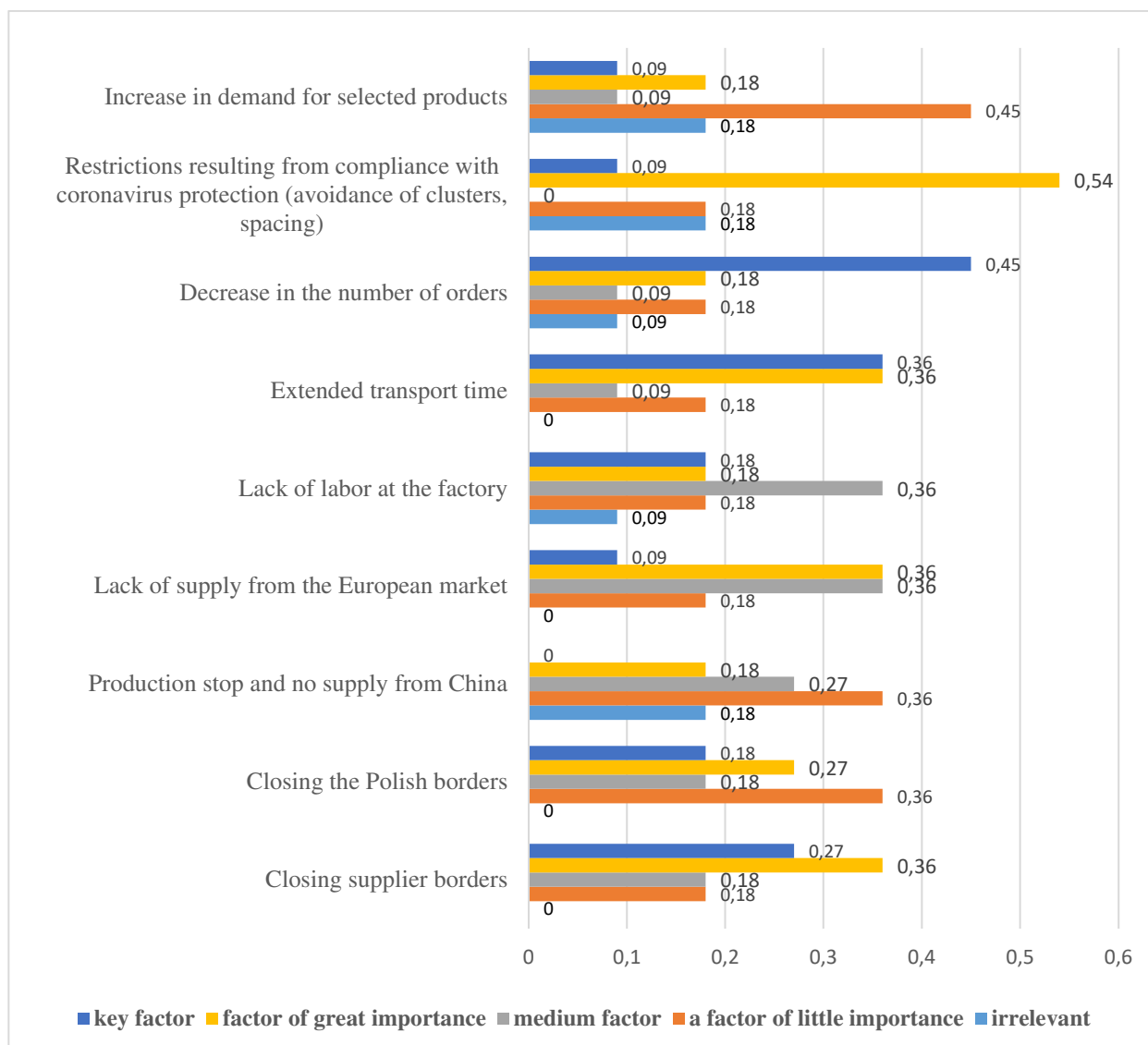
The research was conducted at the beginning of pandemic diffusion in March 2020 in Poland. The aim of this preliminary empirical study was to identify the most

important elements constituting the disturbance resulting from the COVID-19 pandemic, their impact on the supply chain flows, tools used for risk reduction and the reaction that disturbances would cause on further supply chain strategy and development.

