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THE SIGNIFICANCE OF CHANGES IN FUEL PRICES IN THE CONTEXT OF THE OPERATIONS OF TRANSPORT ENTERPRISES IN POLAND AND EUROPE

Summary. This paper presents the development of the transport industry and indicates its leading role in the economic development of the country and the world. The paper analyzes the structure of the transport market in Poland and Europe, indicating its dynamic development despite the existing challenges related to fuel prices. The main objective is to assess fuel price fluctuations in the context of the activities of transport companies, in particular those performing land transport within the European Union. The assessment is conducted from the perspective of the operational activities of transport companies. This research aimed to identify the impact of fuel prices on companies' operating costs, analyze the economic factors influencing fuel prices, and assess the general situation in the transport market. In addition, the research also examined the opinions of entrepreneurs on how they cope with the current fuel crisis. Achieving the research goal required the preparation and administration of surveys among representatives of transport companies. The study involved 71 companies registered in Poland. The paper contains selected statistical data along with their interpretation, providing an introduction to further research in the field of identification and assessment of the degree of impact of fuel price fluctuations on the operational activities of transport companies. The research methodology focused on statistical analysis using the Pearson correlation coefficient and one-way ANOVA. This paper fills a gap in the literature on the impact of fuel price fluctuations on the activities of sports enterprises. The innovative element of the paper is the inclusion of entrepreneurs' opinions on the fuel crisis and their assessment of the degree of impact of changes on the operating costs and strategic management of transport enterprises. Considering these opinions provides the unique value of the conducted scientific considerations.

1. INTRODUCTION

Over the last 12 years, the transport industry has been developing dynamically, both in the domestic and international markets [1, 2]. More and more new transport companies are being established, infrastructure is being expanded, new logistics and forwarding centers are being created, and innovative

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solutions are being introduced [3, 4]. Despite the continuous growth of the transport market, it faces many challenges [5, 6]. The most important ones in recent years include the shortage of professional drivers, changing domestic and international transport regulations, and new rules covering environmental protection standards and unstable transport rates and fees that are difficult to estimate [7, 8]. Many internal and external factors influence the changes taking place in transport. The most important factors are the economic situation in the country and in the world, the level of inflation, the unemployment rate, price fluctuations in the fuel market, and the recent armed conflict in Ukraine, which forced many carriers to change the direction of operation of their enterprises [9, 10].

One of the most essential branches of the economy is the transport industry, especially road transport [11, 12]. This is evidenced by the fact that currently, virtually all areas of the economy depend on transport [13, 14]. Even though the share of transport and storage is 6% of the Polish GDP, other industries, especially trade and industry, cannot function without transport. In 2022 transport companies employed 1 million people, were responsible for 85% of Polish exports, and contributed over 4.5 billion euros in taxes to the state budget [15, 16].

Polish transport companies also have a significant impact on the European economy. From 2008 to 2020, the share of Polish carriers in transporting goods from Germany to France increased more than threefold (from 8% to 25%) [17, 18]. It is also worth adding that in 2022 alone, the cargo volume transported by Polish carriers accounted for almost 20% of all transport in the European Union; Poland ranked first among European countries in this regard [19, 20]. One of the biggest challenges facing Polish transport companies is the dynamic change in the fuel market in Poland and around the world. Therefore, this research aimed to determine the extent to which fuel prices affect international transport. The scope of the work includes determining the economic and business factors that have had the most significant impact on the fuel price market over the last 10 years. Some of the most critical research problems posed in the article are: [21, 22]

- how fuel prices influenced the transport market,
- whether the fuel crisis has hampered development in the transport industry,
- how transport companies deal with high fuel prices.

The main aim of the research is to assess fuel price fluctuations in the activities of transport companies, particularly those carrying out land transport in the European Union. In addition, the research aimed to examine the opinions of entrepreneurs on how they are dealing with the current fuel crisis. Achieving the research goal required preparing and administering surveys among representatives of transport companies. Seventy-one enterprises registered in Poland participated in the research.

The answers to the questions enable an objective assessment of the current situation in the transport market. Additionally, they demonstrate the extent to which fuel market conditions influence transport companies' operations [23].

2. RESEARCH METHODOLOGY

This paper aimed to assess the impact of fuel price fluctuations on the operational activities of transport companies, especially those performing land transport operations in the European Union. The study also aimed to examine the positions and opinions of companies regarding how they are coping with the fuel crisis.

The paper answers the following key questions:

- How do fuel prices affect the transport market?
- Has the fuel crisis caused a slowdown in the development of the transport industry?
- How do transport companies cope with high fuel prices?

1. In the first stage, an analysis of the structure of the transport market in Europe and Poland was carried out. Based on data from Eurostat, a comparison and analysis of the number of tonne-kilometers (a unit of measurement used in freight transport of transport work performed by a means of freight transport, defining the transport of one tonne of goods over a distance of one kilometer) traveled in individual European countries and the number of tonne-kilometers covered in domestic transport was

made. Based on data from the Polish Central Statistical Office, a comparison and analysis were made of several factors. These include the number of licenses issued in international road transport, the number of transport companies, and the number of vehicles. The analysis also covered the carriage of goods in international road transport.

