



Abstract. In general, transport companies have an unimportant role in the business market, in order to achieve the required sales and the related profit. Competition in road transport is great and enforcement from a large number of carriers is considerable. It is the price for the transport of goods that plays the most important role how to get the carrier and the customer who wants the lowest transport price. On the contrary, the carrier would like to get the highest amount for the shipment. A compromise between these two requirements should form the required shipping price. Pricing involves a factor other than costs, the attractiveness of the transport destination, in terms of the possibility of return utilization the vehicle. The aim of the paper is to verify the hypothesis, that the cost of transport is affected not only by the carrier's costs, but also the target destination of the ordered shipment.

Keywords: offer, demand, road transport, price, costs, transportation

INTRODUCTION

In the current period in the EU Member States, price liberalization applies when carrying out road freight transport. In the Western European countries (of the original 15 EU Member States) carriers have historically been operating for a long time in a competitive market, where the price is an important tool of maintaining your customer (Říha and Tichý, 2015). On the other hand, the price must ensure the operation of the carrier also in the next period. The principles of price formation are not unambiguously incorporated into practice in the central and eastern parts of the EU. The carriers in the 1990s were operating in regulated markets for which the price for a specific shipment is unchanged, so it was not a customer acquisition tool. Currently, the carriers are priced on the basis of the cost of running the vehicles, often the price is set at a rate in €/km. The carriers are unaware, that the same price does not cover costs for each country, to which it is carried out the transport. On the one hand is affected by different charges for the use of infrastructure, on the other side possibilities of reuse the vehicle (Poliak and Poliaková, 2015).

The purpose of this post is to confirm the hypothesis, that the cost of transport is affected not only by the carrier's costs, but also the target destination of the ordered shipment.

ANALYSIS OF THE CURRENT STATE OF PRICE FORMATION

Considering that, pricing in road freight is liberalized, each carrier may enter the market with its own pricing policy. In accordance interpreted by Newbery (Newbery, 1988.) It is possible to identify the following factors affecting the transport price:

- Vehicle size and dimensions;
- Vehicle reloading options (Demand Impact);
- Empty ride of vehicle;
- Availability of mediation and other services;
- Road and traffic conditions;
- Input factor for the price (work, vehicle, spare parts and fuel);
- Quality of management, supervision

Another factor influencing price formation, which related to vehicle fleet maintenance analyzed by Drożdziel and Piasecki (Drozdziel and Piasecki, 1995). Based on the author's output, it is possible to state, that the economically more efficient vehicle fleet in the case if the prescribed maintenance is performed on it. Based on the output Korzhenevych (Korzhenevych et al., 2014). It is possible to define the share of the individual costs shown in Table 1.

Table 1.
Typical share of transport costs in semi-trailers

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

Source: processed by the authors

Costs can be divided into two groups and that:

- Variable costs - their level can be reported by relationship

$$CV = f(P) \cdot c_v \quad (1)$$

where:

CV – Variable costs (overall transportation),

P – performance (km/year)

- Fixed costs – their level can be reported by relationship

$$CF = f(t) \cdot fc \quad (2)$$

where:

CF – Fixed costs (transportation),

t – time of transportation (hours),

fc – unit fixed costs (€/day)

In general, the price can be expressed as the sum of fixed and variable costs increased by the carrier's profit:

$$Pr = CV + CF = f(P) \cdot c_v + f(t) \cdot fc \quad (3)$$

where:

Pr – price (€)

Under the current conditions, principles are applied when creating pricing:

- The benefit principle
- Cost principle

The benefit principle:

Also called as a value principle, represents the value of the transported service from the position of the customer or forwarder. This utility principle expresses the financial amount associated with the benefit of transport, respectively with loss resulting from non-delivery transport. Loss is the thought of losing the customer. When it is the value of the transported service, it is significantly affected by this competition. The value of the service is influenced in particular (Říha, 2016):

- conditions of competition,
- price of transported goods,
- the difference in the price of the product at the place of production and at the place of consumption.

