

Dr inż. Marcin Świtata
 Road and Bridge Research Institute
 ORCID: 0000-0002-4001-8948
 e-mail: mswitata@ibdim.edu.pl

Dr Agnieszka Łukasiewicz
 Road and Bridge Research Institute
 ORCID: 0000-0001-6876-8110
 e-mail: alukas@ibdim.edu.pl

Road freight transport companies facing the COVID-19 pandemic

Przedsiębiorstwa transportu drogowego towarów w obliczu pandemii COVID-19

Abstract

The purpose of this article is to present the results of research on the impact of the COVID-19 pandemic on the activity of road freight transport companies. Moreover, it outlines the main corrective actions that have been taken by road carriers to eliminate the effects of the crisis. The source basis are the results of studies, which were conducted on a purposively selected sample of 100 enterprises representing the sector. What emerges from the research carried out is a destructive impact of the pandemic on the activities carried out in the field of road transport. Consequences of the epidemic can be seen both in the reduction for transport services' demand and in poorer financial condition of the companies surveyed. In response to the crisis, transport companies have taken numerous cost-cutting measures.

Keywords:

road carriers, COVID-19 pandemic, corrective measures, road freight transport

Streszczenie

Celem artykułu jest przedstawienie wyników badań dotyczących wpływu pandemii COVID-19 na działalność przedsiębiorstw transportu drogowego towarów z jednoczesnym nakreśleniem głównych działań naprawczych, które zostały podjęte przez przewoźników w celu eliminacji skutków kryzysu. Podstawę źródłową stanowią wyniki badań bezpośrednich, które przeprowadzono na celowo dobranej próbie 100 przedsiębiorstw reprezentujących ten sektor. Z przeprowadzonych badań wyłania się destrukcyjny wpływ pandemii na działalność realizowaną w obszarze transportu drogowego. Skutki epidemii widoczne są zarówno w spadku zapotrzebowania na usługi przewozowe, jak i w gorszej kondycji finansowej badanych przedsiębiorstw. W odpowiedzi na ten kryzys przewoźnicy drogowi podjęli liczne działania zmierzające do redukcji kosztów.

Słowa kluczowe:

przewoźnicy drogowi, pandemia COVID-19, działania naprawcze, przewóz drogowy towarów

JEL: L1, N7

Introduction

The global crisis caused by the COVID-19 pandemic has had a significant impact on the activities of almost all sections and sectors of the national economy. Transport activities responsible for the movement of goods in supply chains have not been spared either. Service providers specialising in road transport appear to be particularly hard hit. They were the ones who were forced to operate under extremely difficult conditions due to the suspension or significant reduction of supplies in

most sectors of industrial production, especially in the first months of the pandemic, as well as due to various restrictions on traffic and border crossings. The difficulties for freight transport companies to optimise their loads and vehicle routes in the supply chain, in addition to the need for them to take a number of protective measures ensuring the security of their supplies and staff are illustrative of the current situation. Worth of noting is that professional drivers are a group of workers at the high risk of coronavirus infection.

In recent months, many studies have been conducted on the impact of the Covid-19 pandemic on various areas of the socio-economic life of our country. The work carried out, mostly in an empirical way, has tried to determine, among other things, the impact of the pandemic on the geographical diversification of foreign trade (Wilczewski & Bryk, 2020), functioning of domestic enterprises (Ligaj & Pawlos, 2021), human resource management (Dolot, 2020), consumer behaviour (Samuk & Sidorowicz, 2020), or supply chain management (Dąbrowska *et al.*, 2020). When analysing the effects of the pandemic on transport activities, the main focus of the researchers was on passenger transport and related mobility (*i.e.* Betkier, 2020; Borkowski *et al.*, 2021; Plac & Danielczyk, 2020), and to a lesser extent on freight transport activities. The results of research diagnosing the situation in road transport, including the outlining of possible scenarios of change, are worth noting here (Paprocki & Letkiewicz, 2020), as well as the results of a study on the impact of a pandemic on the domestic logistics services sector (DGC/Eurologistics, 2020).

Considering the above, the following article is an attempt to look at the activities of road transport companies carried out in pandemic circumstances. In order to determine the impact of the epidemic on the national transport services sector, including the decrease in demand for the services provided, as well as the adaptation measures taken by road carriers, the survey was conducted on a sample of 100 representatives of the sector. The results presented in this paper were collected at the turn of the first and second quarter of 2020, *i.e.* during the so-called first wave of illnesses and the shock caused by the lockdown. That, in turn, has translated into a particularly difficult situation for road carriers providing services to industrial sectors.