2. In the second stage, a survey was conducted. The study covered 71 transport companies registered in Poland. The research subjects are transport companies offering cargo transport services by land on international (European) routes. It should be noted that this type of transport is essential for the development of the domestic, European, and global economies. The sample of 71 companies represents a wide range of transport companies, characterized by the size of the fleet, the number of transport services performed, and the scope of activity. The respondents were representatives who held key positions in transport companies. This ensured that answers based on practical experience and knowledge about the functioning of the companies were obtained. The study was conducted in the fourth quarter of 2022. This period was deliberately chosen to consider the changes in fuel prices and their impact on the activities of transport companies. Surveys were sent to representatives of transport companies using an online platform, which enabled quick and efficient collection of responses from survey participants. Both closed and open questions were included in the survey, which allowed for the collection of quantitative and qualitative data.
3. At this research stage, a statistical analysis was carried out using the Pearson correlation coefficient and one-way analysis of variance (ANOVA).

3.1. Pearson correlation analysis was used to determine the relationship between the variables studied characterizing transport companies (fleet size, average number of transport services performed per month, impact of fuel prices on transport, transport rates about fuel prices, and assessment of the development of the transport industry). Correlations measured the direction and strength of the relationship between the variables.

The null and alternative hypotheses for Pearson correlation analysis testing the existence of relationships between the variables studied were as follows:

- Null hypothesis: There is no correlation between the studied variables.
- Alternative hypothesis: There is a correlation between the studied variables.

3.2. ANOVA was used twice. The first time was to determine the relationship between the possibility of expanding the transport fleet and the factors characterizing transport companies.

The null hypothesis and the alternative hypothesis for the ANOVA conducted to test the existence of relationships between the variables studied were as follows:

- Null hypothesis: The factor characterizing the possibility of expanding the transport fleet does not affect the variable related to the transport company.
- Alternative hypothesis: The factor presenting the possibility of expanding the transport fleet affects the variable related to the transport company.

The second time, the ANOVA analysis was used to determine the relationships between the factors characterizing transport companies and the possibility of expanding the transport fleet.

The null hypothesis and the alternative hypothesis for the ANOVA test conducted to assess the existence of relationships between the variables studied were as follows:

- Null hypothesis: The factor characterizing the company does not affect the variable related to the possibility of expanding the transport fleet.
- Alternative hypothesis: The factor characterizing the company affects the variable related to the possibility of expanding the transport fleet.

Statistical analyses were conducted to provide empirical evidence for significant relationships between the variables studied.

The results constitute an innovative approach to the conducted research and allow for the presentation of recommendations regarding the stabilization of fuel prices and the formulation of the paper's conclusions.

3. ANALYSIS OF THE STRUCTURE OF THE TRANSPORT MARKET IN EUROPE AND POLAND

3.1. The structure of the transport market in Europe

In 2022, around 1,000,000 transport companies were operating in the European Union, of which around 600,000 were road transport companies [24]. Most have their own fleets that transport goods within the country or abroad. They transport goods manufactured in Europe or imported from other continents by ship or plane. Table 1 presents selected European Union countries where transport plays a key role in the economy and domestic and international trade. Additionally, the indicated countries have different levels of development of transport infrastructure. In terms of the number of transported cargo podium in Europe is occupied by countries such as Poland, Germany, and Spain [25, 26]. However, the leader is Poland. Germany is the only country that has recorded a decrease in the ranking of the amount of cargo transported. Although Spain constantly increases the number of tonne-kilometers transported, the difference between Spain and Poland does not decrease significantly and is still over 100,000 tonne-kilometers. It is worth paying attention to countries such as the Czech Republic and Lithuania, which increased their productivity by almost half from 2017 to 2021. Spain and Italy recorded significant rebounds in 2021 compared to 2020. The COVID-19 pandemic hit these countries particularly hard [27, 28].

Table 1

Number of tonne-kilometers traveled in individual European countries [19]

Country	2017	2018	2019	2020	2021	2022	Variation 2018/2022 [%]
Poland	335,22	315,874	348,952	354,927	379,82	385,089	21.9
Germany	313,149	316,772	311,875	304,613	307,272	303,948	-4.0
Spain	231,109	238,994	249,559	242,268	270,176	266,724	11.6
France	167,691	171,875	174,061	169,663	174,853	173,353	0.9
Italy	119,687	124,915	137,986	133,222	144,986	151,100	21.0
Netherlands	67,533	68,876	68,923	67,594	70,228	67,148	-2.5
Czech Republic	44,274	41,073	39,059	56,09	63,756	65,794	60.2
Romania	54,704	58,762	61,041	55,027	61,849	64,353	9.5
Lithuania	39,099	43,59	53,117	55,292	57,755	53,773	23.4
Sweden	41,851	43,478	42,604	43,187	47,485	47,865	10.1