Evaluation of the elements constituting the disturbance resulting from the COVID-19 pandemic

Restrictions in running a business, and thus hibernation in many sectors of the economy, have a definitely negative impact on the functioning of supply chains and their flows. One of the first topics subjected to in-depth IDI research was the identification of factors resulting from a coronavirus pandemic that have the greatest impact on the functioning of supply chains.

In the first part of the study managers were asked to assess factors with the greatest negative impact on their supply chains. The most important (key) factor was connected with restrictions resulting from compliance with coronavirus protection (avoidance of clusters, spacing) – more than half of respondents underlined this factor. The second factor was the decrease of the number of orders. Lower sales might be a reason of the restrictions that were put on the customers, i.e. avoidance of gathering (which was the factor of great importance for respondents). Managers underlined also the problem with extended transport time and lack of supply from the European market. All of the pointed problems are very important signals to revise current supply chain strategy in terms of prolonging Just-In-Time idea within the system and analyzing possibilities to configure supply chain based on local suppliers. Detail distribution of responses is shown of Fig. 4.



Source: own elaboration based on the IDI study results

Fig. 4. Factors impacting on the supply chain disruption due to COVID-19

The IDI study allows for a broader view of the coronavirus pandemic problem, therefore it is possible to identify additional factors negatively affecting supply chain flows. The following additional factors were pointed by respondents and should be considered individually:

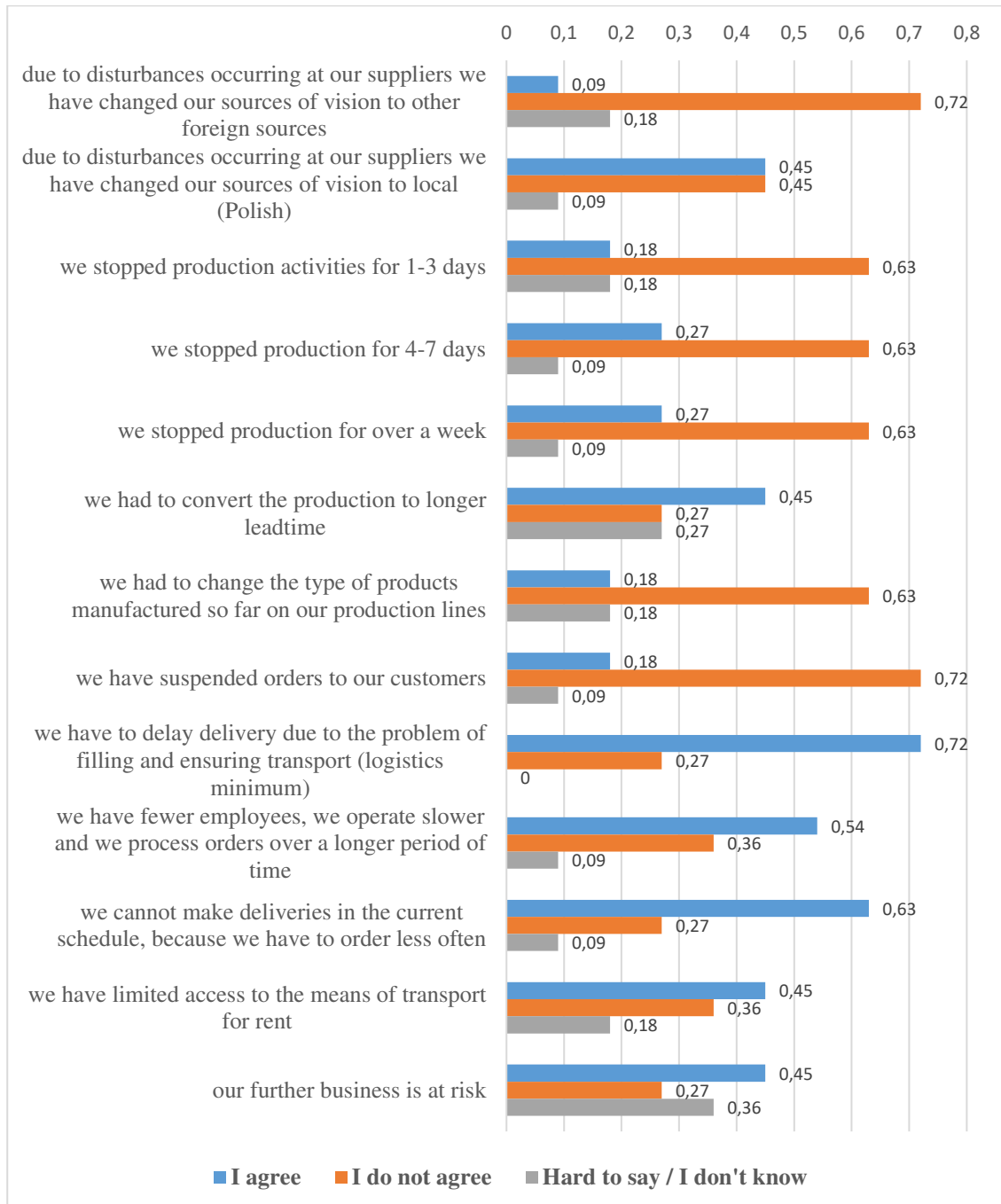
- closed borders and mandatory quarantine for people returning to the country makes it impossible to conduct trainings or receive scheduled deliveries of construction equipment directly from manufacturers, which in most cases is associated with traveling abroad,
- sudden increase in the prices of goods - semi-finished products and long waiting times for them,
- market uncertainty,
- customers' fear of purchasing and using services,
- closing factories in Germany, which resulted in stopping production,
- increase in orders, increase in demand for raw materials that suppliers are unable to deliver,
- extending customs clearance times,
- slowdown and reduction of profit,

