

# COMPARATIVE ANALYSIS OF THE UNIT COSTS OF THE POLISH FREIGHT INTERNATIONAL TRANSPORT OPERATING ON THE EASTERN AND EU MARKETS, 2009-2021

Małgorzata Zysińska, Maciej Menes

## Abstract

The article represents next part of the cyclical publications of the Department of Economic Research and Transport accessibility in the field of cost analysis of the Polish international freight transport companies. It made a comparative assessment of the average unit costs of international carriers incurred in 2021 in relation to the results from previous years. The study covered enterprises serving Eastern markets and the European Union (EU). The statistical characteristics of the surveyed entities are presented, taking into account their size, determined based on the size of the fleet of trucks operated. It also shows the average costs of one vehicle-kilometre (vehicle-km) of mileage for a truck over 12 Mg GVM, depending on the size of the enterprise and taking into account the direction of transport. The generic cost structure of the surveyed carriers was also analysed. The development of unit costs in 2021 in relation to the period 2009-2020 is presented in tabular and graphic form. A summary of the evaluation of the impact of external factors on the functioning of the sector, from the carriers' perspective, was also presented. The study was conducted based on the questionnaires completed by carriers associated with (ZMPD) Association of International Road Carriers

## Keywords:

international transport, freight transport, unit costs.

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## Introduction

The transport, forwarding and logistics (LSP) sector, and especially its international road transport sector, struggled with serious difficulties in the years 2000-2021 [4]. In 2020, no new transport companies were registered, but there were more trucks performing larger transports. The bankruptcy rate among transport companies in 2020 was 12%, and in 2021 – 10%. However, while Polish road carriers operating on the international market coped relatively well with the pandemic crisis, the war in Ukraine prevented the implementation of development plans of many of them [11-13]. It took Polish carriers half a year to recover from the pandemic in 2021. In the first half of the year, some of them reactivated transport to Eastern destinations. A lot of perturbations were caused by the implementation of subsequent provisions of the so-called Mobility Package, especially on drivers' working time and delegating and their use in cabotage or cross-trade transport carried out within the EU [14-16]. Carriers have become more concerned about the implementation of new regulations, which, in their opinion, are not adapted to market realities and are inconsistent with the Community emission policy. At the same time, new regulations regarding Eastern markets appeared, and the shortage of drivers, uncertainty and restrictions on operations on Eastern markets became more and more noticeable. These factors slowed down the activity of Polish carriers on Eastern markets in the second half of 2021 [15-17].

However, in the evaluation of the total external threats to the activities of Polish international carriers, the so-called Mobility Package leads

the way. According to the majority of respondents surveyed by ITS, in 2022 the most noticeable effect of implementing the so-called Mobility Package will result in an increase in the operating costs of Polish companies and a deterioration in the competitiveness of their operations (80%). Almost every third carrier surveyed by ITS claims that the implementation of regulations will lead to further market consolidation and bankruptcy of entities in the coming years (32%) [10], [17]. As much as 12 percent of carriers surveyed by ITS predicts intensified development of companies on the domestic market, as part of the so-called groupage transport. And 8 percent of them plan to discontinue transport activities, and another 7 percent predicts concentration on non-European markets. Only 3 percent respondents believe that the implemented regulations will lead to the transfer of activities to other countries, and only 2 percent believes that they will not affect the operations of carriers. ITS research also showed that there were changes in the fleet structure in 2020-2021. They were associated with an increase in the share of vehicles with a higher GVM (in the group of GVM above 12 Mg, also 25 Mg).

The distinguishing feature of international road transport services provided by Polish international carriers is still their full-truck nature and the resulting advantage of a fleet with a GVW above 12 Mg, with a universal body, [13], [14]. The changes described above did not significantly disturb the fleet structure. International freight transport was still characterized by cost differences depending on the type of markets served. The rates and costs in relations with Eastern markets were different than in the EU markets. It should be assumed that due to the current war in Ukraine and its future and currently difficult to predict consequences, the costs of international transport will increase and the disproportions in them will deepen [15], [16]. This is mainly due to factors such as: massive outflow of Ukrainian drivers from transport services performed by Polish transport companies, increase in fuel prices, increase in employment costs, as well as other expenses resulting from the implementation of the regulations of so-called, Mobility Package. However, the average unit costs of one vehicle-kilometre of mileage vary depending on the size of the enterprise and the direction of transport. Hence the interest in continuing research in the area of international transport costs, which is confirmed by this article.

## 1. Characteristics of the sample and research method

The data, based on which this article was created was obtained as a result of

- direct surveys (survey template – Annex 1) at selected enterprises providing international truck transport services;
- research via the ITS electronic survey form.

The Association of International Road Carriers (ZMPD), with which the Transport Economics and Accessibility Department has been cooperating for many years, played a significant role in collecting data from international truck transport companies. The obtained data was subjected to two-stage validation and verification. Then it was entered into an electronic database, based on an original computer program. A total of 99 surveys on transport activities for 2021 were analysed. Out of the total sample, 56 concerned enterprises with a dominant share of transport to and from the EU markets, while 43 with a dominant share of transport along the route to the Eastern markets. The results of the presented cost research made it possible to capture trends in changes in unit costs of transport. Detailed characteristics of the research sample analysed are included in Tables 1-2.

**Table 1. Characteristic features of the surveyed sample of international truck transport enterprises, with a dominant share of transport to/from the markets of EU countries, operating rolling stock above 12.0 Mg GVW with universal bodies, participating in cost studies for the entire year 2021, by enterprise size and weighted averages for the examined population**

Specification	measurement units	micro (1-5) [PLN/vehicle-km]	small (6-9) [PLN/vehicle-km]	medium (10-49) [PLN/vehicle-km]	large (50+) [PLN/vehicle-km]	average
Average number of trucks	pieces	2,8	7,4	19,6	77,2	30,8
Average number of employees at the enterprise	employee	3,4	8,8	25	103	40,4
Average number of drivers at the company	driver	2,8	7,4	19,8	78,6	31,2
Average mileage of cars at the enterprise	thousands of km	191,6	532,3	1368,5	5349,2	2136,9
Average mileage of one car at the enterprise	thousands of km	68,4	71,9	69,8	69,3	69,4
Number of companies examined	pieces	14	5	21	16	56

Source: authors' own study based on the ITS database on costs at the truck transport companies (as of December 31, 2022).

**Table 2. Characteristic features of the surveyed sample of international truck transport enterprises, with a dominant share of transport with Eastern markets, operating rolling stock above 12.0 Mg GVW with universal bodies, participating in cost studies for the entire year 2021, according to the enterprise size and weighted averages for the examined community**

Specification	measurement units	micro (1-5) [PLN/vehicle-km]	small (6-9) [PLN/vehicle-km]	medium (10-49) [PLN/vehicle-km]	large (50+) [PLN/vehicle-km]	average
Average number of trucks	pieces	2,9	7,0	25,8	68,0	24,8
Average number of employees at the enterprise	employee	3,7	10,0	32,2	80,4	30,5
Average number of drivers at the company	driver	2,9	7,1	26,2	67,3	24,9
Average mileage of cars at the enterprise	thousands of km	197,9	472,0	1800,8	4613,3	1706,9
Average mileage of one car at the enterprise	thousands of km	68,2	67,4	69,8	67,8	68,8
Number of companies examined	pieces	9	7	20	7	43

Source: authors' own study based on the ITS database on costs at the truck transport companies (as of December 31, 2022).