Germany has been the leader in domestic transport for several years despite stagnation since 2017. It is worth noting that the rest of the leading countries in Europe significantly increased the amount of domestic cargo transported during the period in question. In 2019, Spain pushed France out of second place, and this state of affairs continues today. According to the data in Fig. 1, Poland dominates the international transport market in Europe. Almost 1/3 of the cargo is handled by Polish companies. In second place is Germany, and in third place is Spain, with an increase of almost 15% in five years and a significant advantage over fourth place. The number of tonne-kilometers traveled in domestic transport is the lowest for Romania, Lithuania, and Sweden. In summary, Poland, Germany, and Spain have been the top three countries in Europe for several years in terms of the number of tonne-kilometers transported. However, when domestic and international transport are separated, other countries also lead in this ranking. The undisputed global and domestic transport leaders are Poland and Germany. However, many countries are developing their transport operations, which has changed the structure of the transport market in Europe, and the biggest surprise in recent years has been Lithuania, which has significantly increased its share, especially in international transport, and has overtaken such an economic power as Germany.

3.2. The structure of the transport market in Poland

Analyzing various structural data and reports on transport in Poland shows that Polish transport is still developing. The number of transported loads and transport companies has increased every year.

Poland also plays a vital role in the European market. In 2022 alone, the cargo volume transported by Polish carriers accounted for almost 20% of all transport in the European Union, putting Poland in first place in this ranking. Transport development is also accompanied by infrastructure; more and more new roads are being built, and companies are adding more cars to their fleets (Fig. 1).

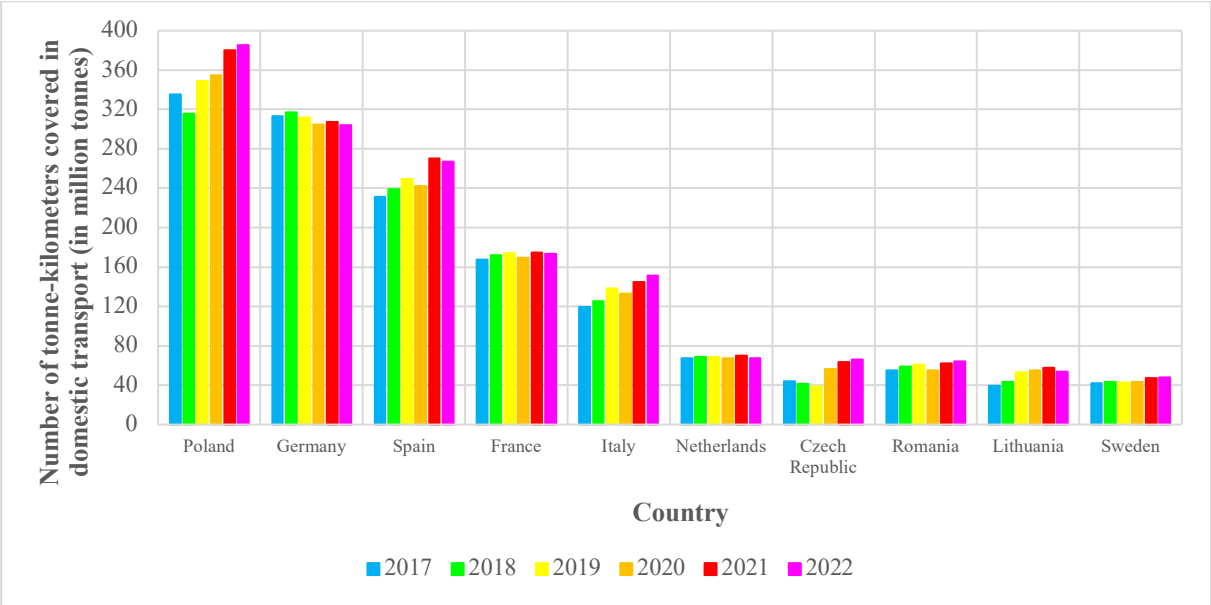

Fig. 1. Number of tonne-kilometers covered in domestic transport [19]

According to the data presented in Fig. 2, over the last 10 years, the number of extracts of international licenses (which is a necessary document for all vehicles that provide commercial transport services outside Poland), has more than doubled. There are more and more vehicles in the market, and transport companies are increasing their fleets and, therefore, investing more in development year over year.

There are 36,511 transport companies in Poland that have an international license to transport goods, and their fleets comprise a total of 256,000 vehicles. As shown in Fig. 3, the companies with two to four vehicles are the most common. It is worth adding, however, that only 15% of vehicles have licensed carriers. In the last five years, companies with over 100 vehicles in their fleets are the fastest growing (there are over 30% more now than in 2017). Companies with 51–100 vehicles are developing similarly. When it comes to the smallest carriers (one to four vehicles), their number increases proportionally from year to year. Turmoil appears after 2022, with a significant increase in companies with one and two to four vehicles. This may mean that the development of smaller transport companies may result in increased competition in the market.

