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THE CHANGES IN THE APPROACH TO THE REALIZATION OF "GREEN DEAL" GOALS OF POLISH LARGE AND MEDIUM-SIZED ROAD CARRIERS AS A RESULT OF THE COVID-19 PANDEMIC

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ABSTRACT: The purpose of the article is to show changes in the operation of Polish large and medium-sized road carriers in the context of the EU's pro-environmental requirements contained in the Green Deal in the post-pandemic period. The decline in the number of transport orders resulting from the general slowdown in the economy during the COVID-19 pandemic undoubtedly had an impact on the turnover of road carriers and, consequently, on funding for investment projects, including environmentally friendly investments. Verifying the magnitude and direction of such changes seems a much-needed aspect of the research in the context of the Green Deal's unchanging high demands. The research that was conducted shows the impact of the pandemic on the investment decisions and activities of transport companies and the reality of post-pandemic transport. The practical application of the research results is very useful, primarily as guidance for road carriers in the context of Green Deal.

KEYWORDS: pandemic, regulations, green deal, transport

Introduction

Over the past few years, the European market has experienced significant turbulence and problems that have affected and are still affecting virtually all industries. One of the great problems that occurred in the global socio-economic space, and as such – also affected European countries, was the spread of the SARS-CoV-2 virus to such an extent that on March 11, 2020, the WHO declared a pandemic state bearing the name COVID-19 (Cucinotta & Vanelli, 2020).

Numerous illnesses and multiple deaths are the most important consequences resulting from the COVID-19 pandemic, which, *de facto*, started in 2019. However, much suffering and personal as well as social problems arose as a result of the pandemic, it nevertheless had effects in the economic sphere as well (Hervani et al., 2023). Moreover, it has triggered a number of changes in the approach to business in the post-pandemic era. Among other consequences, the extent of justifiable state interventionism has changed, especially in the area of environmental protection (Wang et al., 2022a). The change in attitude toward the environment can also be seen in specific industries (Zachariadis et al., 2023), particularly transport. An example of the impact of the pandemic situation, which has triggered necessary adjustments by carriers in the performance of transport operations and the fuel used, and consequently the impact on the environment, is maritime transport. Problems that surfaced during the pandemic brought solutions that are still being developed today in the post-pandemic era (Ye et al., 2022).

The consequences of the pandemic shock to individual transport modes are also visible in rail transport – individual carriers in rail passenger transport continue to experience the effects of falling passenger numbers. Many individuals have not returned to mass rail transport. The situation is different in rail freight transport – it has not seen a great decline in pandemic conditions (it has even increased freight operations in some European countries). Arguably, this was due to a higher level of transport safety and the lack of problems when crossing borders – which was in opposition to road transport. The pandemic situation served as a lesson to individual companies building their supply chains, especially those requiring long-distance transport that rail transport is less likely to break those chains. This is undoubtedly one of the effects of the pandemic on affecting the post-pandemic era (Barczak, 2022).

An overview of the literature

Road transport is the branch of transport that dominates the European Union's freight transport (de Smedt & de Wispelaere, 2023). Its share in freight transport operations has remained fairly stable at around 72% in the EU for years. Road transport is one of the most important segments of the national economies in the EU, dependent on fossil fuels, accounting for approx. 73% of total greenhouse gas emissions in transport. More than 308 million road vehicles in Europe depend on conventional fuels, including gasoline and diesel (Chiaramonti et al., 2021).

European road transport, including cargo transport, is an important part of the transport system. Road transport plays a complementary role to other branches, for example, maritime transport of cargo requires delivery of cargo to the port and subsequent distribution. The development of combined transport requires international system solutions, which is undoubtedly a challenge for European transport policy (Priendl & Stolzle, 2021).