The article consists of three parts. The first one is a theoretical approach to the problem. The second part presents the research methodology and describes the research sample. The third part contains an analysis and discussion of the research findings relating to: the scope of services provided, the impact of the pandemic on the performance of transport service providers, and the identification of actions to mitigate the negative effects of the pandemic, successively. The summary presents the principal conclusions, focusing mainly on the research findings.

Background

A new coronavirus called SARS-CoV-2, which was first identified in Wuhan, China, in late 2019,

has spread rapidly. Hypermobility and the numerous links of the global transportation network have led to its rapid global transmission. By the end of May 2020, the virus had spread to most countries, and by June 1, 2020, there were more than 6 million cases and more than 371.000 deaths worldwide (WHO, 2020). Currently, as of 7 March 2021, the number of confirmed cases has increased to 115.478.709 infections and 2.568.720 deaths (WHO, 2021).

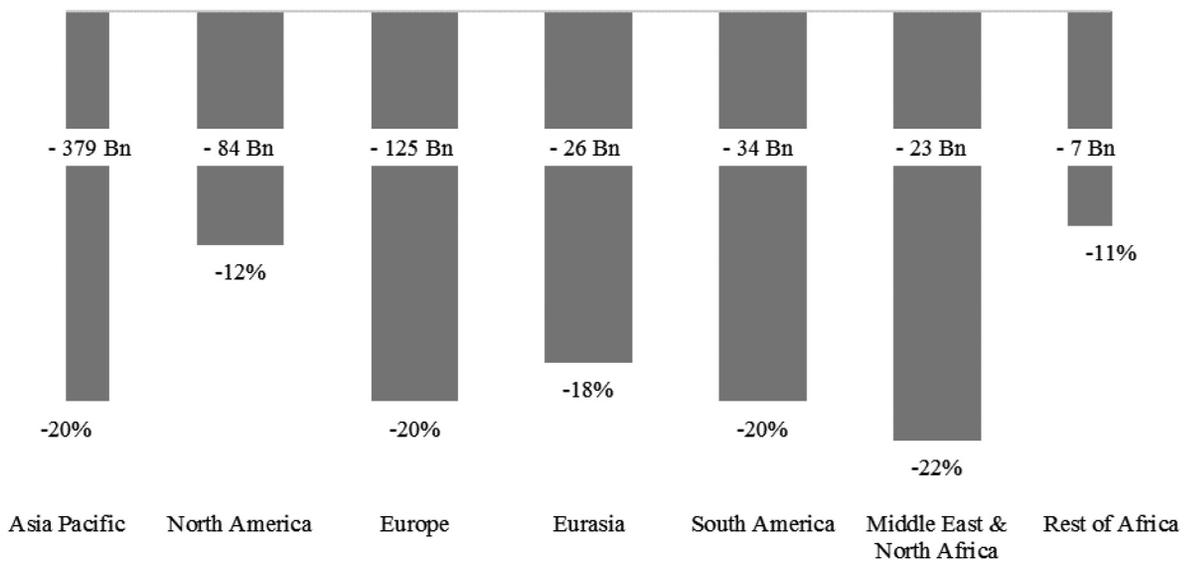
With the COVID-19 pandemic crisis, most countries in the world have been forced to explicitly subordinate the day-to-day functioning of the economy to the need to preserve the health security of the population (Dantas *et al.*, 2020; Le Quéré *et al.*, 2020; Męcina & Potocki, 2020; Sharma *et al.*, 2020). Restrictions introduced among others: social distance, mobility restrictions, closure of many sectors of the economy, including the catering and hospitality industry, have had an impact on the deterioration of national economies of many countries, and consequently on the scale of transport services, both in the domestic market and international transportation. Taking into account only commercial transport activities, including services provided by road transport companies, *i.e.* entities for which transport services are the main activity, it is worth emphasising their dominant role in road transport. Data show that nearly 63% of all freight in Poland was handled via commercial transport in 2019. In turn, transportation carried out by Polish carriers accounted for almost 77% of all services provided against payment (Świtła *et al.*, 2020).

Considering the foregoing, one may be tempted to state that the impact of the pandemic on the condition of road transport service providers reflects the condition of the entire TSL (Transport, Forwarding, Logistics) sector. It is worth emphasizing that in the current situation, ensuring optimal conditions for the performance of transport activities has become an extremely difficult and complicated task, often requiring decisions with unforeseeable consequences.