Over the last 10 years, cargo transport by Polish carriers has increased by almost 250%. Notably, more goods are exported than imported (i.e., there is a trade surplus). The amount of exported goods is growing every year, and road transport plays one of the most important, if not the most important, roles among all types of transport. As previously mentioned, Poland is the leader in the entire European Union in terms of cargo transport [29]. When analyzing the development of transport companies in Poland, we must remember the introduction of modern solutions that increase their profitability and allow for a quick analysis of the situation in the company. We can mention the Transport Management Systems, which quickly collects data from the entire vehicle fleet and allows one to respond quickly to a given situation [30, 31]. The transport market in Poland is constantly evolving; new mobility packages and driver monitoring tools are being introduced. Therefore, investing in new technologies and introducing innovative solutions is essential to be competitive and achieve constant development [32, 33].

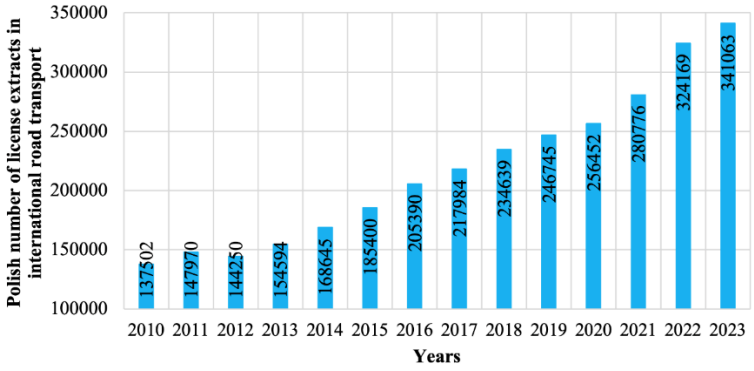

Fig. 2. Number of license extracts in international road transport in Poland [20]

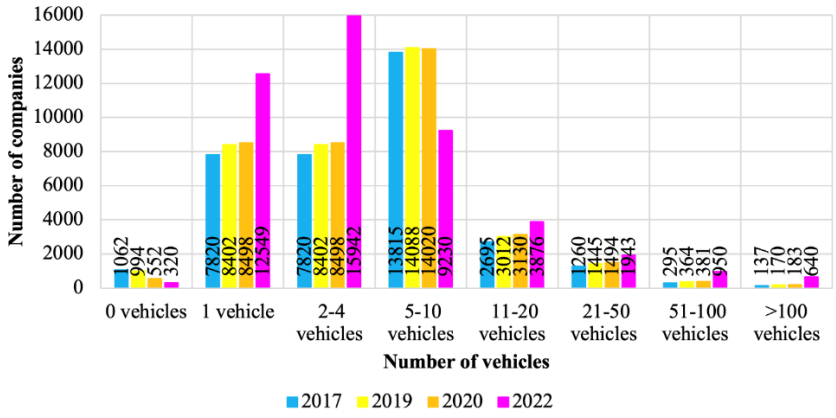

Fig. 3. Number of transport companies compared to the number of vehicles [21]

4. ANALYSIS OF THE RESULTS OF RESEARCH CONDUCTED AMONG TRANSPORT ENTERPRISES

The survey aimed to determine the extent to which fuel prices influence the transport market and the functioning of transport companies. The 71 transport companies from all over Poland took part in the study. The study was conducted in the last quarter of 2022. The most important questions concerning the research problem were selected and analyzed based on several questions. The analysis of the research results is presented below.

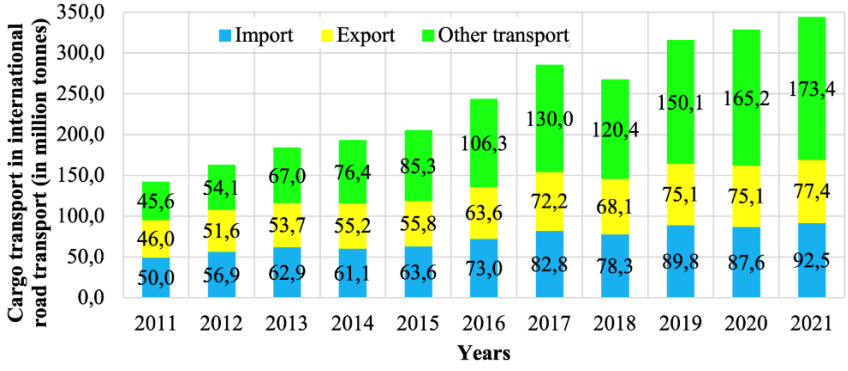

Fig. 4. Cargo transport in international road transport (in million tonnes) [22]

The data presented in Fig. 5 show that most companies among the respondents have up to 10 vehicles, and they play the most crucial role in the market, which has already been confirmed in the structural analysis of the transport market. Despite this, the majority of companies have 10 to 50 vehicles. It is also worth adding that most smaller companies (up to 10 vehicles) provide transport within Poland. In comparison, larger companies and those without a fleet operate both abroad and in Poland or only offer international transport services.