One of the most important challenges of modern road transport is the design, adaptation to carry out the transport operations, purchase and operating costs, and environmental impact of autonomous vehicles. There is a clear trend in the literature to present these investments (Wang et al., 2022b; Aoyama & Alvarez Leon, 2021). Autonomous technology is expected to contribute to lower fuel and transport costs – here, the decrease in costs is due not only to the cost of fuel consumption but also to the lack of the need for breaks. However, the conviction that self-driving vehicles are safe and environmentally friendly has been curbed by experts, enumerating the drawbacks and risks of such technological solutions, especially in the absence of sufficient preparation (Dixit et al., 2021). There are a number of challenges in the implementation of autonomous vehicles, including in the realm of infrastructure adaptation, regulation of criminal liability in the event of an accident, and mixed traffic training. It is necessary to adjust Polish law, roads, knowledge and public awareness in

advance (Litman, 2015). Autonomous vehicles may have lower emissions than traditional gasoline-powered vehicles. However, their mass deployment may increase demand for driving alone or in smaller groups, which negatively affects the environment. Among the risks, there is also the exclusion of the human element, resulting in driver unemployment and high production costs. However, any projections currently reside within the realm of planning and simulation (Litman, 2015), as there are no autonomous vehicles on Polish roads yet. If the challenges are overcome and the idea of self-driving vehicles enters the implementation phase, transport (and other areas of the economy) will undergo significant changes.

The development of road transport through investments related to improving safety, environmental performance, speed of delivery, and cost-effectiveness must disturb the environment as little as possible (Pietrzak & Pietrzak, 2020). This is not an easy challenge, as the growth of road cargo transport affects the environment in almost every area – from environmental violations through infrastructure expansion to air pollution through exhaust fumes, oil, brake pads and also the noise it generates. Reducing road transport noise is one of the European Commission's environmental goals. Ambitious plans to reduce environmental noise by 30% by 2030 (Palaia, 2022) are most hampered by noise from road transport precisely because it is the one that has the greatest impact on the environment, life and health (causing premature deaths and ischemic heart disease, among other things). Road freight transport generates external costs, but the accurate calculation of these costs is complex, and there are still discrepancies in approaches and research methods, which, regardless of their diversity, unequivocally state the underestimation of external costs of road transport relative to rail transport (Faulkner & Murphy, 2022).

The negative impact of road transport on the environment is the subject of research publications, but also specific systemic measures. The European Commission, with the introduction of the Green Deal policy, has set directions for the development of member economies to achieve climate neutrality by 2050. The scope of the Green Deal covers in transport all its sectors, defining the transport of the future as multimodal, zero- or low-carbon, digital, and internationally accessible (European Commission, 2021). The Green Deal's assumptions for road transport concern not only vehicle emissions but also the toll system, which is to be sealed and streamlined (Directorate-General for Mobility and Transport, 2022).

With the Union's goals established in this way, it is politically necessary to strengthen the influence on national governments to clearly indicate the timetables and preferences for infrastructure solutions required for the use of alternative motor vehicle propulsion systems. Given the cost-intensive nature, as if the technology were not already innovative, the European Union should introduce an incentive system for both individuals and carriers. Those dedicated to for-profit transport service providers should incorporate elements that contribute to reducing the cost of operating vehicle fleets and, consequently, provide conditions for the profitability of these entities. They should also bear the characteristic of being systematic and long-term since the premature withdrawal of incentives has the effect of lowering confidence in the validity of the measures taken. Effective environmental protection must, therefore, involve systematic solutions (United Nations, 2023). Hence, incorporating the demands of the direct implementers into the proposed measures and incorporating them into the regulatory solutions can guarantee a change in the approach of these entities and thus contribute to increasing their efficiency, streamlining the process and reducing the cost of achieving the Green Deal goals.

Research methods

Data for this survey, as for the previous one, was collected through computer-assisted telephone interviews (CATI). The interviewer's administration of the questionnaire ensures a higher response rate and more complete and accurate answers than self-completion surveys. The survey was conducted by a Polish company that was responsible for sampling and data collection. The design of the questionnaire, consistent with the purpose of the study, as well as the study's main premise, were developed by the authors.

The survey included 170 medium and large road carriers from a previous study¹. The study was conducted in late 2021 and early 2022. During the course of the survey, some companies did not provide answers to the questions posed; hence, for the final analysis of each question, the population of those entities that provided relevant answers was taken, thus omitting entities with answers of “no data, no answer” and excluding those from which it was impossible to obtain answers as a result of the cessation or suspension of operations. As a result, the study population decreased by 24 subjects and amounted to 146 respondents.