- problem with finding a transport company, inability to schedule deliveries in advance.

Identifying factors negatively affecting the functioning of the supply chain from different perspectives (due to the diversity of study participants) allows one to identify how these factors are perceived from the perspective of the supply chain links.

Impact of the disruptions in the global flows on supply chains

Next, managers were asked to identify impact of the negative factors (disruptions) in the global flows on their supply chains. The biggest impact – that was underlined by 72% of respondents – occurred in delaying deliveries due to the problem of filling and ensuring transport (logistics minimum).



Source: own elaboration based on the IDI study results

Fig. 5. Impact of the disruptions in the global flows on supply chains

This situation presents kind of “Domino effect” as supplies in their supply chains were delayed too. The other reason for postponing the delivers – that was marked by 63% of respondents – was a decrease in the number of orders. Almost half of the surveyed managers agreed that the disturbances in the global flows caused lowering number of employees engaged, companies operated slower and processed orders over a longer period of time. To identify full range of possible effects managers were asked to complete the sentence: “Due to disturbances caused by the coronavirus pandemic...” Detailed answers are presented on the Fig. 5.

In addition to the most important answers, the study participants also pointed the following additional problems that enterprises have to face in the age of coronavirus:

- we do not carry out production activities, but we must extend the ordering and picking cycles due to lower frequency of deliveries and limitations in the number of employees (i.e. reduced workforce),
- lack of liquidity, withdrawal of investors,
- too high demand for products delivered to supermarkets, which causes shortage of some products and problems with their delivery,
- difficulties in finding drivers for some countries, or the obligation of a 14-day quarantine (e.g. Turkey),
- no protective measures available to the public.