While the performance of commercial transport operations for 2020 is not yet known, data on the socio-economic situation in the country, in the first year of the pandemic show 8% decline in freight transport, using the branch with a negative overall business outlook index of -7.8% for the transport and storage section (GUS, 2021). Interesting data are also provided by the forecasts of the International Road Transport Union, which show that last year alone, global losses in freight transport exceeded USD 670 billion, with annual turnover decreases ranging from 11% to 22%. More broadly, in Europe, the nominal rate of decline is sharper than in most other regions (Figure 1), with estimated losses of USD 125 billion (IRU, 2020).

Figure 1

Goods road transport forecast losses (USD)



Source: IRU, 2020.

Data and Methods

The research was conducted in the first and second quarter of 2020 at a sample of purposively selected transport service providers. It took into account the employment level, origin of capital and geographical scope of their operations.

The condition for qualifying companies for the survey was the provision of road freight transport services. In order to reach as many entities as possible, an electronic register of road transport entities has been used (GITD, 2021), where the carriers' licence for the carriage of goods was applied as the search criterion. In addition, the resources of the Google search engine were used by entering phrases: "road transport", "international transport", "carriage of cargo" and "transport of goods". A total of 949 companies were invited to participate in the survey. The request to participate in the survey was sent twice, two weeks apart. This resulted in 100 correctly completed questionnaires. The level of effectiveness of reaching respondents was 10.54%, which, considering the time of the survey implementation, should be reckoned a satisfactory result. At this point it is worth indicating that usually web surveys produce a response rate much lower comparing to other modes of survey (Bell *et al.*, 2018).

The respondents who spoke on behalf of the companies were mainly senior managers, as well as managers and specialists of the following departments: transport, forwarding, commercial and market research.

The research sample consisted of service providers with a diverse range of activities. The share of companies with domestic capital exceeded 60% of all observations. On the other hand, 24% of respondents indicated foreign origin of capital and 14% — mixed capital. The survey was dominated by respondents belonging to the SME sector, whose share in the sample exceeded 80%, and the most strongly represented group was that of medium-sized companies (38%). Another strongly represented group was international road transport service providers, with a share of 85% of the total. Domestic operations were indicated by only 4% of the survey participants and global reach by 11%.

The survey was conducted using an on-line questionnaire that was created using a Google form, and the questionnaire consisted of 13 questions organised into three thematic groups (Table 1). Questions about the nature of business, including the range of services provided, the routes operated and the fleet owned accounted for the first group. Then, the second group consisted of essential questions designed to provide data to assess the performance of carriers during the COVID-19 pandemic. The last one contained personal information questions. The respondents' responses were measured using two types of measurement scales *i.e.*: nominal and ordinal.

Standard measures of descriptive statistics were used in the statistical analysis. Frequency distributions, arithmetic means and standard deviations were used. A correlation analysis of the

Table 1
Research questions

<p>1. Business profile/scope of services provided</p> <ul style="list-style-type: none"> ■ range of services: domestic road transport, international road transport, forwarding, logistics, intermodal transport, courier services, cross-docking, other ■ main area of generated income: domestic road transport, international road transport, forwarding, logistics, intermodal transport, courier services, cross-docking, other ■ type of cargo handled: full truck loads, partial loads, general cargo, bulk goods, liquid goods, ADR cargo, controlled temperature cargo, oversize cargo, express shipments, containers, parcels, other ■ number of vans and trucks in service
<p>2. Impact of the pandemic on road freight transport companies activities</p> <ul style="list-style-type: none"> ■ how strongly has the COVID-19 pandemic affected the national transport services sector? [1 — very low impact strength, 5 — very high impact strength] ■ Have you experienced a decrease in demand for your services due to the COVID-19 pandemic? [1 — definitely not, 5 — definitely yes] ■ If you answered "definitely yes" or "rather yes", please indicate by how much the number of your trips has decreased? [1 — 5%, 2 — 10%, 3 — 20%, 4 — 30%, 5 — 40%, 6 — 50%, 7 — >50%] ■ Have you experienced any events that decrease liquidity due to the COVID-19 pandemic? [1 — definitely not, 5 — definitely yes] ■ What actions have you been forced to take in response to the effects of the COVID-19 pandemic: withdrawal of some vehicles from service, sending some employees on compulsory leave, changing the form of employment of some employees, laying off some employees, reducing existing salaries, limiting purchases of external services, suspension of investment projects, freezing investment plans, failure to settle financial obligations towards suppliers, reduction of transport rates in response to the decline in demand, the establishment of crisis response teams and implementation of appropriate procedures, filing for bankruptcy of the company
<p>3. Research sample</p> <ul style="list-style-type: none"> ■ employment volume ■ origin of capital ■ geographical coverage ■ position of the person completing the survey

Source: own study.

variables was also conducted using Kendall's tau-b correlation coefficient. The SPSS package was used to prepare the results.