In keeping with the pandemic and environmental purpose of the survey, the questionnaire design, as well as the main assumption of the survey, was developed by the authors. The questionnaire of the survey concerned many different aspects of the influence of the pandemic on the functioning of enterprises, and only part of the survey contained questions related to vehicles and the environment. Among the questions related to the environment were those covered in this article about actions taken by and expectations of the large and medium-sized road carriers:

Q1. Please specify whether the pandemic has affected your company regarding (yes/no):

- Change in the state of the vehicle fleet,
- Decline in the number of freight transport orders,
- Changes in planned investments in vehicle fleet,
- Changes in the number of employees,
- Environmental policy (planned replacement of vehicle fleet).

Q2. If, over the course of 2020-2021, you sold your vehicle fleet or terminated leasing contracts, which of the following decision criteria for selecting a means of transport was the most important:

- Age/mileage,
- Worst technical condition,
- High operating costs,
- Environmental criteria (e.g., lowest Euro standards),
- Financial benefits.

Q3. Does the enterprise use the following environmental protection techniques:

- Buying new/newer vehicles,
- Increase in vehicle payload utilisation (cargo consolidation, return freights),
- Buying trucks that are cheaper to operate,
- Fairings, limiting vehicle speed,
- Fuel enhancers – Ad Blue,
- Buying energy-efficient tires,
- Using transport planning software,
- Buying vehicles with smaller engines,
- Eco-driving training.

Q4. Please indicate which initiatives can motivate your company to invest further in environmental activities:

- Investments in multimodal terminals,
- Mandatory monitoring and reporting of emissions and greening policy at the company level,
- Multilateral licensing system, including incentives for cleaner and safer trucks,
- Change of regulations on vehicle weights and dimensions,
- Application of mandatory transport planning systems,
- Introduction of charges related to the level of vehicle exhaust emissions,
- Save fuel through driver training (eco-driving),
- Tax incentives to promote alternative fuels,
- A special tax on exhaust emissions,
- Introduction of charges related to the level of vehicle exhaust emissions,
- Fleet renewal programs (tax reduction, subsidies),
- Introduction of tax systems differentiating the amount of vehicle tax depending on exhaust emissions,
- Investments in road infrastructure.

¹ The results of the first study are presented in Letkiewicz et al. (2022).

Results of the research

One of the first questions respondents were asked about their subjective assessment of the impact of the pandemic on selected areas of company activity. Among these areas were the technical condition and size of the vehicle fleet, the environmental policy implemented at the company, employment, planned vehicle fleet investments, and the number of transport orders. The largest number of respondents (58 entities) indicated that the pandemic caused a decrease in the number of shipping orders (Figure 1). Next, respondents indicated that the pandemic had an impact on their entities on changes in employment (50 entities) and changes in planned vehicle fleet investments (44 entities). A change in environmental policy was indicated by 26 entities. A smaller number of entities – 12 – will begin to record changes regarding the vehicle fleet.

At the same time, two seemingly quite significant events occurred during the pandemic year, namely Brexit and the disaster and blockage of the Suez Canal. Respondents were, therefore, asked whether these two events had any impact on the number of freight orders. Only 12 respondents separated a positive answer, while in a question detailing the impact of Brexit on environmental policy, employment levels and planned investments in vehicle fleets, a positive answer in each of these areas was indicated by some 20 entities. The Suez Canal disaster was not of consequence to all entities.

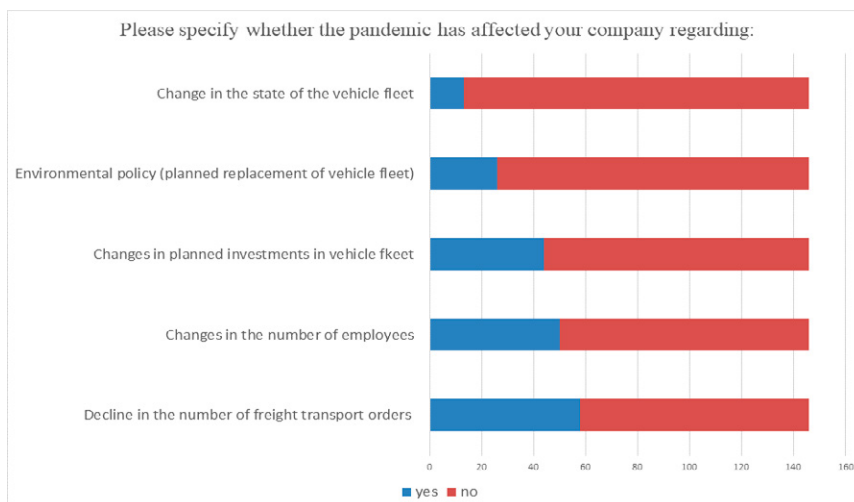


Figure 1. Subjective assessment of the impact of the pandemic on selected areas of operation of Polish road carriers