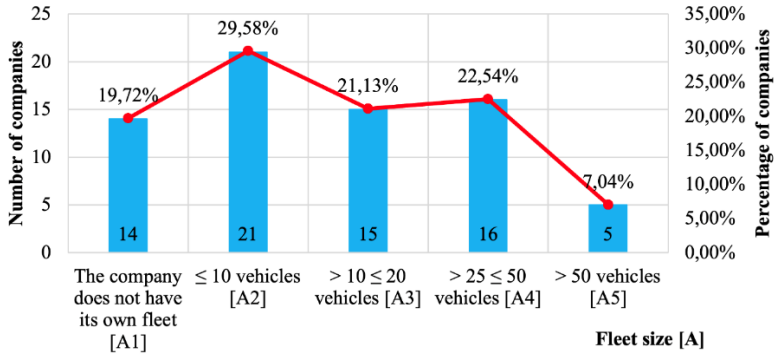

Fig. 5. Fleet size [A]

The data presented in Fig. 6 show that most companies provide more than 200 transport services per month, most of which have a fleet of more than 25 vehicles or are typical forwarding companies that do not have a fleet. However, 69% of respondents provide up to 200 services per month. These are mainly companies that have up to 25 vehicles in their fleet. This statistic shows that the larger the company, the more transport services it can provide. However, forwarding companies without a fleet are becoming increasingly important.

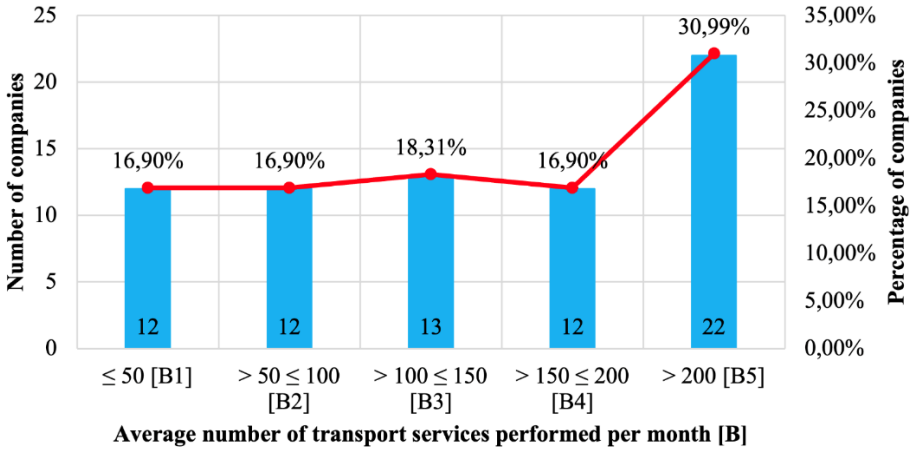

Fig. 6. Average number of transport services performed per month [B]

The data presented in Fig. 7 show that, according to most respondents, the fuel price significantly impacts transport. Considering that most of the fleets of the surveyed companies cover more than 2500 km per week, their demand for fuel is very high, meaning that any price fluctuation is of paramount importance. From my observations, the difference in fuel costs can reach up to several hundred euros per car. Because the dynamics of fuel prices have been very high recently, every company has felt the increase in these prices. Despite this, most companies still need to change the size of their fleets. However, there were a few cases where the number of vehicles decreased slightly (by two to three

vehicles). It is also worth mentioning that the surveyed companies are aware of cases of complete suspension of operations by other enterprises.

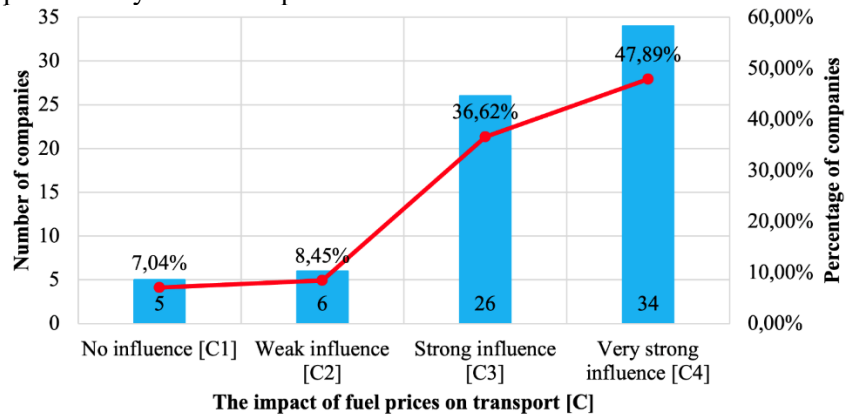

Fig. 7. The impact of fuel prices on transport [C]

The data in Fig. 8 show that with the change in fuel prices, transport rates increased. As can be seen in the chart above, most of the surveyed companies also experienced this. Nearly half saw freight prices increase by more than 10%. Despite this, the number of transport offers did not change according to the majority, but it is worth noting that over 25% of companies recorded a slight decrease in the number of these offers (up to 10%). Target customers who order cargo transportation, taking into account rising fuel prices, react to these changes by increasing transport rates, but in most cases, they do it not very willingly, and, therefore, negotiations with such customers are more difficult.