The majority of companies in the survey were medium-sized enterprises. This conclusion applies to both transport carried out to/from EU (36%) and Eastern (47%) markets. In the case of serving direction on EU markets, the group of small enterprises was the least numerous (9%), while in the case of Eastern markets the least numerous were: the group of large enterprises with a fleet of over 50 vehicles (16%), and small enterprises, within 6 up to 9 vehicles (16%) [10].

In the surveyed sample of entities with a dominant share of transport on the markets of EU countries, in 2021 the statistical transport company had on average 30.8 cars with a GVM exceeding 12.0 Mg, with a universal body, while in the Eastern markets 24.8 cars with the same parameters (Tables 1 and 2). Therefore, there was a change in the fleet structure between the two markets compared to the data from 2020 (an increase in the average number of vehicles on EU markets by 30% and a decrease on Eastern markets by 15%). The average annual mileage of a truck used by enterprises operating on both markets was similar in 2021, although with a predominance of intensification on the Eastern markets in the first half of 2021. Among carriers serving the Eastern markets, it was on average 68.8 thousand. km, and on EU markets - 69.4 thousand. km. However, the difference in the average annual mileage of vehicles in general widened (they were higher in the EU markets than in the Eastern markets by

approximately 25%). This indicated shifts in transport services on Eastern markets in the first half of 2021, resignation from some directions due to the tense political situation, and then intensification of transport on EU markets, just before the announced implementation of the first provisions of the so-called Mobility Package. The average employment in 2021 at the enterprises providing transport mainly on Eastern markets was 30.5 (a decrease of 16%) and in the EU markets - slightly over 40.4 employees (an increase of 30%). These shifts in employment between the two markets (Tables 1 and 2) also indicate the impact of external factors on changes in transport directions, i.e. greater intensification of EU markets at the expense of Eastern markets throughout 2021 than in the previous periods of analysis [10].

The distribution of average employment of drivers in these groups was similar. Among enterprises with a dominant share of transport on the Eastern markets, the average employment of drivers was 24.9, and in EU markets - 30.1. The distribution of the average number of trucks in both groups corresponded to this (Tables 1 and 2). Therefore, the specificity of fleet involvement and employment in both groups was similar, with a larger fleet size and average annual mileage in the case of carriers serving EU markets than Eastern markets. This is a fundamental change compared to the data from 2020 [10].

To sum up, the average mileage of cars at the enterprises operating on both markets was similar only in relation to a single vehicle. However, the average cumulative values of car mileage for the entire 2021 were significantly higher in the EU markets than in the Eastern markets.

## 2. Conclusions from the research

As shown by the data presented, the international road freight transport sector remained in relatively good condition in 2021, despite the ongoing war and unfavourable external factors presented in the introduction. Greater changes were observed on EU markets. The fluctuations in costs, revenues and margins were greater there in 2021. The EU market, despite forecasting changes in regulations that are unfavourable to Polish carriers resulting from the so-called Mobility Package was more favourable for them than the Eastern market, where a further decline in profit margins was recorded in 2021. A small, but first increase in the profit margins since 2015 was recorded on the EU market, resulting from a larger and faster increase in transport rates in relation to the dynamics of the cost of 1 vehicle-kilometre [10].

Over the last six years, the average annual increase in the unit cost of 1 vehicle-kilometre in the surveyed sample of enterprises was at a similar level (5%), although in 2021 the highest increase in the average unit cost of transport was recorded (an increase of 15% in the EU markets and 13% in the Eastern markets). During the entire 2009-2021 period under study, the cost dynamics indicator was 188% for Eastern markets and 162% for EU markets, with a higher unit cost increase in 2021 recorded for EU markets. Profit margins were highly volatile in 2015-2021, with a dominant downward trend. However, their dynamics differed significantly depending on the market served. Last year, the trend observed in 2009-2020 was reversed. In 2021, for the first time there was an increase in the average margin on EU markets (to 3.8%), and its slight decrease on Eastern markets (to 4.0%). The values of weighted average unit costs recorded in both markets over recent years are presented in Table 8 and Figures 9 and 10 [10].

As a result of the research, differences in cost changes were observed resulting from: the served market, the size of the enterprise, and the cost category (see Fig. 1-8). The profitability of enterprises, taking into account differences for the geographical markets served, remained at a similar level, with an average annual profit of almost PLN 0.20-0.21/vehicle-km, although with a clear increase in 2021 in both markets compared to previous years (see Table 8 and 9). It also resulted from the intensification of carriers' activities before the expected implementation of stricter regulations under so-called Mobility Package, in particular regarding drivers' working time and posting of employees. Both areas of regulations implemented from the end of 2021 concerned EU markets, affecting the two most significant items in the cost structure, namely – fuel consumables and drivers' remuneration along with the costs of business trips and insurance. It clearly influenced the high dynamics of growth in transport rates, higher in the EU markets (116%) than in the Eastern markets (113%) [10].

The year 2021 was characterized by a clear increase in average unit profits (by 43%) and profit margins on the EU markets (by 23%), in contrast to previous periods, and a slight improvement in this respect recorded on Eastern markets (an increase in average annual unit profit by 11%). Last year, there was a decline in carriers' interest in Eastern markets in favour of EU markets, which was reflected in the profitability of transport in both markets. Compared to the period 2009-2015, when the average annual profit for transport on Eastern markets was PLN 0.41/vehicle-km, this means an almost two-fold decrease in profitability. We should not forget about the impact of the Russian embargo and trade restrictions related to Eastern markets after the start of the war in Ukraine [16-18].

In 2021, the average annual increase in the unit cost of 1 vehicle-kilometre was characterized by greater disproportion in the distribution of the indicator value in both markets than in the previous five years (see Figures 1-2 and 5-6 and Table 9).

In 2021, the highest increase in the average unit cost of transport was recorded on EU markets (15%), and in the entire period of 2009-2021, the cost dynamics index amounted to 162% and was lower than its value for Eastern markets (188%). Profit margins in both markets showed high variability in the period 2015-2021, but last year it was an increasing trend for EU markets, and a slightly downward trend for Eastern markets. It resulted primarily from the tense political and economic situation in Eastern markets and the relocation of operations by some companies to EU markets (see Table 9 and Figures 9-10) [10].

The average single mileages of cars at the enterprises operating on both markets (EU and Eastern) was similar (see Tables 1-2), but the average values for the entire fleet were much higher for the EU than for the Eastern markets (the difference was 25%). In the group of carriers operating on EU markets, the average mileage of one vehicle increased slightly in 2021 (12%), while in the group of companies serving Eastern markets, an 11% increase in the average vehicle mileage was recorded in this period [10].