Supply chain resistance to disruption

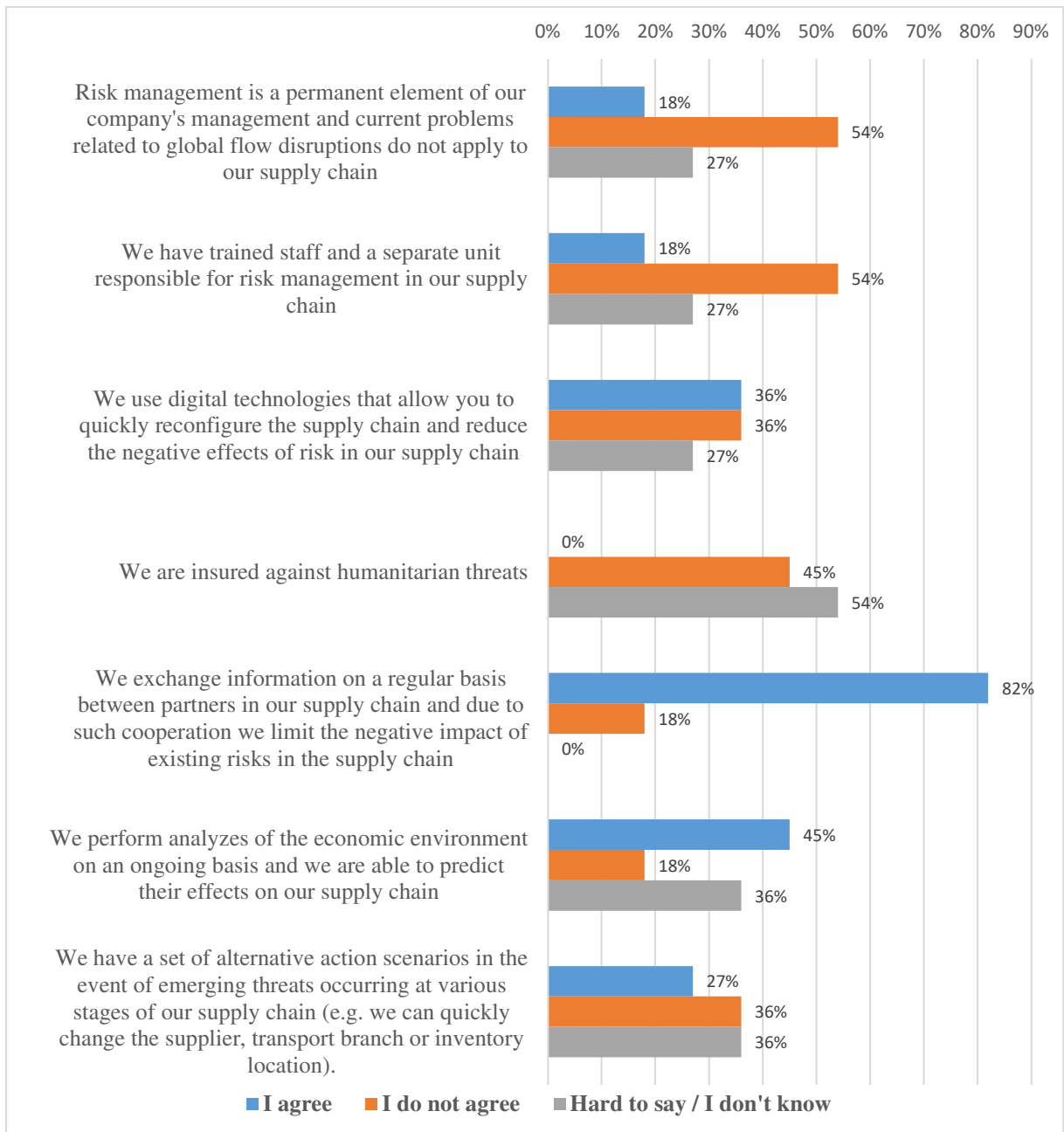
Modern enterprises compete not only in the area of activity, but competition occurs at the supply chain level. The challenge is to be able to operate in the supply chain in a way that ensures the highest efficiency. In the event of coronavirus disruptions, companies face the dilemma of maintaining efficient supply chain flows to sustain their operations. The IDI study allowed to determine how it shapes the level of supply chain resilience through the prism of the resistance of individual links in the supply

chain from the perspective of tools available to managers.

Therefore managers were asked for their approach to mitigate risk in the supply chain. Also it was important to diagnose, how (with what type of tools), the negative impact of disturbance on their supply chain was reduced. There were several different solutions predefined in terms of reducing uncertainty and risk in the supply chains. 82% of the respondents admitted that they exchanged information on a regular basis between partners and due to such cooperation they were able to limit the negative impact of existing risks in their supply chains.