Results

Business profile/scope of services provided

Respondents' responses indicate that most transport providers did not have a strongly developed range of services on offer. In general, the respondents provided slightly more than 3 services ($\bar{x} = 3.35$), of which all freight services offered were divided into domestic and international transport, and every second company made deliveries in both variants. The services were mainly provided with the use of trucks and heavy vehicles and mostly concerned full truckloads, partial truckloads, temperature controlled loads and general cargo. Overall, respondents had an average of 49 trucks and 51 heavy vehicles at their disposal. On average, 2–3 destinations were served in international traffic, with the most frequent being Western European countries and the least frequent Eastern European

countries, including Russia, Romania and Ukraine. The survey found that international road transport was the main source of revenue for 48% of companies and domestic transport for 14%.

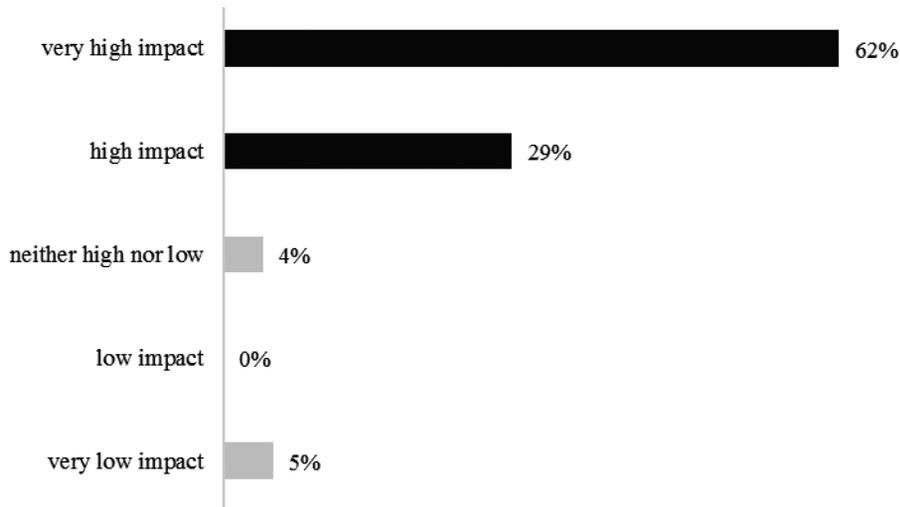
The road carriers' portfolio was also dominated by forwarding services, which were indicated by 70% of the surveyed companies. In addition, a significant number of respondents specialized in providing international freight forwarding services. It is worth noting that for 25% forwarding was the basis of the services provided. In turn, the provision of logistics services was indicated by 49% of the survey participants, although only four companies derived their main revenue from this. Intermodal freight transport was offered to their clients by 29% of the respondents, and courier and cross-docking services by 21% and 10% of the respondents, respectively.

Impact of the pandemic on road freight transport companies activities

The survey results indicate that road carriers are highly inclined to give a negative opinion on the impact of the COVID-19 pandemic on the domestic

Figure 2

Impact of COVID-19 pandemic on the national road transport services market (%)



Source: own study.

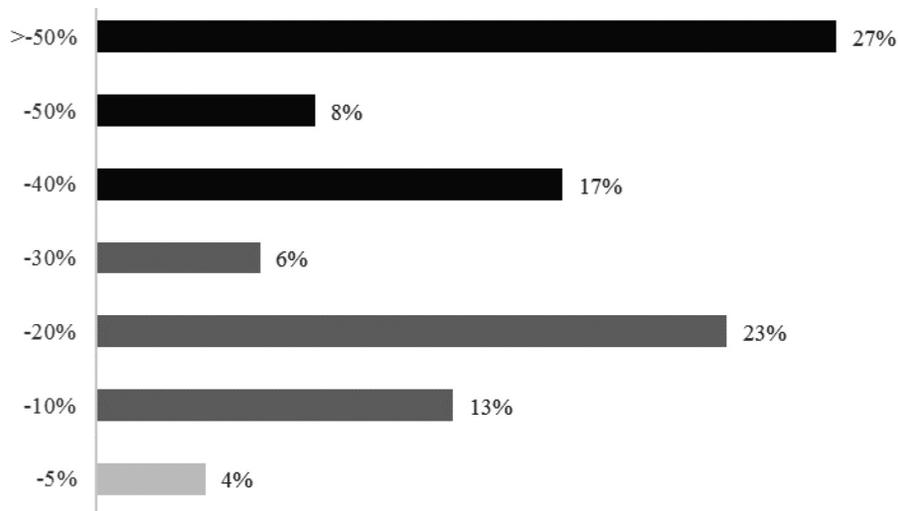
transport services market. Overall, the average score on the 5-point scale (4.43) was clearly above the middle of the scale (3), indicating that respondents preferred to give answers indicating that the pandemic had a high and very high impact on transport activities. The standard deviation value (0.96) also indicates a low degree of polarization in the responses given. In percentage terms, there was a definite advantage of negative indications (91%) over positive responses, as shown in Figure 2. It is worth noting that only 5% of the respondents were convinced of a very low impact, and neutral answers were indicated by 4 participants¹. The survey did not indicate that respondents' responses were determined by geographic coverage or employment level.