If the value of the transported service respectively utility is higher than the shipping cost for the customer, it is more rational to carry out the transport. This assertion does not apply to technologies, which are not produced at the place of transport (Walters, 1968).

Cost principle:

This principle requires the price – tariff rates to cover the costs incurred by the transport company, which are a function of the factors mentioned above.

From the point of view of the carrier, the following model situations may occur (Gnap et al., 2003):

a) *The price below the level of variable costs c_1 :*

If the shipping cost does not even cover variable costs associated with transport such as fuel costs, tires, tolls or vehicle repair and maintenance costs, the carrier is not recommended to carry out this shipment if the vehicle is located at the premises of the carrier (Frumkin, et al., 2004). Only under the condition that the vehicle is located abroad, outside the carrier's premises and does not have backward transport in the long run, it is still acceptable to accept such transport at a price below variable costs. It can be cases when the carrier needs to have the vehicle available from abroad back at the headquarters of the carrier, ensure that the vehicle performs a technical or emission control (Ayala, et al., 2010).

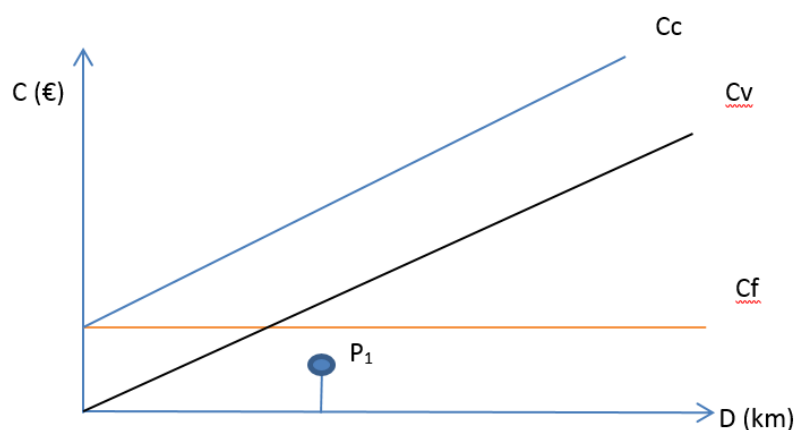


Fig. 1. The price below the level of variable cost c_1

Source: processed by the authors

b) *The price is paid only the variable cost c_2 by the carrier:*

In this case, the shipping cost corresponds only to variable costs paid for carrying out a transport service. It does not always cover fixed costs associated with a given vehicle performance if he wants to get a new customer and transport it later at higher rates for carriage (Brueckner, 1977). Transportation in this case also brings risks, that costs may even be higher than the variable costs themselves. Risks that may occur during transportation are damage occurring on the vehicle itself or the goods carried, imprecise method of calculating the costs incurred, climatic conditions, and so on (Newman and Kenworthy, 1999).

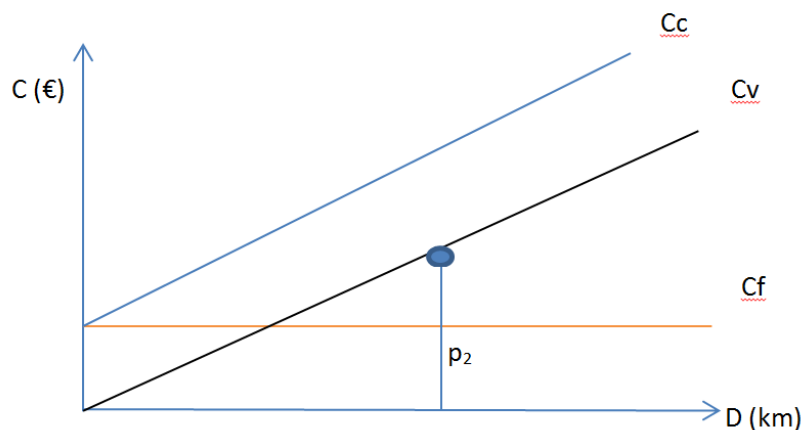


Fig. 2. The price is paid only the variable cost c_2

Source: processed by the authors

c) *The price c_3 covers variable costs and part of fixed costs:*

The cost of the shipping carries out all the variable costs and part of the fixed costs associated with the carriage. If we consider that the carrier would not accept such a shipment and leaves the vehicle without transport, such a vehicle in an unladen carriage creates a loss every day at a time in the form of fixed costs. Fixed costs include all types of insurance relating to the vehicle such as compulsory insurance or accident insurance. Fixed costs may also include service operations of the carrier, vehicle leasing, etc (Anas and Rhee, 2006).