The survey results also show that attitudes toward buying new or newer vehicles as an action that detracts from environmental impact have not changed during the pandemic. More than 85% of the surveyed companies declare renewing their vehicle fleet, i.e. buying one with lower greenhouse gas emissions, as implementation of an environmentally friendly policy. Vehicle fleet renewal is not only the purchase of new transport vehicles but also the sale of existing ones in operation. The management of fixed assets in terms of their sale can be a way of financing operations, which could have ensured survival during the difficult time of the pandemic. An interesting result of the survey is the fact that no transport assets were sold off for financial gain. The rationale for which the surveyed entities sold transport assets was independent of the pandemic and their financial situation (no entity indicated this premise), as the most common rationale was the age and mileage of the vehicles (33 entities), high operating costs (6 entities), the worst technical condition (8 entities). The least frequent, on the other hand, were ecological criteria (1 entity).

Environmental protection in road carriers also manifests itself in an increase in the utilisation of vehicle payloads (cargo consolidation, return freights), which is the second area of pro-environmental activity indicated by approx. 82% of entities (an increase from the previous survey), although only some 40% (a decrease from the previous survey) use specialised software. The second group of commonly used environmentally friendly measures are adding fuel enhancers, reducing air resistance

(fairings) and reducing vehicle speed. Buying vehicles with smaller engines, energy-efficient tyres, and eco-driving training are among the least common. The detailed characteristics of environmental techniques are shown in Figure 2.

The study also looked at the impact of the pandemic on the pro-environmental solutions used in the study population. As part of a comparison of actions taken by large and medium-sized Polish road carriers, the percentages of indications made by respondents are summarised (Figure 3). The biggest swap – an increase from approx. 40% to just under 70% – is in the use of changing the technical characteristics of vehicles, i.e. the use of fairings to limit vehicle speed. The second most dynamic change is the increased importance of improving the utilisation of vehicle payloads (cargo consolidation and seeking return freights). In this regard, the increase was approx. 20%, which means that before the pandemic, 63% of entities used this technique, while during the pandemic, 82% already considered it important.

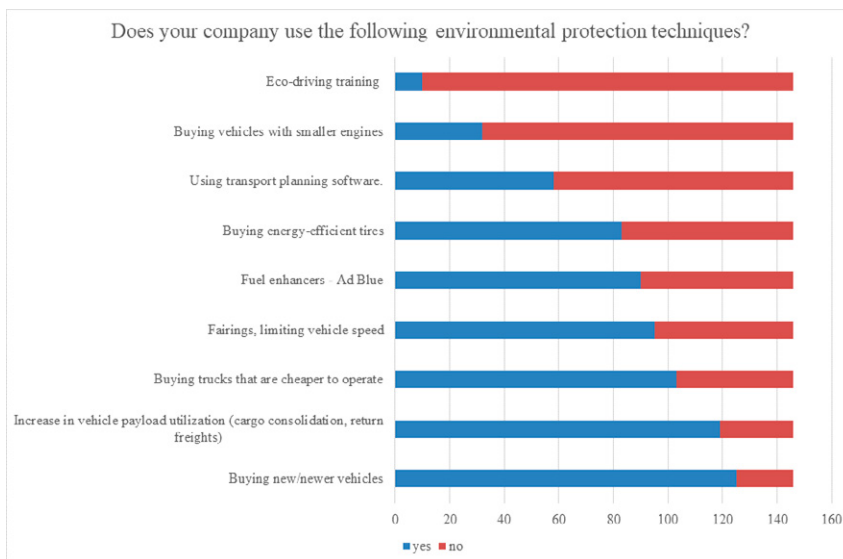


Figure 2. Environmental protection techniques used in surveyed companies according to the 2021 survey