Another interesting declaration was indicated by 45% of respondents – they pointed performing analyses of the economic environment on an ongoing basis and being able to predict their effects on our supply chain. Both of these statements implemented in business practice should serve to improve the security of flows in the supply chains and be a kind of alert for immediate implementation of "plan B". This alternative solution could help them to reduce the negative effects of risk occurred in the supply chains.

It should be underlined, that sharing information is one of the most important principles for developing competitive supply chains [Nowicka, 2018]. It is also a stable base for strengthening integration helping companies within supply chains to mitigate risk and reduce uncertainty. Currently, one of the most important resource for exchanging data and information among different stakeholders is digital technology [Nowicka 2019a]. Unfortunately, only 36% of respondents declared using digital technologies that allow them to quickly reconfigure the supply chain and reduce the negative effects of risk in their supply chains. Interestingly, many companies do not indicate having any form of insurance against the effects of a global pandemic directly affecting the company. All the responses are shown on Fig. 6.



Source: own elaboration based on the IDI study results

Fig. 6. Supply chain resilience to the disruptions in the global flows

Impact of the current disruptions to global flows on the supply chains future

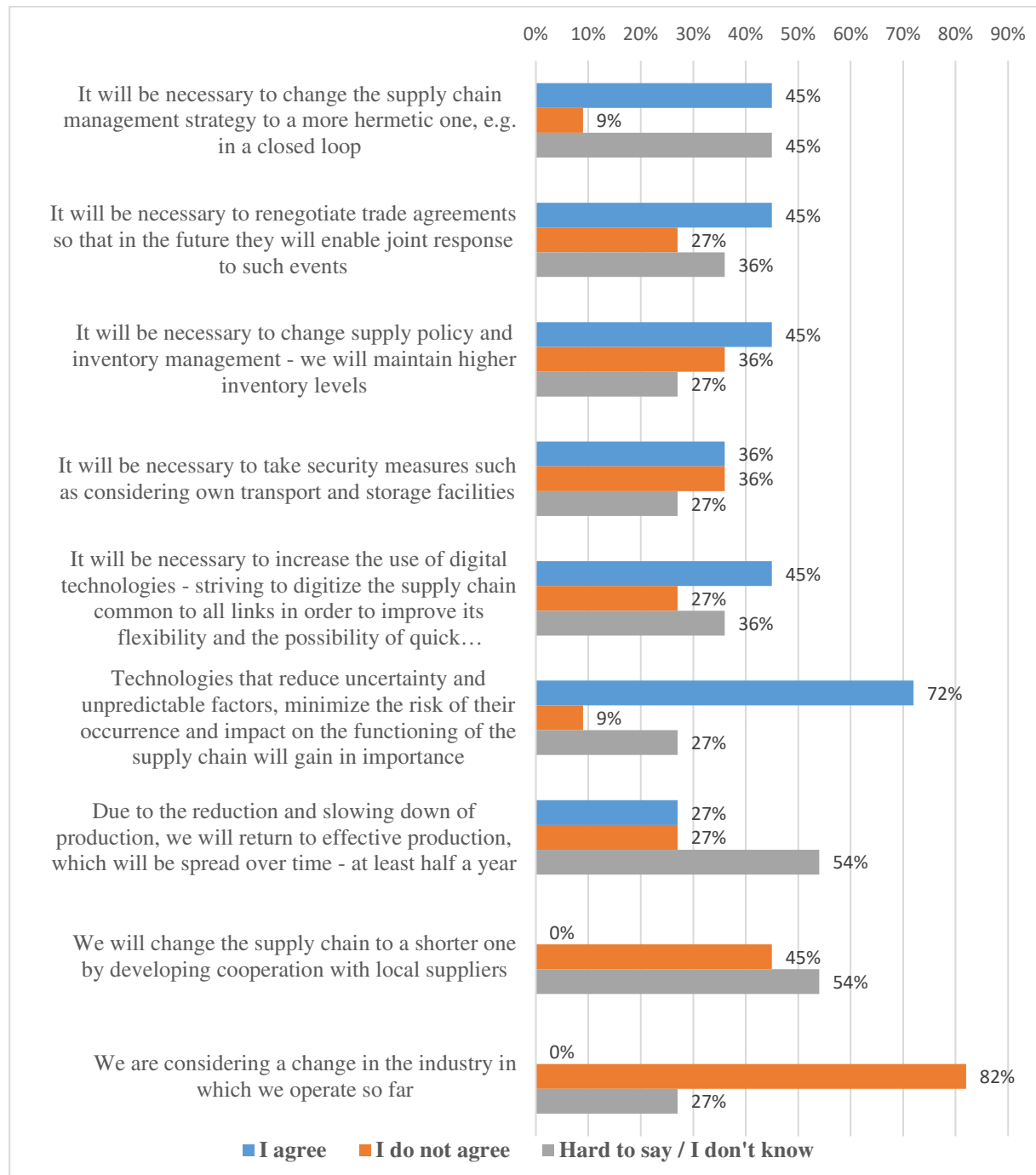
In a global pandemic situation, when global flows can be affected by unpredictable factors, changes occur in these flows in a way that can have long-term effects. It is possible to transfer

