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IDENTIFICATION OF COSTS STRUCTURE CHANGE IN ROAD TRANSPORT COMPANIES

The costs of each company on the market are an essential component of financial decision making, not only on the price of the goods and services provided, but also about the business efficiency. In business, services have a significant impact on pricing, but also for deciding on the realization of performances. Costs structure is composed of fixed and variable costs. Changing the costs structure creates assumptions for other decisions, as well as the pricing of the entrepreneur. The goal of this article was to identify, whether there is a change in time of the costs structure.

Keywords: *costs, freight transport, transport companies, business*

1. Introduction

Pricing in the road freight transport, with regard to the provision of services, in a liberalized market in terms of price, is not regulated by the prescribed tariffs or pricing processes [1]. The price for transportation is decided only by agreement between the carrier and the shipper. Given this fact, the carrier must know the real costs that arise at him in providing of services, as a prerequisite for the agreement of the shipping costs. If the costs structure changes over time that would affect the price change of the realized performance. If one assumes that the carrier has created the two basic costs group - fixed and variable costs, their share would affect the development of the transport price. At a higher share of the fixed costs, the growth rate of total costs slows down, but there would be growth of realized costs [2]. However, the overall costs decrease more slowly when the performance declines, which reduces the competitiveness of the entrepreneur, because the price depends on the total costs [2]. The objective of this article was to identify whether there is a change in time of the costs structure, assuming that the price change option is influenced by the changing performance in time periods.

2. Analysis of current costs situation in transport companies

Considering that pricing in the road freight transport is liberalized, every carrier can come to the market with its own pricing policy. From this perspective, the following factors can be identified affecting the price of transport:
- Vehicle size and dimensions;
- Options of recovery transportation (demand impact);
- Unladen driving (empty ride);
- Referral availability and other services;
- Road and traffic conditions;
- Price input factor (work, vehicle, spare parts and fuel);
- Quality of management [3].

Based on output by Korzhenevych et al. [3], it is possible to define the share of individual costs, featured in Table 1.

Another factor, influencing pricing, is related to the maintenance of the rolling stock, analysed by Drozdiel a Piasecki [4]. Based on those author's outputs, it is possible to state, that the fleet is more economically efficient if prescribed maintenance is carried out.

2.1 Impact of costs structure on costs calculation by variable and fixed costs

There are currently several calculation methods, which however cannot be used economically to calculate the price in the road transport, since that is a service area. The aim of this part of the paper is to highlight the reality that the cost structure affects the price of realized services. Output of costs calculation, with their division into the variable and fixed parts, are the following price rates [5]:
- Per kilometer with cargo,
- For one hour of the vehicle's operation.

This calculation specifically approaches the individual costs groups. The variable costs, which can be labelled as costs dependent on distance (e.g. toll costs, fuel costs, tire costs), arise only when the vehicle is moving; this means that they shall be incurred by the carrier only if he realizes the transportation. If the carrier is unable to provide the shipment, the costs would not arise [6-7].

The second group of costs are the fixed costs, which are dependent on time and arise regardless of whether the carrier carries out the transport or the vehicle is in downtime (e.g.

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Table 1 *Typical share of transport costs for semi-trailers*

	Cost item	Share of operating costs (%)
Variable costs	Fuel	20-30
	Motor oil	1-5
	Tires	10-15
	Spare parts	15-20
	Drivers - wages	10-20
Fixed costs	Other work	5
	Depreciation and interest	15-20
	Burden costs	10-15

Table 2 *Average costs item values of the transport companies between 2004 and 2017*