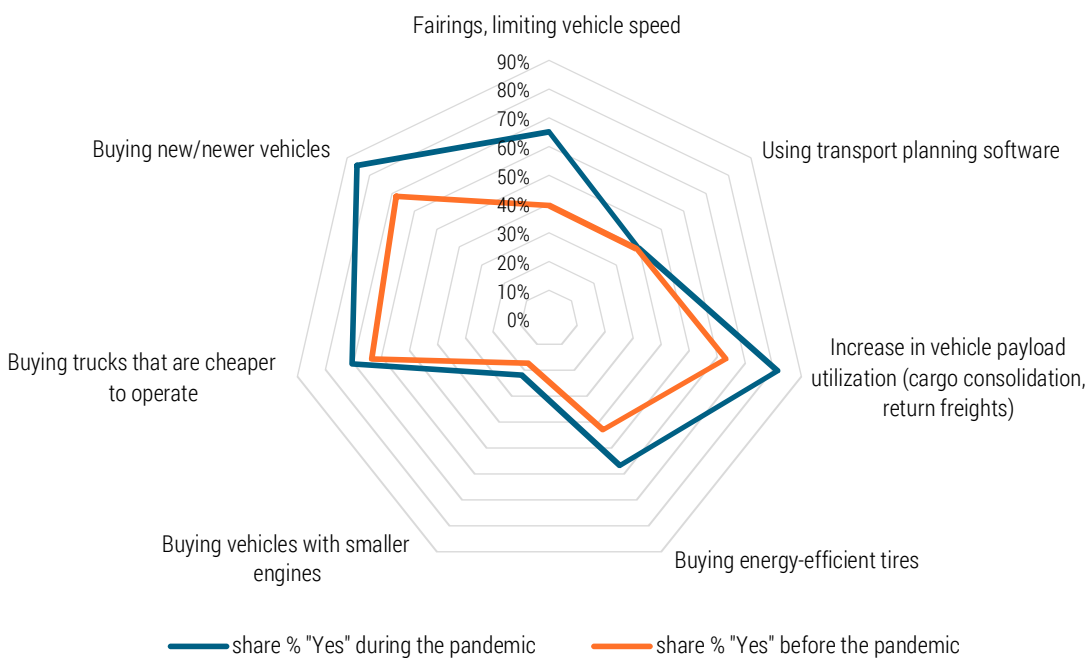


Figure 3. Comparison of environmental protection techniques used in the surveyed companies before and during the pandemic

The survey was designed not only to analyse areas of environmental activities of road carriers but also to identify changes in regulatory initiatives that could motivate companies to invest in environmental activities further. The answers provided by the surveyed companies can, therefore, be helpful in determining practical directions for implementing *Green Deal* principles in the national space in the new post-pandemic reality. The set of factors included:

- investments in road infrastructure,
- investments in multimodal terminals,
- fleet renewal programs (tax reduction, subsidies),
- introduction of tax systems differentiating vehicle taxes depending on exhaust emissions,
- special tax on exhaust emissions,
- tax incentives to promote alternative fuels,
- introduction of charges related to the level of vehicle exhaust emissions,
- introduction of road charges based on the level of vehicle exhaust emissions,
- application of transport planning systems (software) to reduce the importance of empty runs,
- mandatory monitoring and reporting of emissions and greening policies at the company level,
- fuel savings through driver training (eco-driving),
- revising regulations on vehicle weights and dimensions,
- multilateral licensing system, including incentives for cleaner and safer trucks.

Particularly relevant to the policy of implementing green governance, therefore, are those factors to which companies will theoretically show the greatest sensitivity, i.e. those to which the greatest weight has been assigned. At the time of the pandemic, among these potential motivators (external incentives), the largest number of companies pointed to “investments in road infrastructure” and “introduction of tax systems differentiating vehicle taxes based on emissions” as the most attractive incentive initiatives. It is therefore not surprising to point out the dependence of the amount of tax on exhaust emissions as a motivating factor for pro-environmental behaviours since the results of this research show that road carriers in Poland are paying increasing attention to the emission performance of their fleets. This was followed by other factors. Their distribution is shown in Figure 4.