new solutions to long-term operations. It is significant to take account of humanitarian disruption risks in everyday operations. It is worth noting here that the return to activity at the desired level of efficiency will take place taking into account permanently new ways of

reacting managers to sudden volatility and disruption.

In the last part of the study respondents were asked how the current disruptions to global flows would affect the future of their supply chains. Based on the results of this part of the study, it can be concluded that long-term

effects may become one of the areas of activity, but these are not radical changes. First of all they admitted to stay in the industry they were currently operate in. Over 80% of managers strongly deny that a change of industry is necessary.



Source: own elaboration based on the IDI study results

Fig. 7. Impact of the disruptions in the global flows on the future of the supply chain management

Managers assume the development and implementation of technologies that reduce uncertainty and unpredictable factors, and minimize the risk of their occurrence and impact on the functioning of supply chains as a certain consequence, permanently remaining in the field of supply chain management as a result of a pandemic. More than 70% of surveyed managers pointed the role of technologies in their future operations. It is an important sign in the way of digitization or digital transformation that is expected to speed up due to COVID-19 pandemic. It is also an important solution that in the connection with previous declaration concerning the level of sharing information between partners might strongly impact on supply chain resilience. This is due to the fact that digital technologies are currently one of the best tools supporting sharing information [Frankowska, Nowicka, 2018] and warning of dangerous events, so building smart supply chains having smart Plan B enable for risk mitigation.

More detailed results concerning the aspect of future activities that would be undertaken by managers within the supply chain are presented on Fig. 7.

The level of compliance of the respondents' opinions with the questionnaires contained in the questionnaire was analyzed. First, it turned out that the COVID-19/SARS-CoV-2 pandemic had a strong impact on the supply chain network properties (maintenance of the logistics system). The pandemic changed the logistics process due to the problem of filling and ensuring transportation because of withdrawal of transport fleet by operators (necessity to achieve logistics minimum by suppliers). This contributed to the delays of deliveries (72% of consistent answers). There were also significant restrictions on the availability of materials and goods (with the current production schedule), which resulted in a forced change in the frequency of orders (orders are placed less frequently) - (63% of consistent answers). The potential for work has been reduced (the number of employees due to quarantine or holidays has been reduced), it caused the necessity to convert own production because of a longer lead time (45%) and, as

a result, a longer lead time for clients (54% consistent answers).

Secondly, it has been clearly pointed out that the supply chain network resilience depends on the responsibility for the ability and willingness to exchange tactical and operational information between all partners regularly, which allows to limit the negative impact of existing risks significantly (82% of consistent answers). Confirmation is the joint implementation of corrective and preventive actions (in order to increase the probability of assumed effects - 45% of consistent answers). Considering the above, the exchange of information throughout the entire supply chain network should not only support the efficient logistics process processes at the operational level, but also enable in the strategic dimension, e.g.:

- activation of the attitudes of first and second-order suppliers so that they also develop their "B" plans for the future
- jointly analyzing the shape and reviewing the supply chain network to make it more resistant to disruptions
- reviewing contracts with suppliers and customers to take into account the eventuality and level of occurrence of specific disruptions, which were overlooked as pandemic usually
- re-prioritization of strategic clients (and their full logistical protection)
- plan to rebuild the full logistics network and existing partnerships.