However, there was a significant positive correlation (Kendall's tau b coefficient = .326 at $p < .00$) between the above-mentioned assessment and respondents' declaration that their financial standing had worsened. The results of the research show that the more the respondents were convinced of the negative impact of the pandemic on the domestic road transport services market, the more they also indicated difficulties in maintaining their financial liquidity. Overall, the average score (3.74) was above the middle of the scale (3) and was close to a "yes" statement (4). The distribution of responses shows that this situation occurred in almost 60% of the carriers surveyed. The occurrence of financial difficulties was found to be negatively related to company size (Kendall's tau b coefficient = $-.288$ at $p < .00$), meaning that small companies were more likely to experience financial distress than medium and large enterprises.

The survey results indicating that financial liquidity difficulties are strongly correlated with a decline in freight demand are hardly surprising, either. A statistically significant relationship was found at the 0.00 level with a Kendall's tau b coefficient of 538. To be more specific, respondents were asked the following question: "Have you experienced a decrease in demand for your services due to the ongoing pandemic?" Again, this was measured using a 5-point Likert scale. Analysis of the data shows that the average score was 4.17, well above the midpoint of the scale (3), indicating a clear predominance of affirmative responses over negative ones. It is worth noting that more than half of the respondents (54%) answered "definitely yes", while the total of 79% of respondents confirmed that the number of orders handled decreased as a result of the pandemic. The percentage of transport service providers who were of an opposite opinion was not high at 16%, although in no case were these statements categorical ("definitely not"). These respondents, overwhelmingly, appeared to be small domestic carriers.

In addition to the above question, respondents were also asked by how much the number of orders carried out during the first lockdown decreased. Transport companies responded using a seven-point ordinal scale (from -5% to more than -50%). The detailed structure of the responses obtained is presented in Figure 3. Analysing the data it may be observed that more than half of the service providers reported a decrease in demand for haulage services of at least 40%, and in every fourth

Figure 3
Decrease in demand for transport services (%)



Source: own study.

company the number of completed courses decreased by more than 50%. Small decreases of 5%-10% occurred, in turn, among 17% of the total.

The survey indicated the existence of a statistically significant negative correlation between the percentage scale of decline in transport demand and the size of the company in question, measured by the number of its employees (Kendall's tau b coefficient = -0.493 at $p < .00$). It is worth emphasizing that while in the group of large carriers the decrease in demand was most frequently in the range of 5%–20% (more than 80% of indications), in case of micro and small service providers the reduction in the number of orders was most frequently at least 50% (70% of indications).

Measures to mitigate the negative effects of pandemic on road freight transport services

Respondents were asked to identify what actions they were forced to take in response to the impact of the pandemic. The answers were categorised into four groups of anti-crisis measures, *i.e.* measures in the area of employment, work reorganisation, external cooperation and strategic measures. On average, each respondent took four actions to reduce the negative effects of the pandemic on their own business.

According to the results presented in Table 2, the most frequently applied solutions turned out to be those with a strategic dimension and consisting in the suspension of investment plans, including

investments already started, which were declared by 70% and 67% of the surveyed companies, respectively. Furthermore, every second company undertook changes in both cases. The analysis of the data also shows that as the size of the enterprise increased, the willingness to undertake measures aimed at freezing plans, or stopping investments already made, decreased (Kendall's tau b coefficient = -0.227 at $p < .01$). Among medium and large transport providers, the share of respondents declaring no changes in this respect turned out to be significantly higher than in the group of micro and small enterprises (21% versus 11%). The situation was different when deciding to make changes in both options. In this case, the percentage of indications was 67% for micro and small enterprises and 37% for the comparison group.