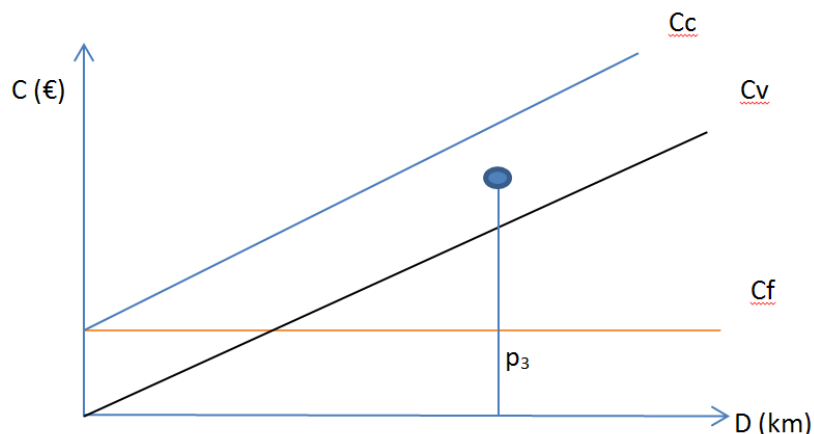


Fig. 3. The price c_3 covers variable costs and part of fixed costs

Source: processed by the authors

d) *The price c_4 generates a profit:*

The shipping cost already covers all variable costs and fixed costs that are calculated by the transport company for the vehicle and its realization of the offered transport for the customer (Sullivan, 2007). The full value of the order price, which has already paid these two types of costs (variable and fixed costs), it also provides a profit for a given transport company from concluded transport.

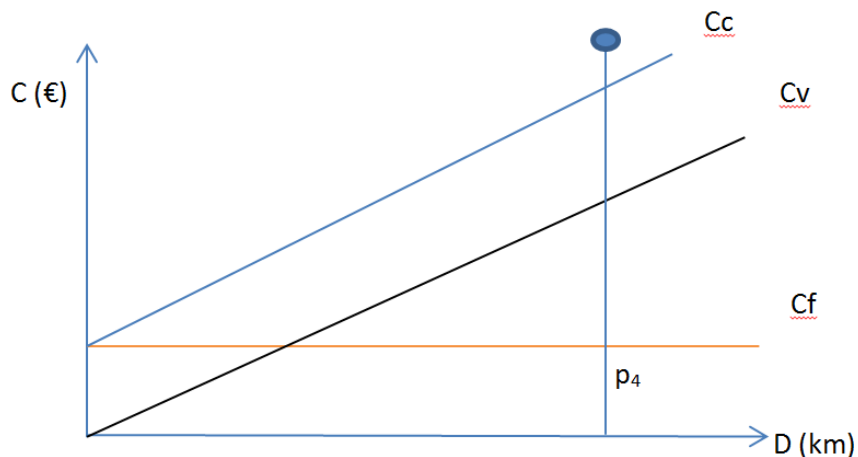


Fig. 4. The price c_4 generates a profit

Source: processed by the authors

METHODOLOGY

As mentioned in Chapter 1, Existence lots of types of cases, if the cost of transport does not even cover variable costs of the carrier and the carrier nevertheless carries out the transport. These are cases, if the carrier has no long-term reuse use of the vehicle. It follows from that assertion, that there are countries where it is easier to obtain back shipping and there are countries in which back shipping is more difficult and there is a risk that in the extreme situation the carrier with the vehicle will have to return to the place of loading without further

shipment (Mieszkowski, 1993) So it's about driving of vehicle, where no revenue will flow to the carrier. In any case, the carrier will incur costs.