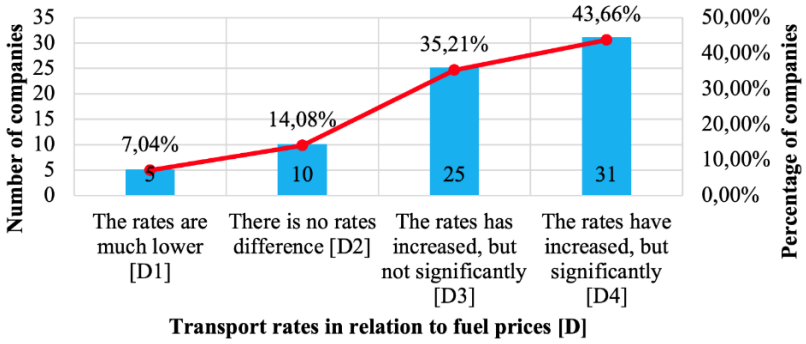

Fig. 8. Transport rates in relation to fuel prices [D]

The data in Fig. 9 show that although most respondents assess the situation in the fuel market as bad or very bad (over 80%), it did not harm the development of the transport industry. Over 70% of companies believe that transport is developing, albeit at a moderate pace. The increased costs of entrepreneurs are compensated by the previously mentioned changes in rates, and as a result, the industry continues to develop. However, not everyone is of the same opinion, and there are concerns about the future of the industry, mainly resulting from other companies declaring bankruptcy.

Based on the data in Fig. 10, it can be concluded that due to the current crisis, the vast majority of companies do not plan to expand their fleet. This is mainly due to the unstable economic situation and the dynamics of price changes. Nevertheless, some companies are moving forward with their planned investments. They are expanding their fleets, training and developing their employees, and introducing newer software. It is also worth noting that many companies (over 40%) have long-term plans to introduce vehicles powered by alternative energy sources (electricity or gas). This also shows that the industry is heading in the right direction and that companies want to introduce innovative solutions to the market.

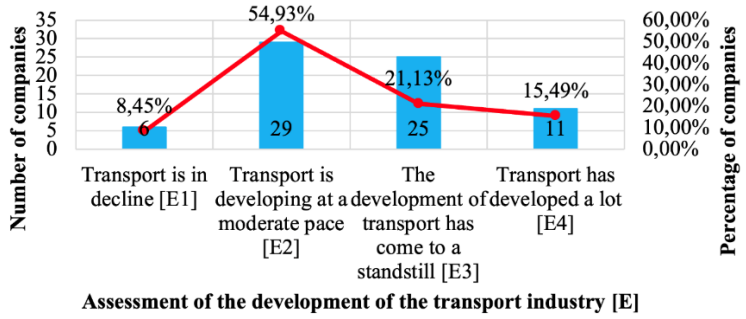

Fig. 9. Assessment of the development of the transport industry [E]

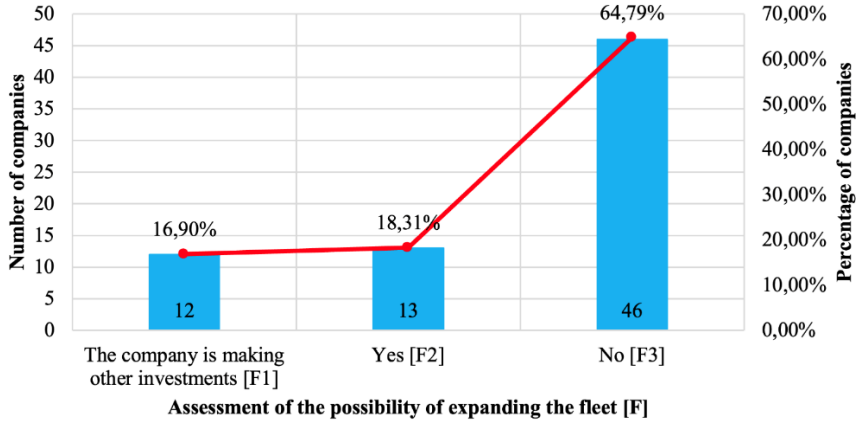

Fig. 10. Assessment of the possibility of expanding the fleet [F]

5. STATISTICAL ANALYSIS AND DISCUSSION

At this research stage, statistical analysis was performed using the Pearson correlation coefficient. The analysis focused on assessing the impact of fuel prices on the operational activities of the 71 surveyed transport companies and their cost management strategies, including transport rates. This analysis provides empirical evidence of the existence of significant relationships between the studied variables (fleet size, average number of transport services performed per month, the impact of fuel prices on transport, transport rates in relation to fuel prices, and an assessment of the development of the transport industry), which may enhance cost management in the face of changing fuel prices.

Pearson R-correlation coefficient values and corresponding p-values were carefully analyzed (Table 2). The aim was to determine which of the analyzed factors were statistically significant and to what extent they were related. The analysis results provide valuable information regarding the impact of fuel prices on the transport industry. Additionally, they can help transport companies and political decision-makers make more accurate and informed strategic decisions.