In addition, frequent changes in the area of market cooperation among the participants of the survey were noticed. On the one hand, that consisted in a partial reduction of their own purchasing activity (67%), on the other hand, in lowering transport rates for their customers (47%). The inability to pay suppliers on time was a rare occurrence, though; such a declaration was made by only 7% of respondents, including, while taking into account the employment level, two small and five medium-sized carriers.

In comparison with the first two groups, the respondents decided a little less frequently to implement changes in the area of work organisation. According to the survey, in response to the impact of the pandemic, 46% of road carriers have decided to withdraw some vehicles from operation and 39%

Table 2

Measures taken by hauliers in response to the impact of the pandemic (frequency of responses)

Employment measures			Work reorganization		
No.	Specification	%	No.	Specification	%
1.	Referring some staff for compulsory leave	35	1.	Withdrawal of some vehicles from operation	46
2.	Pay cuts	25	2.	Establishing emergency response teams and implementation of appropriate security procedures	39
3.	Dismissal of some employees	21			
4.	Change in the form of employment of some employees	12			
Cooperation activities			Actions of a strategic nature		
No.	Specification	%	No.	Specification	%
1.	Restriction on purchases of third-party services	61	1.	Freezing of investment plans	70
2.	Reduction of transport rates	47	2.	Suspension of investments carried out	67
3.	Non-payment of financial obligations to suppliers	7			

Source: own study.

have implemented safety procedures and established emergency response teams. It is noteworthy that work reorganisation was more common among medium and large companies than micro and small firms (Kendall's tau b coefficient = .173 at $p < .05$).

On the other hand, the least frequently indicated actions were staff changes which, if they occurred, most often consisted of referring some employees for compulsory leave (35%) or cutting their remuneration (25%).

Conclusion

In 2020, road freight transport was one of the industries hardest hit by the coronavirus pandemic. That is confirmed not only by the results of our own research, but also by statistical data showing a general decline in demand for road freight transport (GUS, 2021). In this context, it is also worth referring to the results of the analysis of traffic on national roads, which indicates much lower activity of heavy vehicles, especially in the first months of the pandemic. The survey found that, in 2020, the daily number of heavy vehicles on the road decreased by about 20.000 vehicles, compared to the previous year (GDDKiA, 2020).

Demand for transport services is likely to rise again, once restrictions are eased and activity gradually picks up. Its growth rate will, however, vary depending on the sectoral specialisation of service providers, along with the rate of recovery on primary markets, the investment made to fight the virus, and the sustainability of changes in road

transport supply and demand caused by the direct and indirect effects of the pandemic. It is assumed that it will probably not be possible to identify the economic impact of the crisis in more detail until late 2021, but the associated repercussions will continue to be felt over at least next 3 years (JRC European Commission, 2020).

Considering the survey results, it is important to observe that respondents, regardless of the employment level, origin of capital, and scope of operations, indicated high and very high negative impact of the pandemic on transportation operations. It is worth mentioning that as a result of the current restrictions, 80% of the survey participants reported a decrease in demand for transport services, which in turn resulted in negative consequences in the form of significant difficulties in maintaining financial liquidity. It is important to be noted that for most transport providers, the decrease in demand for transport during the first months of the pandemic exceeded 40%.

The results of the survey also allow for a conclusion on the actions taken by carriers in response to the impact of the pandemic. During the survey, respondents were characterised by a particularly strong desire for financial stability. It appears that all of the changes implemented, regardless of their nature, were an attempt to compensate for the loss of demand for the services provided. It should be underlined that the group of small companies was more likely to experience financial difficulties and take corrective actions than medium and large companies. The relationship found seems quite obvious: in the case of small road carriers, due to the small scale of their operations,

there is often a dependence on one link in the supply chain or on a large logistics service provider which, in the face of uncertainty and changing market trends, can lead to serious financial difficulties.

Summarizing the findings of this research, it should be stated that the actions taken by the carriers in response to the crisis are difficult to assess unequivocally. Certainly, withholding investment to reduce costs is an effective method of surviving the crisis in the short term. The carriers' decisions are not surprising, as many of them were struggling to maintain liquidity even before the coronavirus pandemic broke out. According to Economic Information Bureau InfoMonitor (debtor register) in the report "Slowing down the

speeding transport", almost 10% of transport companies paid their liabilities with delay, which was the highest percentage among all sectors of the economy (Rogowski & Kochalska, 2020). It should be noted that in road transport, as in inland waterway transport, the only way for supply to adjust to falling demand is for the fleet to be decommissioned, with a simultaneous reduction in the workforce (Paprocki & Letkiewicz, 2020). Our research shows, however, that in most cases, carriers did not opt for this measure. The prevailing belief among the respondents was that the drastic fall in demand would be temporary rather than permanent, which turned out to be quite an accurate assumption.