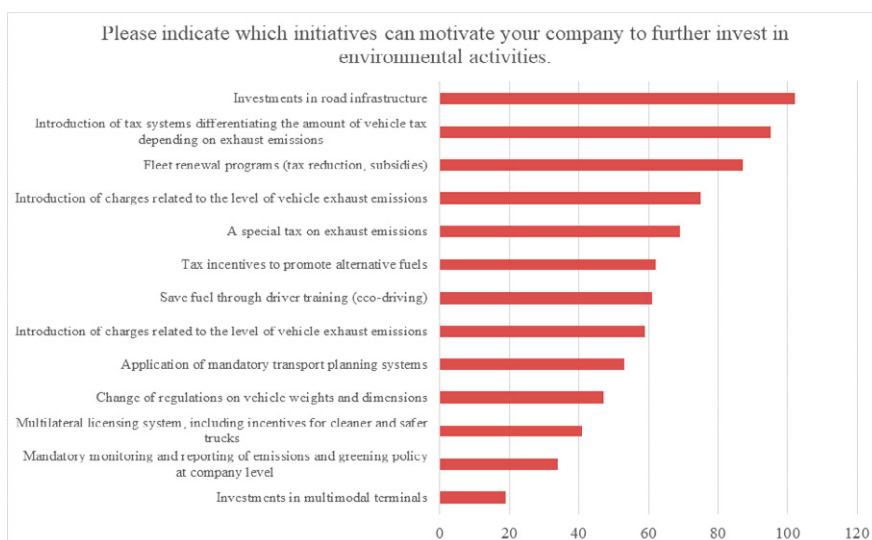


Figure 4. Distribution of factors potentially most motivating transport companies to behave in an environmentally friendly way

It should be noted that the previous study assumed that in the era of the 2020-2021 pandemic, conditions in the transport services market (including companies' purchasing decisions and planned investments) may be deformed. As a result of the economic crisis, companies' environmental activities have lost ground (OECD, 2020), although this did not necessarily mean an unequivocally worse situation in terms of the negative environmental impact of road carriers. Thus, it seems interesting to compare the results ranked by the 2018 survey with those obtained during the pandemic (Figure 5).