### 2.1. Average costs of 1 vehicle-kilometre of mileage and according to type – EU markets

The results of research on the cost structure of truck transport companies operating on EU markets are given in Table 3, and on Eastern markets in Table 5. They take into account the size of transport companies, due to the size of the fleet and using weighted average costs of 1 vehicle-kilometre of mileage in 2021 year, separately in both groups, due to the dominant markets served [10].

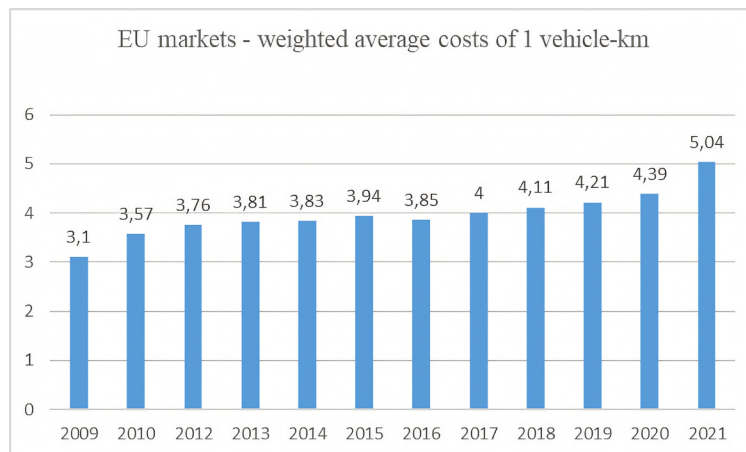
Table 4 and Figures 1 and 2 present the results of cost studies in truck transport companies according to enterprise size groups and calculated as average weighted costs of 1 vehicle-kilometre of mileage for the entire year 2021 for the entire sample of international transport companies with a dominant share of transport on the markets of EU countries. Table 4 contains a detailed list of average unit costs per vehicle-kilometre, taking into account their type structure in 2009-2021. The weighted average costs of 1 vehicle-kilometre of mileage in the subject group in 2021 amounted to PLN 5.04/vehicle-kilometre.

The results of research conducted in the period 2009-2021 are presented below:

- in 2021 5,04 PLN/veh-km,
- w 2020 r. 4,39 zł/ veh-km,
- w 2019 r. 4,21 zł/ veh-km,
- w 2018 r. 4,11 zł/ veh-km,
- w 2017 r. 4,00 zł/ veh-km,
- w 2016 r. 3,85 zł/ veh-km,
- w 2015 r. 3,94 zł/ veh-km,
- w 2014 r. 3,83 zł/ veh-km,
- w 2013 r. 3,81 zł/ veh-km,
- w 2012 r. 3,76 zł/ veh-km,
- w 2011 r. 3,57 zł/ veh-km,
- w 2010 r. 3,10 zł/ veh-km,
- w 2009 r. 2,99 zł/ veh-km,

During the entire period under review, the dynamics rate of the average cost of 1 vehicle-kilometre for transport on the markets of EU countries amounted to 169%. The dynamics of changes in individual categories of the cost of 1 vehicle-kilometre are presented in Figures 2 and 3, and their structure for 2021 is presented in Figure 4.

Fig. 1. Average costs of 1 vehicle-kilometre of mileage at the surveyed international transport companies in the years 2009 – 2021 (universal rolling stock above 12.0 Mg GVM; EU markets) [PLN/vehicle-kilometre]



Source: authors' own study based on the ITS cost database (as of December 31, 2022).

Table 3. Average costs of 1 vehicle-kilometre of mileage in total and according to type of costs, size of enterprises and average weighted costs at the surveyed enterprises in 2021 (universal rolling stock; EU countries' markets) [PLN/vehicle-kilometre]

Specification	micro (1-5) [PLN/vehicle-km]	small (6-9) [PLN/vehicle-km]	medium (10-49) [PLN/vehicle-km]	large (50+) [PLN/vehicle-km]	Weighted average costs of 1 vehicle-km of mileage [PLN/vehicle-km]
Average costs of 1 vehicle-kilometre of mileage, including:	4,89	5,20	5,12	5,00	5,04
propellants and consumables	2,052	2,227	2,163	2,123	2,13
overhaul services, repairs and tires	0,162	0,175	0,129	0,138	0,14
depreciation or loss of market value of the rolling stock	0,135	0,139	0,148	0,118	0,14
other capital costs (leasing, loan)	0,007	0,028	0,023	0,035	0,02
drivers' remuneration and business trips social insurance down to the employers	1,436	1,431	1,478	1,395	1,44
insurance of means of transport and tax on fixed assets	0,443	0,493	0,465	0,459	0,46
road tolls	0,483	0,554	0,498	0,488	0,50
remaining costs of transport activities of the company	0,175	0,153	0,213	0,247	0,21
Number of companies examined	14	5	21	16	56

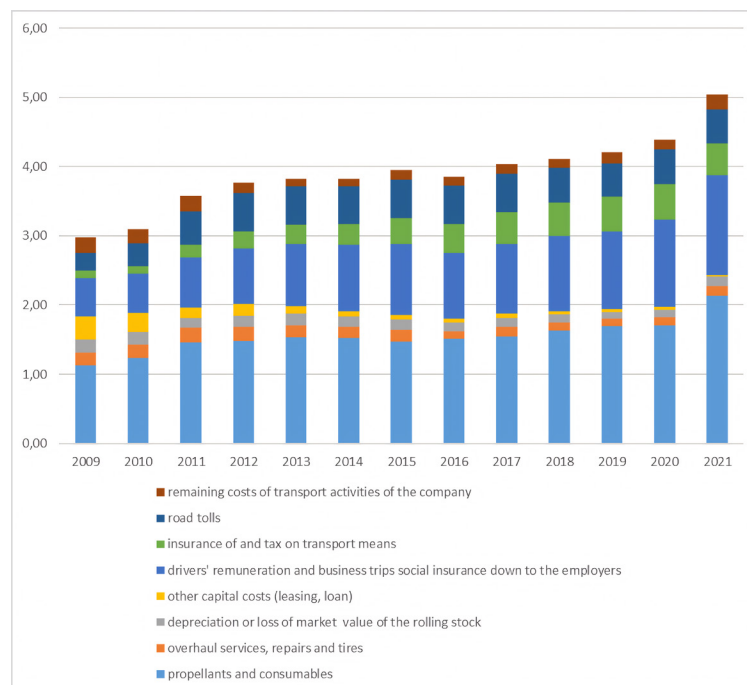
Source: authors' own study based on the ITS database on costs at the truck transport companies (as of December 31, 2022).

