Comparative Evaluation of Transporting Cargo by Road and Rail between Lviv and Kharkiv

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Abstract – The current economic downturn in Ukraine, which led to a significant increase in costs, including transportation, made it necessary to revise approaches to the organization of the transport process. This paper presents a comparative evaluation of the transportation costs for packaged goods shipping by road and rail in 2013 and 2016. It was revealed that transporting cargo by rail is the most profitable in present market conditions in comparison with road transport, but it is necessary to take into account a number of rail shortcomings including transportation time, rail sidings of consigner and consignee and cargo safety.

Key words – transportation cost, immobilisation cost, road transport, rail transport.

I. Introduction

Reducing costs has been and remains one of the most important tasks of any concern. A separate section of the economy and business studies and explores the question of forming and managing costs. In this modern market turnover corresponds to the phase of the widespread use of IT technologies, including the optimization of the enterprise costs. However, this does not fully solve the problem of optimization of the costs of production, storage, transport due to the constantly changing market conditions.

According to business statistics data transport costs remain a weighty component of the total cost. Therefore, optimization of the transportation costs is a priority for most businesses. One of the possible options to optimize transportation costs is the right choice of the optimal transport mode. Selecting the transport mode depends on many factors, including cost, time, reliability of transportation ect. [1-3]. Considering the logistics infrastructure in Ukraine, it may be noted that the challenge of the transport mode choice between road and rail subject to availability of communication lines. This is becoming increasingly important question of transport choice for palletized goods. In most researches we can found that rail transport is mainly used when transporting over long distances with large amounts of cargo. However, this statement does not allow to make a decision about choosing sustainable transport modes for specific conditions. This is especially important in the current economic conditions in our state in which significantly increased costs for road transport, primarily due to higher fuel prices and the devaluation of the national currency. This is not so fast and significantly reflected at the rate of railway transport.

Prevailing conditions have caused the importance of considering the choice of road and rail transport modes during transportation goods in the territory of Ukraine.

The goal of this paper is to compare transportation cost while shipping cargo on pallets by motor and rail in order to select expedient transport mode.

II. Research

Most of the cargo are transported by various packaging. If we consider the scope of consumer goods, almost all goods are transported on pallets. A high concentration of manufacturing companies that send the finished products in large quantities over long distances in Ukraine we can observe.

Concerning the interaction between motor and rail transport, research focused initially on competitions between motor and rail transport modes. Observed competition has not been subjected to systematic or exhaustive research. According to [4] methodology of choosing transport mode is based on equivalent distance approach, but it is considered only movement and auxiliary operations that are calculated on the basis of unit variable cost. This method does not allow to take into account real cost for specific conditions. Thus, to verify expedient transport mode while shopping cargo by road and rail transport, the focus of research should be on the comparison of the transportation cost. This is the approach taken here.

This research looks at two Ukrainian cities (Lviv and Kharkiv), which covers two opposite sides of the state. Data of model had been formed by surveying experts and statistical data processing of large enterprises, which uses a road and rail transport while delivering finished products in Ukraine. Automation of calculation makes it possible to determine transportation cost, depending on the selected transport mode, as well as to carry out the monitoring of other factors model. The experimental conditions were adopted by the following: transportation is provided within Ukraine, cargo transported into universal vehicles and wagons, the road and rail vehicles' capacity are 20 tons and 40 (60) tons in accordance. The rail wagons are owned by rail enterprises.

The objective function of the researched system is characterized by the minimizing of transportation costs. The variables of model are load and unload operation costs, cargo amount, immobilization costs, cargo costs, transportation rate, transportation distance, forwarder service costs. The results of the calculation model with a monthly traffic cargo amount from 20 tons to 180 tons by road and rail transport are shown as the graph (Fig. 1).

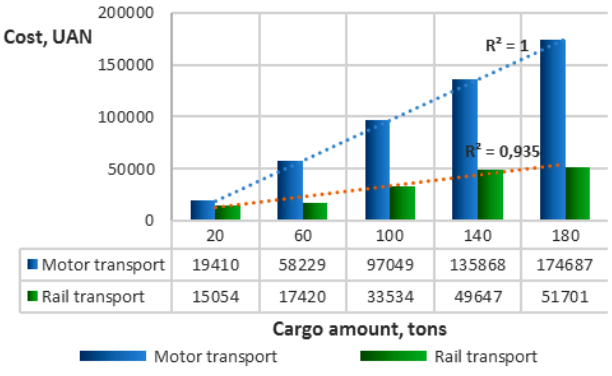

Fig.1 Transportation costs while transporting cargo by motor and rail transport between Lviv and Kharkiv (2016)

It was found that motor transportation costs are upward than rail transportation costs. In this case, when shipping 20 tons cargo the cost difference is 4536 UAH or about 29 %, when shipping 180 tons cargo the cost difference is 122986 UAH or almost 379 %. If we compare the cost difference between this transport means in 2013, it is nearly three times less (Fig. 2).