	fuel (€/km)	toll (€/km)	tires (€/km)	oil (€/km)	driver's wages (€/km)	depreciation (€/km)	repair maintenance (€/km)	motor insurance (€/km)	accident insurance (€/km)	motor vehicle tax (€/km)	burden (€/km)	∑ (€/km)
2004	0.3142	0.063	0.02	0.00467	0.13	0.12	0.03	0.0155	0.016	0.015	0.012	0.74037
2005	0.3253	0.063	0.021	0.00467	0.135	0.13	0.035	0.0155	0.017	0.015	0.013	0.77447
2006	0.3498	0.063	0.022	0.0048	0.14	0.14	0.035	0.0155	0.017	0.015	0.014	0.8161
2007	0.3587	0.066	0.023	0.005	0.15	0.14	0.04	0.0155	0.018	0.016	0.014	0.8462
2008	0.3701	0.07	0.023	0.006	0.158	0.15	0.04	0.016	0.018	0.016	0.014	0.8811
2009	0.3594	0.078	0.024	0.0088	0.16	0.16	0.05	0.016	0.02	0.017	0.015	0.9082
2010	0.3627	0.1111	0.026	0.0125	0.165	0.165	0.054	0.016	0.02	0.017	0.0155	0.9648
2011	0.3788	0.1158	0.028	0.0178	0.17	0.17	0.055	0.165	0.022	0.017	0.016	1.1554
2012	0.3785	0.12	0.03	0.021	0.175	0.17	0.06	0.017	0.025	0.0175	0.016	1.03
2013	0.3822	0.12	0.033	0.022	0.18	0.175	0.06	0.017	0.025	0.0198	0.0165	1.0505
2014	0.3856	0.1242	0.038	0.024	0.185	0.18	0.065	0.0175	0.028	0.0198	0.017	1.0841
2015	0.3874	0.1287	0.048	0.025	0.19	0.185	0.065	0.018	0.028	0.0198	0.0185	1.1134
2016	0.3896	0.129	0.05	0.026	0.198	0.19	0.07	0.02	0.03	0.02	0.019	1.1416
2017	0.3914	0.13	0.052	0.0265	0.2	0.19	0.074	0.02	0.03	0.0208	0.019	1.1537
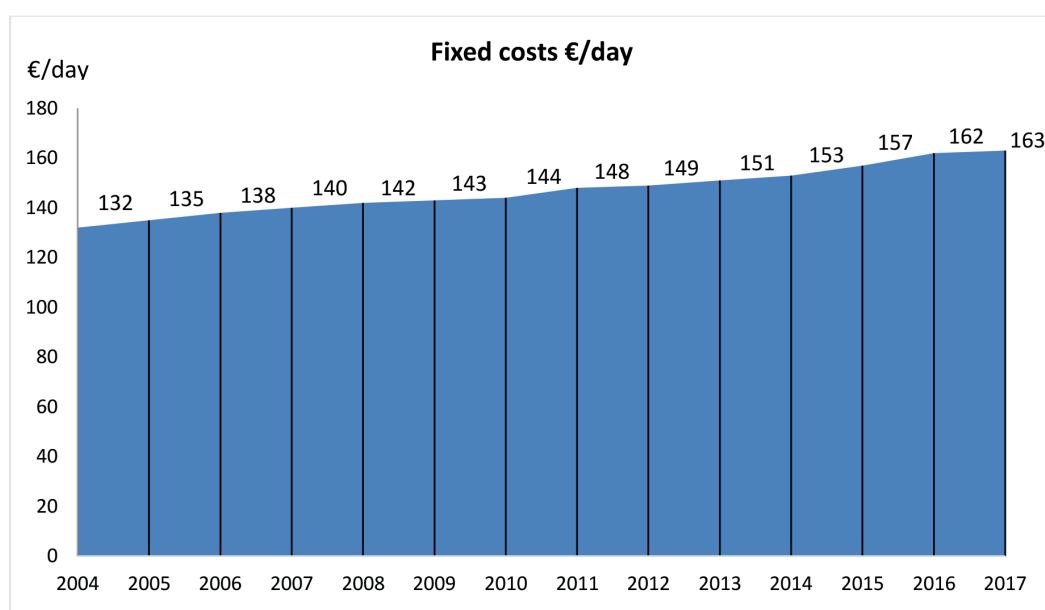
Figure 1 *The course of fixed costs for transport companies between 2004 and 2017 per vehicle - semi-trailer*
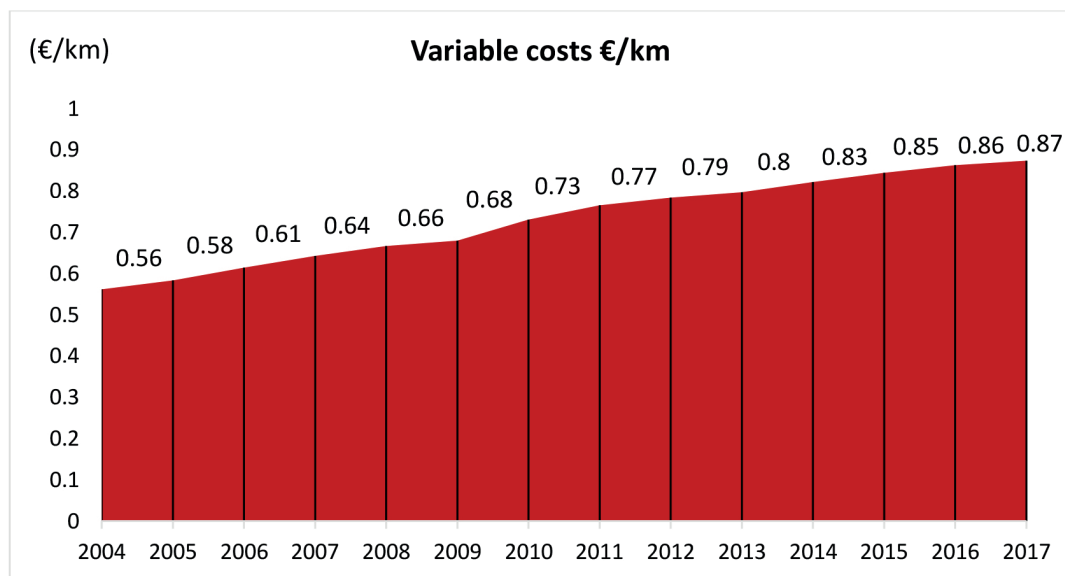
Variable costs €/km