If we proceed from this assumption, it is possible to define two boundary states:

- the carrier does not have a back transportation problem,
- there is no back transportation for the carrier.

If we evaluated these boundary states with a coefficient „k“ with an interval of values from 0 to 1, then in case that:

- the carrier will surely get a return transportation, we can determine: $k = 1$
- the carrier will certainly not get back transportation, we can determine: $k = 0$

This coefficient should then be taken into account when the carrier planning initial transport in terms of price formation.

In order to verify this claim, the authors of the paper carried out research, during which they monitored the development of the transport offer over a period of 90 days and the supply of transport capacity in transport databases between the Slovak Republic and selected countries of Europe, to confirm the hypothesis, that there is an impact on the price not only of the cost position, but also from the opportunity for back transportation of vehicle, from a specific transportation destination.

RESEARCH

What shipments are being carried out and at what price depends on many factors. One of them is the transport offer on the transport market. The aforementioned transport databases publish the offer and demand of shipments itself on a daily basis. The number of bids to be shifted every minute and the cost of transport. In this article, we will look at the shipping offer from a transport database. Market research was carried out of transport offers for 26 business days in months February and March from Monday to Friday in 19 European countries. On a daily basis, it was observed in the morning exactly between 9:00 and 9:30 a.m. Offer and demand for transport on the transport database, from which in Table 2.

Changes can be observed from the given statistical set between shipments from offer transport from Slovakia and offer transport to Slovakia (Fig. 5). It can be a fact, that there is a bigger problem with the back-loading of vehicles back to the territory of the Slovak Republic how to find a transport from the territory of the Slovak Republic. This can also be seen in figures 5, where the transport menu is displayed graphically. The values for a particular state were output using a statistical indicator – of the average of the 26 days of the observed survey, implemented for this article.

Table 2.
Offer transport overview from and to Slovakia

States	Offer transport from SR (%)	States	Offer transport to SR (%)
Belgium	3.85	Belgium	3.58
Bulgaria	6.88	Bulgaria	2.88
Czech republic	25.85	Czech republic	42.12
France	38.35	France	4.15
Netherland	3.69	Netherland	7.62
Luxemburg	2.85	Luxemburg	3.19
Hungary	63.27	Hungary	7.77
Germany	36.65	Germany	6.19
Poland	20.19	Poland	37.85
Austria	36.42	Austria	18.27
Romania	49.88	Romania	3.15
Slovakia	43.00	Slovakia	43.00
Slovenia	19.96	Slovenia	16.77
Serbia	33.19	Serbia	2.92
Spain	11.8	Spain	4.88
Switzerland	8.23	Switzerland	2.62
Italy	28.42	Italy	16.58
Turkey	19.31	Turkey	5.81
Great Britain	17.42	Great Britain	6.81

Source: processed by the authors



Fig. 5. Offer transport to Slovak Republic

Source: processed by the authors

CONCLUSION

Based on research, the hypothesis can be confirmed, there are differences between the different destinations back transportation of vehicle what the carrier's pricing should also react to. This fact must be taken into account when creating the cost of the first transportation. It is possible to design a relationship for pricing of first transportation:

$$Pr = \frac{f(P) \cdot cv + f(t) \cdot fc}{\left(\frac{1+k}{2}\right)} \quad (4)$$

where:

- 1 means 100% use the ride there,
- k coefficient of back transportation of vehicle,
- 2 means average load on first transportation.

If there is no back transportation of the vehicle, coefficient $k = 0$, which means that $(1+k)/2$ is a value 0.5, which increases the price to double, because of pay the back return transportation of the vehicle, driving without a shipment.

If there is a back transportation of the vehicle, $k = 1$, which means that the denominator is in the level 1 and the price for the first transportation does not make any raise, because the vehicle is also driving in the reverse direction.

If the carrier does not consider this fact and the price is determined only on the basis of costs, it is possible that even if they agree on the transportation price, which should generate a profit, after taking into account the conditions for the return of the vehicle the overall loss of the vehicle operations appears.

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