**Table 4. Weighted average costs of 1 vehicle-kilometre of mileage in total and according to selected types of costs in the years 2009 – 2021 at the surveyed truck transport companies operating a fleet above 12.0 Mg GVW with universal bodies, licensed to perform international transport, with a dominant share of transport on the markets of EU countries**

Average costs of 1 vehicle-kilometre of mileage, including:	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
propellants and consumables	1,13	1,24	1,46	1,48	1,53	1,52	1,47	1,51	1,54	1,63	1,69	1,70	2,13
overhaul services, repairs and tires	0,18	0,19	0,21	0,20	0,18	0,16	0,17	0,11	0,14	0,12	0,11	0,12	0,14
depreciation or loss of market value of the rolling stock	0,19	0,18	0,14	0,16	0,17	0,15	0,15	0,13	0,13	0,12	0,10	0,11	0,14
other capital costs (leasing, loan)	0,33	0,28	0,15	0,17	0,10	0,08	0,07	0,05	0,07	0,04	0,04	0,04	0,02
remuneration and business trips of drivers	0,56	0,56	0,73	0,81	0,90	0,96	1,02	0,95	1,00	1,09	1,12	1,26	1,44
insurance of transport means and tax on transport means	0,11	0,11	0,18	0,24	0,28	0,30	0,37	0,42	0,46	0,48	0,50	0,52	0,46
road tolls	0,25	0,33	0,48	0,56	0,55	0,54	0,56	0,56	0,56	0,50	0,49	0,50	0,5
remaining costs of transport activities	0,23	0,20	0,22	0,15	0,11	0,11	0,14	0,12	0,13	0,13	0,16	0,14	0,21
<b>Number of companies examined</b>	<b>63</b>	<b>70</b>	<b>66</b>	<b>48</b>	<b>61</b>	<b>62</b>	<b>61</b>	<b>58</b>	<b>71</b>	<b>79</b>	<b>79</b>	<b>85</b>	<b>56</b>

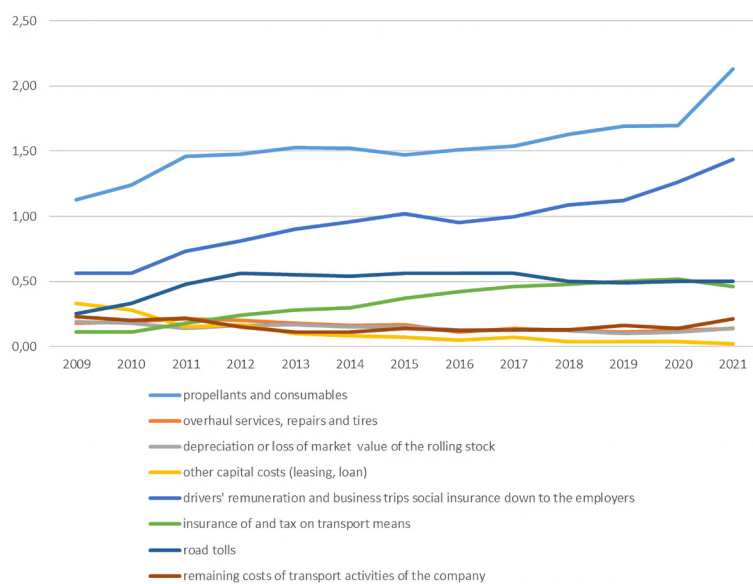
Source: authors' own study based on the ITS database on costs at the truck transport companies (as of December 31, 2022).

**Fig. 2. Weighted average costs by type of 1 vehicle-kilometre of mileage at the surveyed international transport companies (universal rolling stock; over 12.0 Mg DMC; EU markets; 2009 – 2021) [PLN/vehicle-kilometre]**



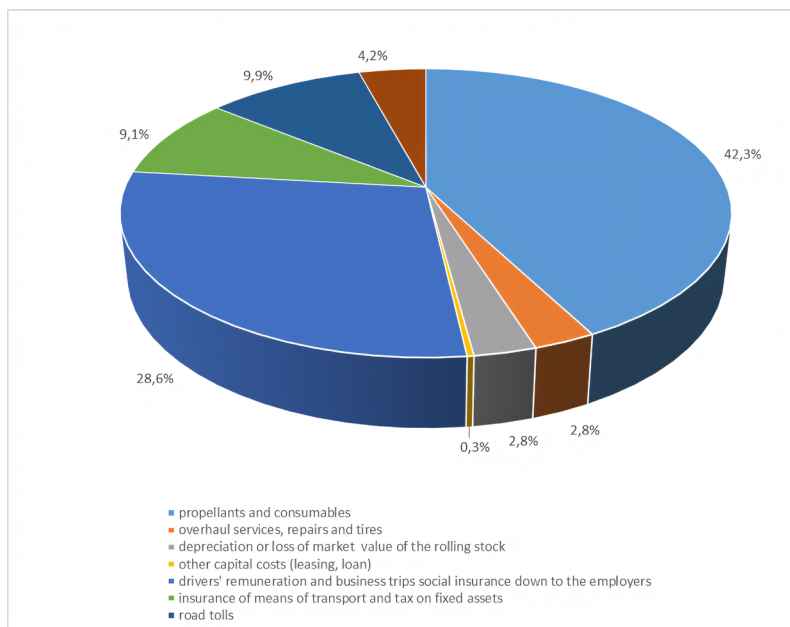
Source: authors' own study based on Tab. 4.

Fig. 3. Variability of the weighted average costs of 1 vehicle-kilometre of mileage according to the types of costs at the surveyed international transport companies in the years 2009 – 2021 (universal rolling stock; over 12.0 Mg GVW; EU countries' markets) [PLN/vehicle-kilometre]



Source: authors' own study based on Tab. 4.

Fig. 4. Generic structure of the weighted average cost of 1 vehicle-kilometre of mileage at the surveyed enterprises with licenses to perform international transport in 2021 (universal rolling stock above 12.0 Mg GVW; EU countries' markets) [%]



Source: authors' own study based on Tab. 4.

Average costs of 1 vehicle-kilometre of mileage and according to type – Eastern markets

Table 6 and Figures 5 and 6 present the results of cost studies at the truck transport companies according to enterprise size groups and calculated as

average weighted costs of 1 vehicle-kilometre of mileage for the entire year 2021, for the entire sample of enterprises carrying out international transport with a dominant share of Eastern markets. Table 6 contains a detailed list of average unit costs per vehicle-kilometre, taking into account their type structure. The weighted average costs of 1 vehicle-kilometre of mileage at

the subject group in 2021 amounted to PLN 4.94/vehicle-kilometre. The results of research conducted in the period 2009-2021 are presented below:

- in 2021 4,94 PLN/veh-km,
- w 2020 r. 4,36 zł/ veh-km,
- w 2019 r. 4,24 zł/ veh-km,
- w 2018 r. 4,10 zł/ veh-km,
- w 2017 r. 3,99 zł/ veh-km,
- w 2016 r. 3,83 zł/ veh-km,
- w 2015 r. 3,49 zł/ veh-km,
- w 2014 r. 3,61 zł/ veh-km,
- w 2013 r. 3,64 zł/ veh-km,
- w 2012 r. 3,68 zł/ veh-km,
- w 2011r. 3,36 zł/ veh-km,
- w 2010 r. 2,66 zł/ veh-km,
- w 2009 r. 2,62 zł/ veh-km,

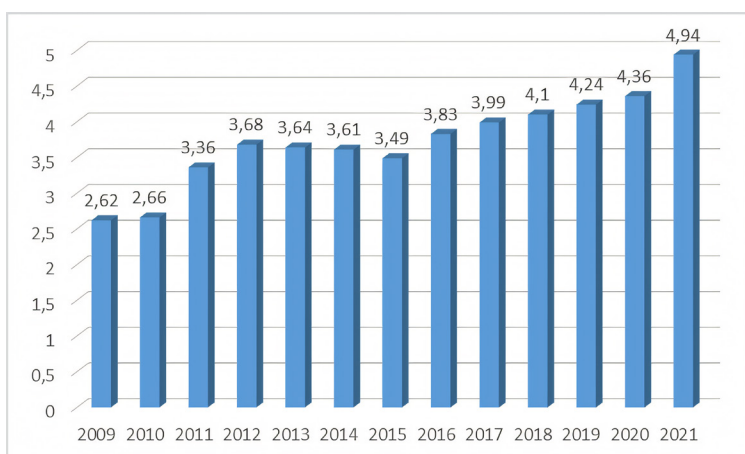
They show that during the entire period under study, the dynamics of the average cost of 1 vehicle-kilometre for transport on the markets of EU countries amounted to 188%. The dynamics of changes in individual categories of the cost of 1 vehicle-kilometre are presented in Figures 6 and 7, and their structure recorded in 2021 – in Figure 8 [6-9].