(€/km)

Figure 2 The course of variable costs for transport companies between 2004 and 2017

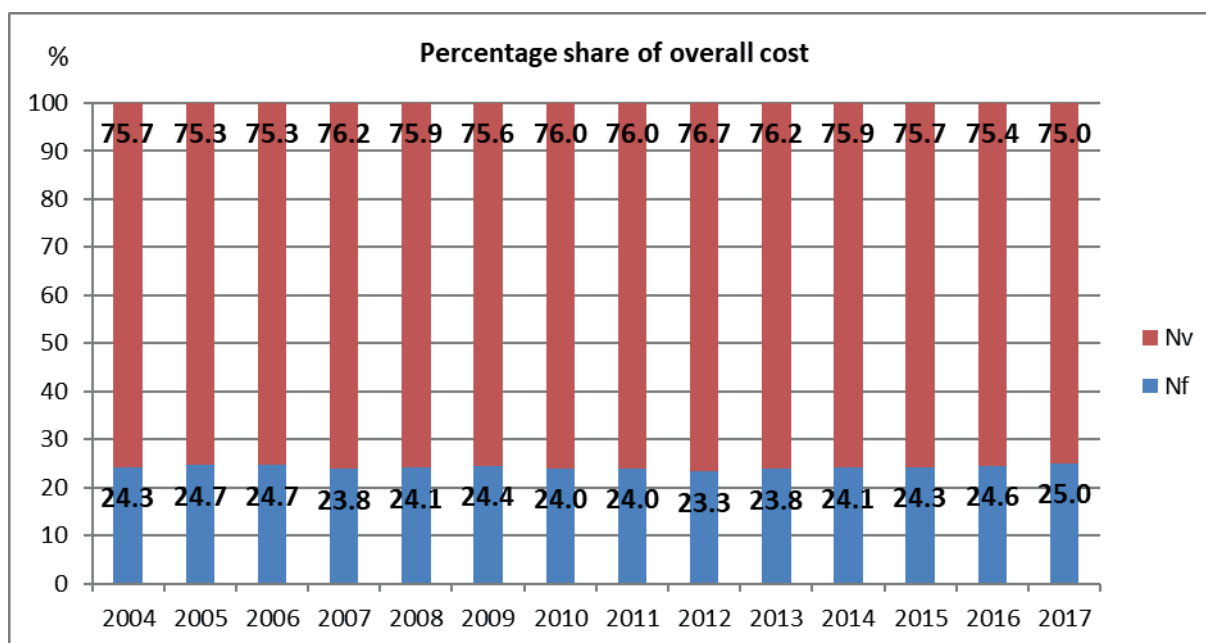**Percentage share of overall cost**

Figure 3 Expressing the structure of costs and their shares from 2004 to 2017

depreciation costs, vehicle insurance costs, the costs of motor vehicle tax) [8-9].