There is a statistically significant (p-value=0.0000) positive moderate correlation (Pearson R=0.5600) between [A] and [B]. This means that companies with a larger fleet provide more transport services per month. There is a statistically significant (p-value=0.0000) positive moderate correlation (R-Pearson=0.6695) between [B] and [C]. This means that fuel costs have a greater impact on companies that provide more transport services per month. There is a statistically significant (p-value=0.0000) positive moderate correlation (Pearson R=0.6695) between [B] and [D]. This means companies that provide more monthly transport services have higher transport rates. There is a statistically significant (p-value=0.0000) positive strong correlation (R-Pearson=0.8758) between [C] and [D]. This means that an increase in fuel costs leads to increased transport rates. There is a statistically significant (p-value=0.0020) weak negative correlation (R-Pearson=-0.3669) between [C] and [E]. This means that

an increase in fuel prices results in a lower assessment of the development of the transport industry. There is a statistically significant (p-value=0.0210) weak negative correlation (R-Pearson=-0.2737) between [D] and [E]. This means that higher transport rates have a lower impact on the development of the transport industry.

Table 2

Pearson R-correlation results

	Factor		[A]	[B]	[C]	[D]	[E]
[A]	Fleet size	R-Pearson	-				
		p-value	-				
[B]	Average number of transport services performed per month	R-Pearson	0.5600	-			
		p-value	0.0000	-			
[C]	Impact of fuel prices on transport	R-Pearson	0.1677	0.6695	-		
		p-value	0.1620	0.000	-		
[D]	Transport rates in relation to fuel prices	R-Pearson	0.0703	0.6470	0.8758	-	
		p-value	0.5600	0.000	0.0000	-	
[E]	Assessment of the development of the transport industry	R-Pearson	0.1449	0.0037	-0.3669	-0.2737	-
		p-value	0.2280	0.9760	0.0020	0.0210	-

Pearson's correlation analysis indicates that the size of the company's fleet significantly impacts the number of transport services provided. Rising fuel prices significantly affect the number of transport services, which requires transport companies to increase transport rates. High fuel prices have a strong impact on the number of transport services. This also requires transport companies to increase transport rates. A very strong relationship exists between increasing fuel prices and increasing transport rates. Rising fuel prices and the related rising transport rates may harm the development of the transport industry. The above conclusions emphasize the importance of fuel costs for developing the transport industry in constantly changing market conditions. In the next stage, a one-way ANOVA was performed. This analysis aimed to assess the relationship between the possibility of expanding the transport fleet [F] and the factors characterizing transport companies [A], [B], [C], [D]. There is a statistically significant impact of factor [F] on [A], [B], [C], and [D]. In each example, companies planning to expand their fleet [F2] have a higher average rating. The full results of the analysis (Fischer Statistics, p-value, Mean [M], and standard deviation [SD]) are presented in Table 3.

Table 3

One-way ANOVA results – Assessment of the possibility of expanding the fleet

Factor	[F]									
	Fischer Statistics	p-value	[F1]		[F2]		[F3]		Overall group	
			[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]
[A]	8.4653	0.0005	3.0000	1.5374	3.6923	1.0316	2.3043	1.0082	2.6761	1.2279
[B]	23.8047	0.0000	4.0833	0.7930	4.9231	0.2774	2.6087	1.3577	3.2817	1.4850
[C]	9.3270	0.0003	3.6667	0.6513	3.9231	0.2774	2.9565	0.9179	3.2535	0.8899
[D]	7.0891	0.0016	3.4167	0.9003	3.8462	0.5547	2.8913	0.9001	3.1549	0.9204
[E]	2.5420	0.0862	2.2500	0.9653	3.0000	1.0801	2.6304	0.7105	2.6338	0.8492

In the next stage of the one-way ANOVA, it was assessed what factors characterizing transport companies – [A], [B], [C], and [D] – influence the decision about [F]. All analyzed factors had a statistically significant impact on [F]. In the case of [A], companies characterized by [A5] are most interested in the possibility of expanding their transport fleet and the least interested in [A2]. In the case of [B], companies characterized by [B4] are most interested in the possibility of expanding their transport fleet, and those characterized by [B1] and [B2] are least interested. In the case of [C], companies characterized by [C4] are most interested in the possibility of expanding their transport fleet,

and the least interested in [C1]. In the case of [D], companies characterized by [D4] are most interested in the possibility of expanding their transport fleet, and the least interested in [D2]. In the case of [E], companies characterized by [E1] are most interested in the possibility of expanding their transport fleet, and the least interested in [E2]. The full results of the analysis (Fischer Statistics, p-value, Mean [M], and standard deviation [SD]) are presented in Table 1.