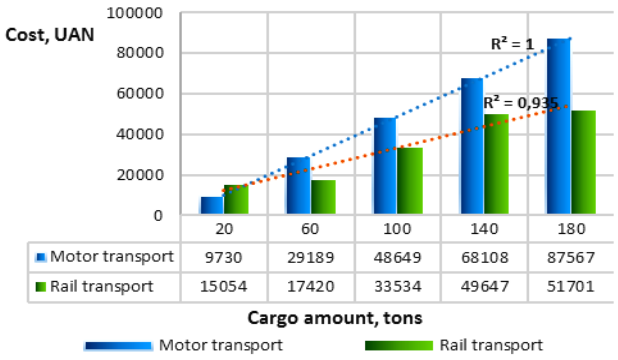

Fig. 2. Transportation costs while transporting cargo by motor and rail transport between Lviv and Kharkiv (2013)

The result of this trend is economic downturn in the country that influence transportation costs. That is to say, shipping by rail 20 tons cargo was less expensive then use road transport in 2013.

Certainly, making a decision about the choice transport mode based only on transportation costs is not always advisable. Especially considering that the rail has a number of shortcomings, significant of which are the transportation time, rail sidings of consigner and consignee and cargo safety. In this case, if the decision was made in 2013, in most cases, first choice was given to road transport. Now, however, we must compare more clearly total costs associated with shipping, especially considering the economic point of view. Moreover, comparing the transportation cost, it is necessary to take into account emerging storage costs during transportation by rail large amounts of cargo. In this study, not presented calculations concerning storage costs arising as a result of the need to store large consignment on the basis of diversity costs for each particular company.

Also it was analysed the costs resulting from immobilization funds of cargo transportation. The results are shown in Fig. 3.

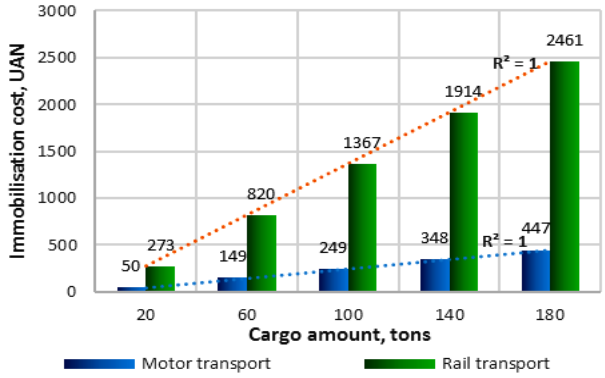

Fig. 3. Immobilization costs while transporting cargo by motor and rail transport between Lviv and Kharkiv (2016)

Immobilization of funds depend on the delivery time and shipping cost. In this paper, it is assumed that the delivery time is consisted of the transportation time, the time of loading and unloading operations and time for the formation of orders by road and rail. Investigation of the industrial enterprises are allowed to reveal that time for the formation of orders by road is an average 2 days, by rail - 6 days. Based on these figures and transportation time were calculated immobilization costs. The cargo price is 2520 UAH per ton, interest rate is estimated as 18 %. Thus, we can observe, when we use rail transport the immobilization costs are almost a five times more than using road transport.

Conclusion

A comparative analysis of transportation costs while shipping packaged goods by road and rail transport from Lviv to Kharkiv are showed that using of rail transport is less costly transporting 20 tons. However, this outcome was not observed in 2013. In this situation, it is urgent to revise the method of delivery for shippers and recipients in favour of rail transport, particularly if they have own rail sidings. Certainly they should take into account a number of other drawbacks arising from the use of rail transport. The most important for a consignee is to increase the transportation time, the immobilization costs, an increasing of stocks.

This study suggests possible orientations for further research. It is appropriate to a comparison of total costs when using road and rail transport, including stock costs, time of delivery and additional costs while using rail transport.

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