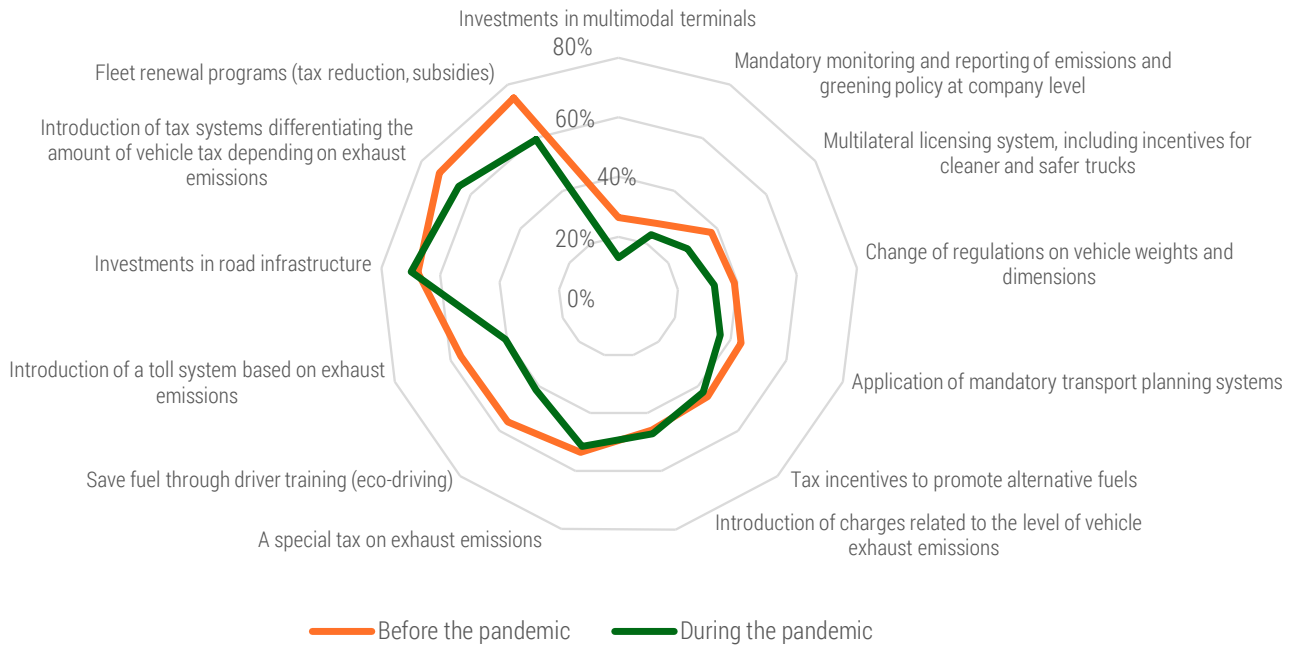


Figure 5. Comparison of the distribution of factors potentially most motivating transport companies to pro-environmental behaviour defined before and during the pandemic

The survey results show changes in the importance of some factors. Within the first three, fleet renewal programs (the most important motivator in the previous survey) have lost importance in favour of infrastructure investment. Thus, currently, the arrangement of activators with the greatest power of impact is as follows:

- investments in road infrastructure,
- introduction of tax systems differentiating vehicle taxes depending on exhaust emissions,
- fleet renewal programs (tax reduction, subsidies).

The change in importance was also noted for the introduction of road charges based on the level of vehicle exhaust emissions.

At this point, it should be emphasised that the results of the research only apply to medium and large road carriers and in a specific pandemic time. Other studies show that the effects on road transport should be considered in the short and long term. Both perspectives reveal a slightly different picture of road freight transport and consequently lead to different conclusions that can be used in shaping strategies for the future years of the sector's operators (Łącka & Suproń, 2021). Moreover, as a result of the pandemic crisis, many countries have taken active anti-crisis measures. One effect of the pandemic, therefore, was that individual countries became more active in assisting businesses. Many Polish small and medium-sized freight transport companies have benefited from the anti-crisis shields, which, as in other European countries, were implemented by the government in Poland because of the COVID-19 pandemic business rescue decision (Osinska & Zalewski, 2020). A survey of 500 small and medium-sized Polish road freight transport companies shows that as many as 98.5% of the entities have benefited from state aid in a variety of forms to help them offset the effects of the crisis felt because of the pandemic. Polish transport companies assessed state aid quite well. The largest number of entities, almost 85%, benefited from assistance consisting of an exemption for three months from paying mandatory social security contributions. Nearly 70% of the surveyed entities have taken advantage of the possibility of financial support provided by labour offices in the form of payment of part of the salary of employees (Osinska & Zalewski, 2020). Considering the above, carrying out research in the population of medium and large road carriers maybe may provide a limited basis for inferring because these carriers are a minority in the population of providers of this type of service (SpotData, 2023). Taking into account the current phase of discussion on the validity of the Green Deal goals, it would be advisable to carry out a wider survey in the near future, i.e. the whole population of road carriers, including small operators.

Conclusions

A long-term perspective allows operators to pursue a thoughtful policy for change. However, the constant volatility of the environment, as indicated by recent events, is also affected by changes that were not foreseeable. In economic theory, such events are called “black swans” (Taleb, 2007). They are drastically changing the economic conditions as well as the perceptions and attitudes towards the planning of the near future by all economic actors, including, consequently, transport service providers.

One of the most significant recent developments that has had and continues to have a significant impact on the world’s economies, as well as on individual sectors, was and is the COVID-19 pandemic, announced by WHO in March 2020. Its impact on the economy has led, among other consequences, to a reduction in transport needs as a result of the de facto halting of certain industries, broken supply chains, and problems for individual freight carriers.