Table 4

One-way ANOVA results

	[A]													
Factor	Fischer Statistics	p-value	[A1]		[A2]		[A3]		[A4]		[A5]		Overall group	
			[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]
[F]	3.3457	0.0148	1.4286	0.8516	1.2857	0.6437	1.3333	0.6172	1.8125	0.8342	2.4000	0.5477	1.5211	0.7720
	[B]													
	Fischer Statistics	p-value	[B1]		[B2]		[B3]		[B4]		[B5]		Overall group	
			[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]
	6.4714	0.0002	1.0000	0.0000	1.0000	0.0000	1.4615	0.8771	1.9167	0.9962	1.9091	0.6838	1.5211	0.7720
	[C]													
	Fischer Statistics	p-value	[C1]		[C2]		[C3]		[C4]		Overall group			
			[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]		
	5.9850	0.0011	1.0000	0.0000	1.3333	0.8165	1.1923	0.5670	1.8824	0.8077	1.5211	0.7720		
	[D]													
	Fischer Statistics	p-value	[D1]		[D2]		[D3]		[D4]		Overall group			
			[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]		
	3.7405	0.0151	1.4000	0.8944	1.1000	0.3162	1.3200	0.7483	1.8387	0.7788	1.5211	0.7720		
	[E]													
	Fischer Statistics	p-value	[E1]		[E2]		[E3]		[E4]		Overall group			
			[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]	[M]	[SD]		
	2.9771	0.0376	2.3333	0.8165	1.3600	0.7572	1.4483	0.7361	1.6364	0.6742	1.5211	0.7720		

The statistical analysis shows that transport companies with larger fleets provide more transport services per month, increasing their sensitivity to fuel price changes. Additionally, it is worth noting that a larger fleet allows for better cost optimization and more effective resource management. In turn, the increase in fuel prices causes an increase in transport rates, which results in a lower assessment of the development of the transport industry. Companies must adapt their pricing strategies to maintain profitability when faced with rising fuel costs. Enterprises that provide more transport services per month and experience a more significant impact of fuel prices are more willing to invest in fleet expansion. Higher transport rates and fuel price increases may hurt the transport industry's development. Companies that have larger fleets, provide more transport services, feel a more substantial impact of fuel prices, offer higher transport rates, and assess the development of the industry are more interested than other companies in investing in development.

By identifying and understanding key relationships, this analysis fills the literature gap regarding the impact of fuel price fluctuations on the transportation industry while offering practical recommendations for transportation companies.

The analysis indicates that the size of a company's fleet significantly impacts the number of transport services provided [34, 35]. Rising fuel prices significantly affect the number of transport services provided by a company, which requires transport companies to raise transport rates [36, 37]. High fuel prices have a very strong impact on the number of transport services provided. This also requires transport companies to raise transport rates [38]. A very strong relationship exists between fuel price increases and rising transport rates [39, 40]. Rising fuel prices and the associated rising transport rates may negatively impact the transport industry's development. The conclusions drawn from the analysis emphasize the importance of fuel costs for developing the transport industry in constantly changing market conditions [41].

6. CONCLUSIONS

The survey results indicate several important conclusions and recommendations regarding the importance of fuel prices in the context of the operational activities of transport companies. Over the last 12 or so years, the transport industry in Poland has been developing dynamically, driven by the increase in transport companies, the expansion of infrastructure, and the introduction of innovative solutions. Nevertheless, the industry faces many challenges, such as a shortage of professional drivers, changing regulations, and unstable transport rates. The key economic factors influencing fuel prices are the economic situation, both in the country and worldwide, inflation, the unemployment rate, and fluctuations in oil prices. The conflict in Ukraine further aggravated the situation, driving up fuel prices. Polish transport companies significantly impact the European economy, which is evident from the growing share of Polish carriers in the international market.

It has been shown that fuel prices significantly impact the transport market. Higher fuel prices lead to higher operating costs for transport companies, forcing them to increase transport rates. Despite this, most transport companies in Poland recorded an increase in transport and maintained their fleet sizes.

Statistical analysis using the Pearson correlation coefficient showed a significant relationship between the studied variables (fleet size, average number of transport services performed per month, the impact of fuel prices on transport, transport rates in relation to fuel prices, and assessments of the development of the transport industry). This knowledge may contribute to more effective cost management in the face of fuel price fluctuations. However, one-way ANOVA results showed a clear relationship between the possibility of expanding the transport fleet and the above-mentioned factors characterizing transport companies.

The recommendations include the need to continue investing in modern technologies and solutions that can increase the operational efficiency of transport companies. Implementing Transport Management Systems and investing in alternative energy sources can help reduce dependence on rising fuel prices. Monitoring and adapting to regulation changes and adopting an innovative approach to fleet management are also key. Companies should also consider diversifying fuel sources and optimizing transport routes to reduce operating costs.

Investing in alternative energy sources can help transport companies adapt to changing market conditions and remain competitive in the market. These strategies can also contribute to more sustainable development.

To sum up, it should be stated that this article significantly fills the literature gap in the field of research on the impact of fuel price fluctuations on the operational activities of transport companies. The article provides specific recommendations regarding the stabilization of fuel prices, which may constitute a practical contribution to the literature. Moreover, the scientific considerations contained in the article may be useful both for transport companies and political decision-makers. The above elements constitute the innovative nature of the paper.

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