The principle of calculation is that per unit of realized power (e.g. km) variable costs are counted directly; the fixed costs expressed in time are converted into a calculation unit - the average speed, as follows [10-11]:

$$n_c = (n_v/\beta) + (N/v_t), \qquad (1)$$

where:
n_c - total costs (€),
n_v - variable costs (€/km),
β - driving utilization coefficient (%),
N_f - fixed costs (€/km),
v_t - average speed (km/h).

The higher the proportion of the fixed costs in annual costs, then at higher performance are the higher level of overall costs, as well [12-13].

2.2 Impact of the costs structure on price at dynamic costing

Dynamic calculation is a costs calculation the output of which are the costs for performance [14-15]. In addition, the outputs of this costs calculation are dependent on the costs structure. The variable costs are set on a unit of realized performance, while the fixed costs are set for one day of vehicle operation. The total costs are set as the sum of the product of the unit of the variable costs and realized performance and the fixed costs per day of operation [16-18].

The fixed costs component of total costs for one day of operation is the same regardless of performance. The costs structure also has significant influence on pricing. With an increasing proportion of the fixed costs, the cost change becomes less flexible [19-20].

3. Research on the costs structure change in the road freight transport

In order to identify the change in the costs structure, costs need to be monitored for a longer period of time. At University of Zilina, a team of authors observed the cost of operating the vehicle, from 2004 to 2017, to identify change the costs structure. Costs were tracked across the multiple companies provided that they performed the fleet analysis. Costs were taken into account and statistical set only for the semi-trailers, weighing up to 40 tonnes with conversion to unit costs. Annual driving performance of one semi-trailer was about 100,000 kilometres with an average consumption of 30 litters per 100 kilometres [21]. Table 2 shows the average values for the transport companies in individual years. Table 2 is made over a span of 15 transport companies and their calculated cost items, who provided data for this research.

Authors divided the costs into two groups: the variable costs that are dependent on the distance travelled and the fixed costs that do not change based on distance travelled [22].

Fixed costs included depreciation, motor insurance, accidents' insurance, motor vehicle tax and burden. In Figure 1 the rising costs in transport companies can be observed in year-on-year comparisons [23]. In Figure 1, an increasing trend can be observed of the fixed costs, which has a uniformly rising character in year-on-year comparisons with a difference of about 5 % increase costs per year.

The second costs group of the transport company are the variable costs, among which authors have included fuel, vignette, respectively toll, engine oil, repair and maintenance and driver wage [24].

In Figure 2 a development of the variable cost items in transport companies can be seen. It can be stated that the biggest increase was recorded in 2010 when the toll item has risen, due to introduction of this charging method of the freight transport in Slovakia. Until 2010, the freight was charged with a highway stamp.

Based on Table 2, the combined fixed and variable costs are graphically represented in Figure 3, in the year-on-year range.

From 2004 to 2017, both costs groups increased. In 2004, the fixed and variable costs totalled 0.7404 €per kilometre. For 2017, this is already a sum of 1.1537 €per kilometre, what means in an increase of 64 % in 14 years period. Figure 3 shows that the costs structure lies year-on-year within range of ¾ for variable costs of the total costs and for the fixed costs of ¼ of the total costs in a transport company.

4. Conclusion

Based on a research conducted for a 14 year period in transport companies, the authors can state that there is very little change in the cost structure in road freight transport. For the identified period from 2004 to 2017, the fixed costs ratio was at the level of 25 % of the total costs while 75 % share belonged to the variable costs of operating vehicle. This research confirmed that, although the transport costs are increasing by the carriers in the 14 year period, the structure of their shares is changing only slightly and practically remains constant, which is good for planning calculation of economic efficiency of the transport company.

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