## 2.2. Comparison of average unit transport costs depending on the market

In the last two years, the highest growth dynamics was recorded in the costs of propellants and consumables, and it was higher on the EU markets, which was related to the implementation of regulations preceding the introduction of the so-called Mobility Package. On the Eastern markets, however, there was a clear increase in insurance costs compared to the markets of EU countries (see Figures 3 and 7). Salary costs and other operating costs were characterized by higher growth dynamics on the EU markets than on Eastern markets, which was the result of inflationary pressure and exchange rate fluctuations as well as an increase in raw material prices and labour costs [4], [11-12].

While analysing the unit cost structure in 2021, a slightly higher share of fuel costs in transport carried out on EU markets than on Eastern markets was recorded (over 2.7 percentage points).

**Fig. 5. Average costs of 1 vehicle-kilometre of mileage at the surveyed international transport companies in the years 2009 – 2021 (universal rolling stock above 12.0 Mg GVM; Eastern markets) [PLN/vehicle-kilometre]**



Source: authors' own study based on Tab. 6.

**Table 5. Average costs of 1 vehicle-kilometre of mileage in total and according to the types of costs, size of enterprises and average weighted costs at the surveyed enterprises in 2021 (universal rolling stock; Eastern markets) [PLN/vehicle-kilometre]**

Specification	micro (1-5) [PLN/vehicle-km]	small (6-9) [PLN/vehicle-km]	medium (10-49) [PLN/vehicle-km]	large (50+) [PLN/vehicle-km]	Weighted average costs of 1 vehicle-km of mileage [PLN/vehicle-km]
Average costs of 1 vehicle-kilometre of mileage, including:	4,80	4,85	4,98	5,06	4,94
propellants and consumables	1,9	1,877	1,996	2,025	1,96
overhaul services, repairs and tires	0,137	0,139	0,129	0,148	0,14
depreciation or loss of market value of the rolling stock	0,15	0,28	0,107	0,166	0,12
other capital costs (leasing, loan)	0,021	0,031	0,029	0,037	0,03
drivers' remuneration and business trips social insurance down to the employers	1,47	1,42	1,436	1,447	1,44
insurance of means of transport and tax on fixed assets	0,466	0,442	0,459	0,456	0,46
road tolls	0,414	0,434	0,459	0,443	0,44
remaining costs of transport activities of the company	0,276	0,379	0,367	0,339	0,35
Number of companies examined	9	7	20	7	43

Source: authors' own study based on the ITS database on costs at the truck transport companies (as of December 31, 2022).

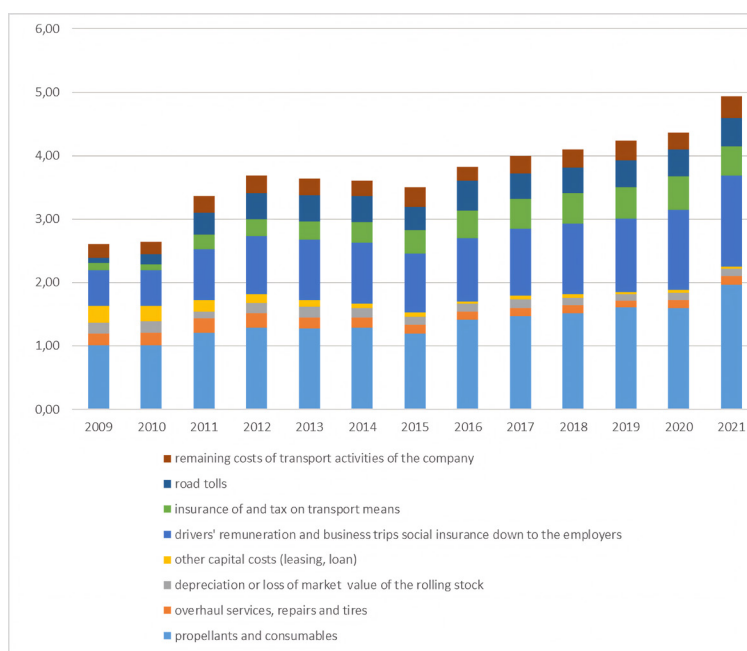
**Table 6. Weighted average costs of 1 vehicle-kilometre of mileage in total and according to selected types of costs in the years 2009 - 2021 at the surveyed truck transport companies operating a fleet above 12.0 Mg GVW with universal bodies, licensed to perform international transport, with a dominant share of transport on the Eastern markets**

Average costs of 1 vehicle-kilometre of mileage, including:	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
propellants and consumables	1,01	1,01	1,21	1,29	1,27	1,29	1,19	1,41	1,47	1,52	1,61	1,60	1,96
overhaul services, repairs and tires	0,18	0,20	0,23	0,22	0,18	0,16	0,14	0,13	0,13	0,12	0,10	0,12	0,14
depreciation or loss of market value of the rolling stock	0,18	0,18	0,10	0,17	0,17	0,14	0,13	0,12	0,13	0,12	0,10	0,12	0,12
other capital costs (leasing, loan)	0,26	0,24	0,18	0,13	0,10	0,07	0,07	0,04	0,06	0,05	0,04	0,04	0,03
remuneration and business trips of drivers	0,56	0,56	0,81	0,92	0,95	0,97	0,93	1,00	1,06	1,12	1,16	1,27	1,44
insurance of transport means and tax on transport means	0,12	0,10	0,23	0,27	0,29	0,32	0,37	0,43	0,47	0,48	0,49	0,52	0,46
road tolls	0,08	0,15	0,34	0,41	0,41	0,41	0,36	0,47	0,40	0,40	0,43	0,43	0,44
remaining costs of transport activities	0,22	0,20	0,26	0,28	0,27	0,25	0,31	0,22	0,27	0,29	0,31	0,26	0,35
Number of companies examined	20	42	23	41	57	57	59	58	65	69	61	84	43

Source: authors' own study based on the ITS database on costs at the truck transport companies (as of 2022/12/01).