During the pandemic, the biggest negative impact was, of course, a decline in the number of transport orders, resulting in the suspensions or cessations of business activity. Under pandemic conditions, Poland’s medium and large road carriers took measures aimed at survival – reducing their workforce and adjusting investment policy guidelines in upgrading their vehicle fleet. As the results of earlier surveys showed, Polish large and medium-sized road carriers had specific expectations regarding incentives from the regulator – the state – which could contribute to their greener behaviour when fulfilled. The introduction of instruments supporting the implementation of a given standard and meeting the expectations of businesses in this regard would benefit the state, the environment, and, thus, society at large. The COVID-19 pandemic, which has changed the business conditions for entities globally, has also had certain effects on large and medium-sized Polish road carriers. The most important impact is that 24 entities among the study sample identical to the previous survey did not participate in the survey due to suspension or cessation of business activity. Other entities changed their environmental activities during the pandemic. The results remained the same only in the use of transport planning software. In terms of expectations for legislative change, there has been a strengthening of expectations for infrastructure investment and the introduction of greenhouse gas emission fees. In contrast, the weight attributed to state financial assistance for fleet renewal toward reducing its environmental impact has declined. The Green Deal as a set of environmental priorities for businesses has not changed and remains the defining document of Europe’s global policy priorities while responding to the challenges of climate and the state of the environment (Leonard et al., 2021). In post-pandemic conditions (which we seem to be slowly moving towards), as those that are reordering the socioeconomic reality, the pattern of expectations of the regulatory processes for implementing Green Deal goals has changed.

The new post-pandemic economic reality is forcing companies to take a repeated look at their strategy for operating under a still-prioritized perception of environmental friendliness. European Commission President Ursula von der Leyen describes the assumptions of the Green Deal as a compass by which “we can turn the crisis of this pandemic into an opportunity to rebuild our economies differently and make them more resilient” (Montesi, 2020). Particularly relevant to the policy of implementing green governance in the context of road transport are, therefore (Janda & Sajdikova, 2022):

- investments in road infrastructure (both those that will help reduce diesel emissions and those that will make it easier to operate vehicles powered by alternative fuels),
- introduction of tax systems differentiating vehicle taxes depending on exhaust emissions,
- fleet renewal programs (tax reduction, subsidies).

Still at issue are the reasons for the change in the ranking and designation of programs to assist carriers by the state in renewing their vehicle fleets. The reason, as it seems, is to be found in the “cleansing” features of crises, which eliminate the weakest entities on the one hand and, on the other hand, stimulate the flexible businesses to verify the areas of operation, assets and the level of economic efficiency. The Green Deal also focuses on the topic of transport asset operation and the investment policies of road carriers (Peeters, 2021). European policy, as defined by the Green Deal assumptions to which road carriers must adhere, has not changed course during the pandemic. Green Deal priorities remain unchanged, for road carriers continue to focus on reducing the harmful effects of road transport on the environment. However, the market has changed, as can be seen, for instance, by

the decline in the number of transport companies, and the new economic reality is a daunting challenge also in terms of environmental friendliness for all market entities.

The contribution of the authors

Conceptualisation, A.L., B.M. and M.Ł.; literature review, M.Ł. and B.M.; methodology, A.L.; formal analysis, A.L., B.M. and M.Ł.; writing, A.L., B.M. and M.Ł.; conclusions and discussion, A.L., B.M. and M.Ł.

The authors have read and agreed to the published version of the manuscript.

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ZMIANY W PODEJŚCIU DO REALIZACJI CELÓW „ZIELONEGO ŁADU” POLSKICH PRZEWOŹNIKÓW DROGOWYCH W WYNIKU PANDEMII COVID-19

STRESZCZENIE: Celem artykułu jest ukazanie zmian w funkcjonowaniu polskich dużych i średnich przewoźników drogowych w kontekście wymogów prośrodowiskowych UE zawartych w Zielonym Ładzie w okresie postpandemicznym. Spadek liczby zleceń transportowych wynikający z ogólnego spowolnienia gospodarki w czasie pandemii Covid-19 niewątpliwie wpłynął na obroty przewoźników drogowych, a w konsekwencji na finansowanie projektów inwestycyjnych, w tym inwestycji przyjaznych środowisku. Weryfikacja skali i kierunku tych zmian wydaje się bardzo potrzebnym aspektem badań w kontekście niezmiennie wysokich wymagań Zielonego Ładu. Przeprowadzone badania pokazują wpływ pandemii na decyzje inwestycyjne i działalność firm transportowych oraz postpandemiczną rzeczywistość w transporcie. Praktyczne zastosowanie wyników badań jest bardzo przydatne, przede wszystkim jako wytyczne dla przewoźników drogowych w kontekście Zielonego Ładu.

SŁOWA KLUCZOWE: pandemia, regulacje, Zielony Ład, transport