CONCLUSION

Uncertainty and risk are a permanent parts of the supply chain management aimed at eliminating or minimizing endo- and exogenous hazards. The most important is a macroeconomic risk as it strong impacts on all of the other types of risks occurring in the supply chain. It is even more danger when analyzing international or global flows and its spread on different markets. Therefore adequate risk management enables supply chains not only to critically survive (negative) environmental circumstances (exogenous environment closer and further), but also

significantly impacts on competitiveness improvement during the crisis period.

The aim of the paper was to identify the most important factors caused by COVID-19 pandemic which significantly impacting on supply chains and the assessment of their readiness for fighting with flows' disruption. For this purpose the IDI empirical research was conducted among managers responsible for operations in the supply chains in Poland. Research was carried on during the first part of COVID-19 pandemic diffusion in March 2020. Managers pointed closing of the borders of suppliers' countries, lack of substitution supply from the European market and the organizationally prolonged transport time of goods as the important factors disrupting flows in their supply chains. However, the key factor that negatively affects the functioning of the supply chain during a coronavirus pandemic was the dramatic decrease in the number of orders. This factor results from both – supply chain disturbed flows (limited potential of suppliers) and new priorities and current market behavior of the customers. In terms of the most important changes, being a response to the occurrence of variable factors caused by a coronavirus pandemic, respondents underlined these related to delivery delays associated with the problem of filling (ensuring full truck loads) and ensuring transport (its availability). Also lower frequency of orders, which results in extending the delivery schedule was problematic. The most frequently indicated way of responding to coronavirus pandemic disturbances in the supply chain was to ensure constant close cooperation at the tactical and operational level, which involves frequent exchange of precise and complete information. This enables processes to be coordinated across all parts of the supply chain. At the same time, enterprises regularly analyze economic environment and thus try to forecast the effects of risk on the supply chain. However, what is important, many companies do not indicate having any form of insurance against the effects of a global pandemic directly affecting the company. These responses are surprising as cooperation leading to exchange information used to be the one that is the most important in uncertainty reduction and is a base for supply chain reconfiguration to mitigate risk – to build and use the Plan B.

Additionally managers declare that technologies that reduce uncertainty and unpredictable factors, minimize the risk of their occurrence and impact on the functioning of the supply chain would gain in importance in the supply chain further management. It is becoming important to increase the use of digital technologies in the pursuit of digitization of the supply chain common to all partners in order to improve flexibility and the possibility of rapid reconfiguration. This implies a change in management strategy, renegotiation (change) of trade agreements as well as transformations in the supply policy.

Technologies are a tool supporting the diversification of the offer, and their systemic implementation in the supply chain processes limits the set of risks appearing on the demand and supply side. Accelerated digitization also stimulates the acquisition of new knowledge and competences among supply chain managers. In this way, new technologies can play a special role in the risk management not only because of supporting the ability to survive in the short term – in the event of crisis, but also because of the impact on the development and competitiveness in the long term. Big Data, in combination with Blockchain and their properties are also important tool helping to leverage the smart Plan B in terms of building resilient, hermetic and safe supply chain business model.

LIMITATIONS AND FURTHER RESEARCH

This article aims to contribute to broadening the discussion about effects of the COVID-19/SARS-CoV-2 pandemic and its impact on disruptions in global supply chain networks. The research has been limited to Polish enterprises, but they are a contrasting example of the disruptions occurrence and increasing the role and importance of sharing information with all partners to use a set of the most appropriate actions to maintain the assumed logistics effects. It turns out that the enterprises, that built Plan B are in a much better position than those that have not made such an effort. The empirical material presented supports other emerging studies, for example the „EuroLogistics” probe with the

target group of logistics company managers, titled „Logistics market during the Covid-19 pandemic”, No. 1, Week 14/2020. Similar studies were undertaken in March 2020 by other authors. However they concentrated on households [Diertrich, Kuester, Muller, Schoenle, 2020] or on relations to the economy [Baker, Bloom, Davis, Terry, 2020].