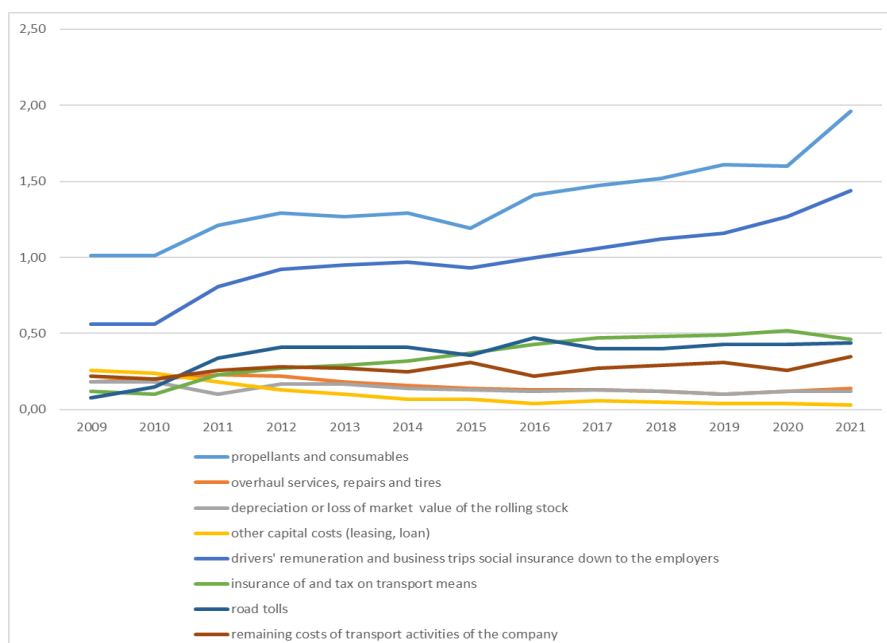


Fig. 6. Weighted average costs by type of 1 vehicle-kilometre of mileage at the surveyed international transport companies (universal rolling stock; over 12.0 Mg DMC; Eastern markets; 2009 – 2021) [PLN/vehicle-kilometre]



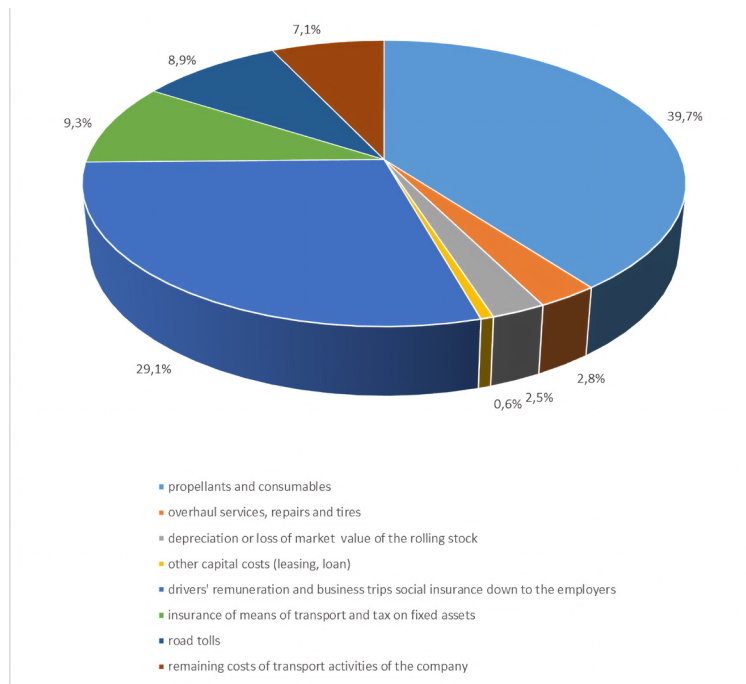
Source: authors' own study based on Tab. 6.

Fig. 7. Variability of the weighted average costs of 1 vehicle-kilometre of mileage according to the types of costs at the surveyed international transport companies in the years 2009 – 2021 (universal rolling stock; over 12.0 Mg GVW; Eastern markets) [PLN/vehicle-kilometre]



Source: authors' own study based on Tab. 6.

Fig. 8. Generic structure of the weighted average cost of 1 vehicle-kilometre of mileage at the surveyed enterprises with licenses to perform international transport in 2021 (universal rolling stock above 12.0 Mg GVW; Eastern markets) [%]



Source: authors' own study based on Tab. 6.

Table 7. Average costs of 1 vehicle-kilometre of mileage in total and according to selected types of costs in 2009, 2019, 2020 and 2021 at the surveyed enterprises (universal rolling stock over 12.0 Mg GVW, markets of other EU countries and Eastern markets)

Average costs of 1 vehicle-kilometre travelled in 2021, including	EU countries markets		Eastern markets	
	PLN/vehicle-km	%	PLN/vehicle-km	%
	5,04	100	4,94	100
propellants and consumables	2,13	42,3	1,96	39,7
overhaul services, repairs and tires	0,14	2,8	0,14	2,8
depreciation or loss of market value of the rolling stock	0,14	2,8	0,12	2,5
other capital costs (leasing, loan)	0,02	0,3	0,03	0,6
remuneration and business trips of drivers and social insurance down to the employers	1,44	28,6	1,44	29,1
insurance of transport means and tax on transport means	0,46	9,1	0,46	9,3
road tolls	0,50	9,9	0,44	8,9
remaining costs of transport activities	0,21	4,2	0,35	7,1
<b>Average costs of 1 vehicle-kilometre travelled in 2020, including</b>	<b>4,39</b>	<b>100</b>	<b>4,36</b>	<b>100</b>
propellants and consumables	1,70	38,7	1,60	36,7
overhaul services, repairs and tires	0,12	2,7	0,12	2,8
depreciation or loss of market value of the rolling stock	0,11	2,5	0,12	2,8
other capital costs (leasing, loan)	0,04	0,9	0,04	0,9
remuneration and business trips of drivers and social insurance down to the employers	1,26	28,7	1,27	29,1
insurance of transport means and tax on transport means	0,52	11,9	0,52	11,9
road tolls	0,50	11,4	0,43	9,9
remaining costs of transport activities	0,14	3,2	0,26	5,9
<b>Average costs of 1 vehicle-kilometre travelled in 2019, including</b>	<b>4,21</b>	<b>100</b>	<b>4,24</b>	<b>100</b>
propellants and consumables	1,69	40,1	1,61	37,9

Average costs of 1 vehicle-kilometre travelled in 2021, including	EU countries markets		Eastern markets	
	PLN/vehicle-km	%	PLN/vehicle-km	%
		5,04	100	4,94
overhaul services, repairs and tires	0,11	2,6	0,1	2,4
depreciation or loss of market value of the rolling stock	0,1	2,4	0,1	2,4
other capital costs (leasing, loan)	0,04	1	0,04	1
remuneration and business trips of drivers and social insurance down to the employers	1,12	26,6	1,16	27,3
insurance of transport means and tax on transport means	0,5	11,9	0,49	11,6
road tolls	0,49	11,6	0,43	10,1
remaining costs of transport activities	0,16	3,8	0,31	7,3
<b>Average costs of 1 vehicle-kilometre travelled in 2009, including</b>	<b>2,99</b>	<b>100</b>	<b>2,62</b>	<b>100</b>
propellants and consumables	1,13	37,7	1,01	38,5
overhaul services, repairs and tires	0,18	6,1	0,18	6,7
depreciation or loss of market value of the rolling stock	0,19	6,5	0,18	7
other capital costs (leasing, loan)	0,33	11,1	0,26	10,1
remuneration and business trips of drivers and social insurance down to the employers	0,56	18,6	0,56	21,5
insurance of transport means and tax on transport means	0,11	3,6	0,11	4,3
road tolls	0,25	8,5	0,09	3,3
remaining costs of transport activities	0,23	7,8	0,22	8,5