Przypisy/Notes

¹ There was no indication of a "low impact" rating.

Bibliografia/References

- Bell, E., Bryman, A., Harley, B. (2018). *Business research methods*. Oxford University Press.
- Betkier, I. (2020). Crosswind Warning Method View project. *European Research Studies Journal*, 23, 99–115. <https://doi.org/10.35808/ersj/1856>.
- Borkowski, P., Jażdżewska-Gutta, M., Szmelter-Jarosz, A. (2021). Lockdowned: Everyday mobility changes in response to COVID-19. *Journal of Transport Geography*, 90. <https://doi.org/10.1016/j.jtrangeo.2020.102906>.
- Dantas, G., Siciliano, B., França, B. B., Silva, C. M. da, Arbilla, G. (2020). The impact of COVID-19 partial lockdown on the air quality of the City of Rio De Janeiro, Brazil. *Science of The Total Environment*, 729, 139085 <https://doi.org/10.1016/j.scitotenv.2020.139085>
- Dąbrowska, J., Dolżyńska, E., & Hryniewicka, G. (2020). Wpływ nieprzewidzianych zdarzeń na łańcuchy dostaw na przykładzie pandemii COVID-19. *Akademia Zarządzania*, 4(2), 71–81.
- DGC/Eurologistics (2020). *Rynek logistyczny w dobie pandemii COVID-19*. https://log24.pl/wydania_pdf/Sonda_Eurologistics_covid_19.pdf (04.05.2021).
- Dolot, A. (2020). Wpływ pandemii COVID-19 na pracę zdalną — perspektywa pracownika. *E-Mentor*, 83(1), 35–43. <https://doi.org/10.15219/em83.1456>
- GDDKiA (2020). *Ruch na drogach krajowych w czasie epidemii. Analiza danych od początku epidemii*. Warszawa: GDDKiA www.gddkia.gov.pl/pl/a/37675/Ruch-na-drogach-krajowych-w-czasie-epidemii-Analiza-danych-od-poczatku-epidemii (30.04.2021).
- GITD (2021). *Krajowy Rejestr Elektroniczny Przedsiębiorców Transportu Drogowego*. <https://kreptd.gitd.gov.pl/> (29.04.2021).
- GUS (2021). *Sytuacja społeczno-gospodarcza kraju w 2020 r.* Warszawa: Główny Urząd Statystyczny.
- IRU (2020). *COVID-19 impacts on commercial road transport*. Geneva: International Road Transport Union (IRU).
- JRC European Commission (2020). *Future of Transport: Update on the economic impacts of COVID-19 Direct impacts on transport and mobility*. <https://doi.org/10.2760/9247>
- Le Quéré, C., Jackson, R. B., Jones, M. W., Smith, A. J. P., Abernethy, S., Andrew, R. M., De-Gol, A. J., Willis, D. R., Shan, Y., Canadell, J. G., Friedlingstein, P., Creutzig, F., Peters, G. P. (2020). Temporary reduction in daily global CO₂ emissions during the COVID-19 forced confinement. *Nature Climate Change*, 10, 647–653. <https://doi.org/10.1038/s41558-020-0797-x>
- Ligaj, M., Pawlos, W. (2021). Wpływ COVID-19 na funkcjonowanie przedsiębiorstw w Polsce. *Gospodarka Materialowa i Logistyka*, (3), 60–65. <https://doi.org/10.33226/1231-2037.2021.3.6>
- Męcina, J., Potocki, P. (2020). Ekspertyza 11. Wpływ COVID 19 na gospodarkę i rynek pracy w Polsce — wyciąg z raportu badawczego. *Paper presented at the Open Eyes Economy Summit*, 29.
- Paprocki, W., Letkiewicz, A. (2020). Diagnostyka ostrzegawcza i wytyczne dalszych działań transportu drogowego rzeczy w warunkach kryzysu wywołanego pandemią COVID-19. Paper presented at the *Open Eyes Economy Summit*, 29, <https://oecs.pl/download/1495497> (27.04.2021).
- Plac, K., Franz, K., Danielczyk, R. (2020). Mobilność miejska w okresie pandemii. Paper presented at the *Tydzień Zrównoważonego Transportu*, 13.
- Rogowski, W., Kochalska, H. (2020). *Powolne hamowanie rozpędzonego transportu; Ogólnopolski Raport Biura Informacji Gospodarczej InfoMonitor o zadłużeniu firm z sektora transportowego*. Biuro Informacji Gospodarczej InfoMonitor S.A. <https://secure.sitebees.com/file/attachment/1556525/31/Raport+BIG+InfoMonitor+Powolne+hamowanie+rozpedzonego+transportu.pdf> (27.04.2021).
- Samuk, G., Sidorowicz, I. (2020). Wpływ pandemii COVID-19 na zachowania konsumentów. *Akademia Zarządzania*, 4(3), 195–206.
- Sharma, S., Zhang, M., Gao, A. J., Zhang, H., Kota, S. H. (2020). Effect of restricted emissions during COVID-19 on air quality in India. *Science of The Total Environment*, 728, 138878. <https://doi.org/10.1016/j.scitotenv.2020.138878>