The dynamics of the environment in which enterprises find themselves means that the situation from this March is radically different in the following months. This is mainly due to the fact that the governments of many countries are taking a number of activities to shield the economy from the negative effects of a pandemic (e.g. by aid programs in Poland: "Shield 1.0", "Shield 2.0" or "Shield 3.0" or a comprehensive package of the European Union "Next Generation EU" for 2021-2024). Therefore it would be important to monitor the situation from the companies' perspective, but – more importantly from the perspective of whole supply chain and its resilience in terms of developing smart Plan B into the risk management portfolio.

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INTELIGENTNY „PLAN B” - W OBLICZU ZAKŁÓCEŃ W ŁAŃCUCHACH DOSTAW W 2020

STRESZCZENIE. Wstęp: Konkurencyjne zarządzanie łańcuchem dostaw to zdolność nie tylko do podjęcia działań naprawczych w stosunku do ryzyka, ale przede wszystkim do zapobiegania takiej sytuacji na co dzień. Zarządzanie ryzykiem jest kluczowym elementem zarządzania przedsiębiorstwem i jednym z najważniejszych czynników wpływających na odporność łańcucha dostaw. Obecnie menedżerowie mają dostęp do wielu narzędzi, tj. technologie cyfrowe, wspierające opracowywanie planów awaryjnych (Plan B) w celu ograniczenia ryzyka. Celem artykułu jest określenie odporności łańcucha dostaw w zakresie zarządzania ryzykiem na początku rozprzestrzeniania się pandemii COVID-19 / SARS-CoV-2 w 2020 r. Wskazano tutaj najważniejsze czynniki wpływające na stabilność przepływów w łańcuchu dostaw wraz z oceną ich przygotowania do pojawiających się zakłóceń w tych przepływach.

Metody: Teoretyczne podstawy opierają się na przeglądzie literatury dotyczącej zakłóceń zarządzania łańcuchem dostaw. Do przeprowadzenia badań wykorzystano metodę pogłębionych wywiadów indywidualnych (IDI) podpartych kwestionariuszem. Badania przeprowadzono wśród menedżerów odpowiedzialnych za operacje łańcucha dostaw w przedsiębiorstwach z sektora produkcji, handlu i usług w Polsce. Uzyskano i przeanalizowano opinie na temat wpływu pandemii koronawirusa na zarządzanie łańcuchem dostaw. Ankieta została przeprowadzona w marcu 2020 r.

Wyniki: Uzyskane wyniki pokazują, że pierwsza faza pandemii rozprzestrzeniła się nieoczekiwanie silnie i wpłynęła na zakłócenia w łańcuchach dostaw. Zamknięte granice, ograniczenia sanitarne i administracyjne doprowadziły do opóźnień w transporcie, dodatkowo odnotowano mniejszą liczbę zamówień skutkującą dalszymi zmianami w przepływach towarów. Jak się okazało negatywne skutki zakłóceń następowały nawet wtedy, gdy menedżerowie deklarowali pogłębioną współpracę i dzielenie się informacjami między partnerami w łańcuchu dostaw.

Wnioski: Wyniki badań wskazały na kluczowy problem związany z brakiem „planu B”, który pomaga łańcuchom dostaw szybko reagować na zakłócenia w przepływach. Także zarządzanie ryzykiem w oparciu o obecny sposób udostępniania informacji jest niewystarczające. Funkcje technologii cyfrowych i digitalizacja są obecnie jednym z najważniejszych rozwiązań, które mogą pomóc w budowie inteligentnego „planu B” w celu ograniczenia ryzyka i poprawy konkurencyjności łańcucha dostaw.

Słowa kluczowe: zarządzanie ryzykiem łańcucha dostaw, wpływ COVID-19 / SARS-CoV-2 na łańcuch dostaw, technologie cyfrowe w ograniczaniu ryzyka

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