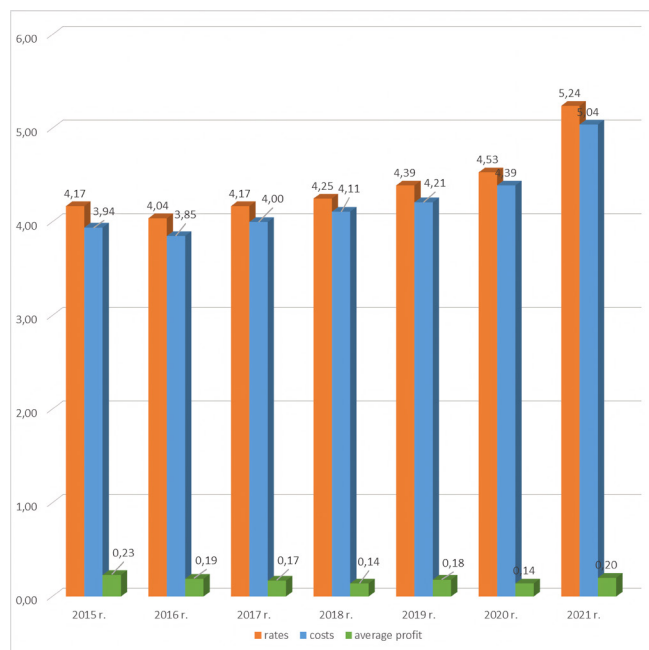
Source: authors' own study based on the ITS database on costs at the truck transport companies (as of December 31, 2022).

**Table 8. Weighted average costs of 1 vehicle-kilometre of mileage and weighted average rates for 1 vehicle-kilometre of mileage at the surveyed enterprises in 2015-2021 (universal rolling stock, over 12.0 Mg GVW) [PLN/vehicle-kilometre]**

	2015			2016			2017			2018			2019			2020			2021		
	costs	rates	profit	costs	rates	profit	costs	rates	profit	costs	rates	profit	costs	rates	profit	costs	rates	profit	costs	rates	profit
EU countries markets	3,94	4,17	0,23	3,85	4,04	0,19	4,00	4,17	0,17	4,11	4,25	0,14	4,21	4,39	0,18	4,39	4,53	0,14	5,04	5,24	0,20
Eastern markets	3,49	3,90	0,41	3,83	4,14	0,31	3,99	4,17	0,18	4,10	4,26	0,16	4,24	4,41	0,17	4,36	4,55	0,19	4,94	5,15	0,21

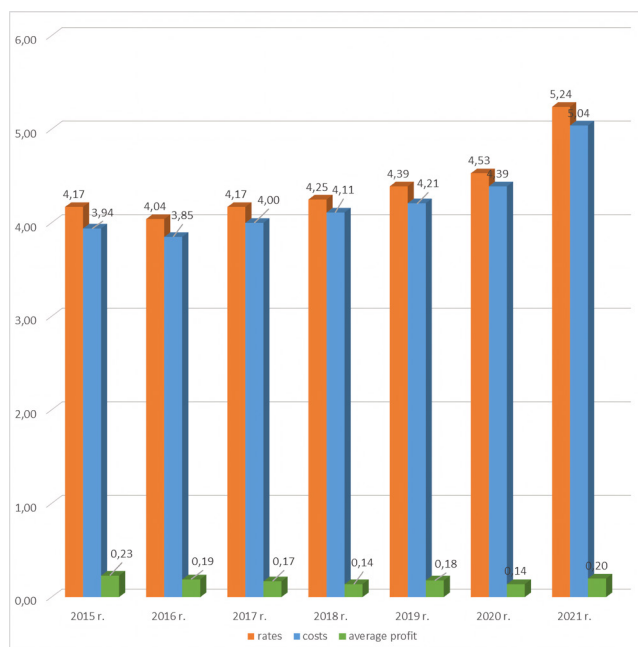
Source: authors' own study based on the ITS database on costs at the truck transport companies (as of December 31, 2022).

Fig. 9. Average weighted transport rates, costs and average unit profit of the surveyed international truck transport companies operating mainly on EU markets in 2015-2021 (universal rolling stock, over 12.0 Mg GVW) [PLN/vehicle-km]



Source: authors' own study based on Tab. 8.

Fig. 10. Average weighted transport rates, costs and average unit profit of the surveyed international truck transport companies operating mainly on Eastern markets in 2015-2021 (universal rolling stock, over 12.0 Mg GVW) [PLN/vehicle-km]



Source: authors' own study based on Tab. 8.

**Table 9. Profit margins and their dynamics in truck transport on the Eastern markets and EU countries, in 2015-2021 (universal rolling stock, over 12.0 Mg DMC) [PLN/vehicle-km]**

Unitary Profit margins for transports PLN/ vehicle-km	EU markets							Unitary Profit margins for transports PLN/ vehicle-km	Eastern markets						
	2015	2016	2017	2018	2019	2020	2021		2015	2016	2017	2018	2019	2020	2021
unit profit	0,23	0,19	0,17	0,14	0,18	0,14	0,20	unit profit	0,41	0,31	0,18	0,16	0,17	0,19	0,21
transport rate	4,17	4,04	4,17	4,25	4,39	4,53	5,24	transport rate	3,90	4,14	4,17	4,26	4,41	4,55	5,15
net profit margin	5,50%	4,70%	4,10%	3,30%	4,10%	3,10%	3,80%	net profit margin	10,50%	7,50%	4,30%	3,80%	3,90%	4,10%	4,00%

Source: authors' own study based on Tab. 7.