- Światała, M., Łukasiewicz, A., Kowalska-Sudyka, M. (2020). Inwestycje drogowe w świetle działalności przedsiębiorstw transportu drogowego towarów. *Studia i Materiały*, (90). Warszawa: Instytut Badawczy Dróg i Mostów.
- WHO (2020). *Coronavirus disease 2019 (COVID-19): situation report, 133*. World Health Organization. <https://apps.who.int/iris/handle/10665/332281> (27.04.2021).
- WHO (2021). *WHO Coronavirus (COVID-19) Dashboard*. <https://covid19.who.int/> (28.04.2021).
- Wilczewski, N., Bryk, M. (2020). Zróżnicowanie geograficzne polskiego handlu zagranicznego i wpływ pandemii COVID-19. *Mysl Ekonomiczna i Polityczna*, 2(69), 34–54.

Dr inż. Marcin Światała

Ph.D. Eng. Assistant Professor at the Economics Department of the Road and Bridge Research Institute. He is also the leader of a research area related to mobility, transport and road infrastructure in FEHRL, an international organisation. In his scientific work he undertakes issues related to the impact of road projects on the economic environment, with particular emphasis on the links between road projects and the activity of road freight transport companies. In recent years, his main research interests have been adaptive behaviour and cooperation of companies in supply chains and networks.

Dr Agnieszka Łukasiewicz

Ph.D. Assistant Professor at the Division of Management Systems and Telematics of the Road and Bridge Research Institute, with extensive international experience. She has participated in a number of international research projects under the sixth and seventh Framework Programmes, HORIZON 2020 and COST (European Cooperation in Science and Technology), including management of planning and implementation of large infrastructure projects, sustainable transport, road safety and travel studies, as well as social aspects of transport sector. She is currently actively involved in the From Sharing to Caring: Examining Socio-Technical Aspects of the Collaborative Economy project and the European Partnership for the new budgetary perspective Horizon Europe, in the area of Connected, Cooperative and Automated Mobility. She was also a participant in numerous national research projects.

Dr inż. Marcin Światała

Adiunkt w Zakładzie Ekonomiki Instytutu Badawczego Dróg i Mostów. Pełni także funkcję lidera obszaru badawczego związanego z mobilnością, transportem oraz infrastrukturą drogową w międzynarodowej organizacji FEHRL. W swojej pracy naukowej podejmuje zagadnienia związane z oddziaływaniem inwestycji drogowych na otoczenie gospodarcze, ze szczególnym uwzględnieniem powiązań łączących inwestycje drogowe z działalnością przedsiębiorstw transportu drogowego towaru. W ostatnich latach głównym przedmiotem jego zainteresowań badawczych były zachowania adaptacyjne i współpraca przedsiębiorstw w łańcuchach i sieciach dostaw.

Dr Agnieszka Łukasiewicz

Adiunkt w Zakładzie Systemów Zarządzania i Telematyki Instytutu Badawczego Dróg i Mostów, z dużym doświadczeniem międzynarodowym. Uczestniczyła w wielu międzynarodowych projektach badawczych w ramach szóstego i siódmego Programu Ramowego, a także programów HORYZONT 2020 i COST (European Cooperation in Science and Technology). Projekty dotyczyły m. in. zarządzania planowaniem i wdrażaniem dużych projektów infrastrukturalnych, zrównoważonego transportu, bezpieczeństwa ruchu drogowego, a także społecznych aspektów sektora transportu. Obecnie jest zaangażowana w projekt From Sharing to Caring: Examining Socio-Technical Aspects of the Collaborative Economy oraz w Partnerstwie Europejskim na rzecz nowej perspektywy budżetowej Horizon Europe, w obszarze Connected, Cooperative and Automated Mobility. Brała również udział w licznych krajowych projektach badawczych.

Księgarnia internetowa Polskiego Wydawnictwa Ekonomicznego zaprasza na zakupy **z rabatem 15%**

www.pwe.com.pl