### 3. Conclusions from research on average unit costs at the international truck transport companies for 2021 against the background of cost research from 2009 – 2020

- 1) The weighted average costs of 1 vehicle-kilometre of mileage in 2021 at the surveyed international truck transport enterprises, in which EU markets prevailed, amounted to PLN 5.04/vehicle-km, and in relation to Eastern markets – PLN 4.94/vehicle-km.
- 2) In 2021, the highest growth rate of average unit costs was recorded compared to previous years. The dynamics rate was 115% on the EU markets and 113% on the Eastern markets. This was the largest increase recorded in the history of this study, conducted repeatedly since 2009. For comparison, these values in the previous year (comparing data from 2019 to 2020) were, respectively: 104% for EU markets and 103% for Eastern markets [6-8].
- 3) The structure of the weighted average costs of 1 vehicle-kilometre was dominated by the costs of propellants and consumables, as well as remuneration and business trips (39.7-42.3% and 28.6-29.1%, respectively). The next significant items in the structure were the costs of insurance and taxes on transport means, and then the costs of road tolls (9.1-9.3% and 8.9-9.9%, respectively). Compared to 2020, in 2021 there was a significant increase in the share of the costs of propellants and consumables in the costs of 1 vehicle-kilometre. The only decrease in cost dynamics concerned the cost of insurance on Eastern markets. The remaining cost items showed growth dynamics, although their share in the structure did not change significantly.
- 4) In 2021, compared to 2009, the weighted average unit costs of road tolls more than doubled, and their dynamics was much higher for transport on Eastern markets (500%) [6-9].
- 5) The weighted average unit remuneration costs of drivers serving EU and Eastern markets (including business trips) increased over two and a half times over the years 2009-2021 (the dynamics rate was approximately 257%), and unit fuel costs increased on average by 94% in relation to Eastern markets and by 88% in relation to EU markets [6-9].
- 6) Compared to the results from 2009, the average costs of remuneration and business trips of the drivers for 1 vehicle-kilometre travelled in 2021 increased on both markets by approximately 88% [6-9].
- 7) Throughout the entire period under review, the costs of road tolls grew fastest, followed by drivers' remuneration (including business trips) and the costs of social insurance charged to the employer, as well as means of transport insurance and tax costs. However, due to the dominating position in the cost structure of expenses related to propellants and consumables, their lower growth dynamics had a much greater impact on changes in unit costs of 1 vehicle-kilometre than other categories [10]. It was similar with the increase in salary costs.
- 8) Average transport rates at the surveyed enterprises over the last five years have increased faster on EU markets (dynamics index – 129%)

than on Eastern markets (dynamics index -124%), in the last year this increase amounted to 16% for EU and 13% for Eastern markets [10].

- 9) In the years 2015-2018, we could observe an annual decline in average profit at the surveyed enterprises. This unfavourable trend was stopped in 2019. However, in 2020, the downward trend returned to the EU markets, while the Eastern markets saw an increase in unit profit.
- 10) In 2021, the unfavourable trend was broken and on both markets the entrepreneurs recorded an increase in average profit, but it was much higher for EU markets (42% compared to 11%) [6-9].
- 11) The nearest prospects related to the implementation of regulations resulting from the so-called Mobility Package and due to the prolonged war in Ukraine will probably result in a deterioration of profitability indicators in this sector. However, it is already known that the current situation related to post-pandemic changes in supply chains, war, the commenced implementation of Community regulations regarding the organization of freight transport, or reducing emissions from transport on EU markets has not caused homogeneous changes among all companies performing international transport [15- 18]. Research in this area, also in the area of evaluating the impact of external factors on the functioning of the international road freight transport sector, will be continued and developed by ITS in cooperation with ZMPD.

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Appendix 1. Questionnaire for international carriers



**ANKIETA  
KOSZTY PRZEWOZÓW ŁADUNKÓW TRANSPORTEM SAMOCHODOWYM  
I półrocze 2022**

Ankieta jest anonimowa. Dane w niej zawarte służą do badań prowadzonych w Instytucie Transportu Samochodowego we współpracy z ZMPD. Odpowiedzi na ewentualne zapytania dotyczące wypełnienia ankiety: 22 438 52 87 lub 84 (ITS).  
W celu prawidłowego wypełnienia ankiety prosimy:

Zaznaczyć odpowiedzi znakiem  w kwadratach lub wpisać liczbę w miejscach wykropkowanych .....

**1. Charakterystyka przedsiębiorstwa**

- 1.1. Zakres działalności przedsiębiorstwa  
Rodzaj licencji: krajowy przewóz rzeczy  międzynarodowy przewóz rzeczy   
Inna dodatkowa działalność: tak  nie   
Jeśli tak, to jaka?.....
- 1.2. Lokalizacja przedsiębiorstwa: województwo .....
- 1.3. Kapitał: krajowy  zagraniczny  mieszany

1.4. Liczba eksploatowanych samochodów ciężarowych	<b>pow. 12 t dmc</b>
w tym liczba eksploatowanych samochodów ciężarowych o masie pow. 25 t dmc.....	
1.5. Liczba pracowników ogółem....., w tym kierowców.....	
mikro przedsiębiorstwo (1-5 pracowników) <input type="checkbox"/>	małe przedsiębiorstwo (6-9) <input type="checkbox"/>
średnie przedsiębiorstwo (10-49) <input type="checkbox"/>	duże przedsiębiorstwo (pow. 50) <input type="checkbox"/>
1.6. Dominujący rynek w przewozach międzynarodowych: UE <input type="checkbox"/>	wschodni <input type="checkbox"/> inny <input type="checkbox"/>

**2. Charakterystyka kosztów przewozów ładunków transportem samochodowym**

Sposób podania kosztu: wartość za okres półrocza (zł)  lub struktura (%)

Koszty wg wybranych rodzajów:	pow. 12 t dmc
2.1. materiały pędne i eksploatacyjne	.....
2.2. usługi remontowe, naprawy i ogumienie	.....
2.3. amortyzacja	.....
2.4. pozostałe koszty kapitału (leasing, kredyt)	.....
2.5. wynagrodzenia i delegacje kierowców oraz ubezpie. społ. obciążaj. pracodawcę	.....
2.6. ubezpieczenie środków transportu oraz podatek od środków transportu	.....
2.7. opłaty drogowe	.....
2.8. pozostałe koszty działalności przewozowej przedsiębiorstwa	.....
<b>Razem koszty:</b>	
.....	.....

3. Przebieg wszystkich samochodów ciężarowych w półroczu ( km ) .....
4. Szacunkowy średni koszt 1wozokm przebiegu (zł/km) .....
5. Średnia stawka przewozowa (zł/km) .....
6. Jakie są największe zagrożenia dla Państwa działalności przewozowej w perspektywie najbliższego roku? (prosimy o ocenę w skali 0-5)
- |  |  |
|--|--|
| a) wojna na Ukrainie.....                                  | b) niedobór kierowców zawodowych.....                          |
| c) kolejna fala pandemii i związane z nią obostrzenia..... | d) regulacje Pakietu Mobilności.....                           |
| e) gwałtowne zmiany popytu na usługi transportowe.....     | f) wzrost cen paliwa.....                                      |
| g) zmiana kursów walut.....                                | h) ograniczenia i sankcje wprowadzane na Rosję i Białoruś..... |
| i) liberalizacja przewozów pomiędzy UE a Ukrainą.....      | j) wzrost obciążeń podatkowych i należności ZUS.....           |
7. Czy obecna wojna w Ukrainie spowodowała spadek / wzrost obrotów Państwa firmy (proszę o podanie szacowanej zmiany w ujęciu %)? styczeń–czerwiec (I poł 2022 r.) TAK..... NIE.....
8. Czy pandemia Covid-19 spowodowała spadek / wzrost obrotów Państwa firmy (ostatnie 24 miesiące)? (proszę o podanie szacowanej zmiany w ujęciu %)? TAK..... NIE.....

Source: authors' own study

**Małgorzata Zysińska**  
malgorzata.zysinska@its.waw.pl  
Motor Transport Institute

**Maciej Menes**  
maciej.menes@its.waw.pl  
Motor Transport Institute