FACTORS INFLUENCING THE COMPETITION AMONG THE PARTICULAR TRANSPORT KINDS

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Summary: The paper deals with the competition in transport. It is especially focused on the competition among the particular transport kinds. It concentrates on some important factors that make differences among the transport kinds and, of course, on criteria influencing customers' choice.

Key words: Transport, Means of transport, Supply and Demand

1. INTRODUCTION

The decisive characteristics of the particular transport kinds are represented for example by speed of transport, ability to meet transport needs, periodicity, availability, safety, quality, energy consumption, work consumption, performance, capacity and many others. These characteristics are regarded as technical economic. They are important not only for the depiction of the particular transport kinds, but they can be also decisive factors for the competition among them.

2. ENERGY INTENSITY

Means of transport moves persons and goods along the transport rout, which is connected with the necessity of overcoming resistances and forces impeding motion through the traction force action. The resistances impeding motion can be divided into two categories – basic resistances and rolling resistances. The basic resistances are determined by the vehicle's construction. The rolling resistances follow from the geographical environment. They are represented by the resistance of the environment (for example air, water, etc.) and the resistance of the transport route (caused by cant and direction ratios). The decisive part of resistances, especially at higher speeds, is made up by the rolling resistance, because, for example, the air resistance is rising with the speed quadrate.

The demand for overcoming of all forces and resistances that counteract vehicles' motion with the minimum amount of invested energy is one of the fundamental requirements of transport effectiveness. The effectiveness of mechanical work carried by the traction force depends on the duration of the traction force effect on a certain distance, the dependence of the traction force on the motion speed, the amount of work carried per a time unit and the vehicle's traction output.

We can therefore say that the traction force needed for overcoming the resistances and keeping the means of transport in motion of a certain speed is directly proportional to the

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vehicle's output. We can also say, with a certain simplification, that the output of the transport (traction) unit will correspond to fuel or energy consumption as well.

On that account, energy consumption for achieving the required output to move persons or goods is decisive for the monitoring of the means of transport efficiency.

Energy consumption in transport we can examine from the standpoint of energy intensity of particular transport kinds. Their energy intensity is dependent on the traction force and the performed mechanical traction work that is necessary for overcoming the motion resistances of the means of transport as well as on losses resulting from energy changes connected with the means of transport drive.

The expended energy amount is dependent especially on:

- mechanical traction work invested in overcoming the resistances of the transport track, which is dependent on qualities of transport means, the transport track and the geographical environment,
- losses in production, treatment and transport of the energy source (coal, mineral resources, electric power from thermal, nuclear, hydro-electric or solar power stations), and in conversion of primary energy into traction energy,
- losses connected with transport means moving off, braking and running of auxiliary drive (heating, lighting, air-conditioning, cooling, etc.), and idle run losses.

Energy intensity of the particular transport branches can be judged according to the primary energy consumption related to the unit of transport work in ton-kilometres that is performed by transport means. We must differentiate between the specific consumption of transport work in kJ · tkm-1, which evaluates energy intensity as well as the specific rolling resistance of transport means including useful load, and the specific consumption related to load capacity or capacity for passengers expressed in kJ instead of km-1, which evaluates energy intensity related to transport supply. Energy consumption of performed work in ton-kilometres or in passenger-kilometres (possibly transposed ton-kilometres), is numbered in transport statistics.

It is possible to state that speed of transport has the dominant impact on energy intensity. The second place is occupied by the environment and the third one by drive efficiency. The important role in energy intensity is played by using transport means to full capacity both in passenger transport and freight transport. In freight transport the load ratio plays a double role. On the one hand it improves the ratio of useful load (appraised by tariffs) to the vehicle's weight, on the other hand the specific rolling resistance decreases with the load.

3. TRANSPORT PERFORMANCE

Besides energy intensity we must take into account also transport performance in comparing the particular transport kinds. It is the second technical economic characteristic.

Transport performance of the particular transport kinds is influenced by the transport route performance, and the capacity of transport means or units.

Transport performance of the transport kind or the means of transport in question must meet differential transport requirements. It is necessary to take into consideration rush hours

and variations of the requirements in order that the customer (forwarder, individual firm, etc.) is satisfied with transport and don't go over to a competing carrier, whether from the same transport kind or the different.

Transport requirements can be:

- in freight transport especially kind of goods, weight of carried goods, consignment characteristics, speed of transport, price for transport, spatial and time distribution of transport, necessity of JIT,
- in passenger transport especially speed of transport, price for transport, travelling comfort, complementary services, connection suitability, etc.

When we set performance in transport we must take into account the following types of performance:

- permeable performance of the transport route and its equipment, which can be measured by the number of transport units or means of transport (trains, cars, boats, airplanes, etc.) that are able to get through a given technically equipped section of the transport route or its equipment in a certain period (needful means of transport are supposed to be available),
- operating performance, which is measured by the number of transport units or means of transport that are able to get through a given technically equipped section of the transport route or its equipment in a certain period with respect to the standby stand of transport means and workers' qualification in a given transport organization, operation, maintenance and repairs of technical means,
- maximum transport performance of the transport route's sections at a given transport structure, which is expressed by maximum number of passengers carried in a certain period, derived from permeable performance of the transport route at the utmost load of transport means,
- available transport performance, which can be measured by the number of passengers or tons of goods carried in a certain period, corresponding to operating performance at useful load of transport means at a certain transport structure.

Transport performance must be large enough to be able to manage even fluctuations in transport of goods and passengers. When the transport route is being built or transport means, storehouses, ramps, etc. are being purchased, attention should be paid to the estimated growth or fall trends concerning transport demand.

It follows from the comparison of the particular forms of performance measurement in transport that the optimal performance is influenced especially by the following factors:

- required speed of goods and passenger transport,
- continuity of traffic flow,
- safety of transport.

Considering that performance in transport must be measured from the viewpoint of both transport and also permeable performance of the particular transport kinds, the common comparative base can be theoretical permeable performance, which follows, in a simplified way, from the following prerequisites:

- continuous stream of transport means or transport units on a horizontal and straight dual carriageway (or double track),
- running continuity, which is ensured by a such sequence of transport means or units that enables their continuous run without speed decreasing and stopping,
- safety of transport ensured by the minimum distance of successive moving transport means or units that enables their safe stoppage at a sudden stoppage of the vehicle before.

4. TRANSPORT KIND CHOICE

Another perspective on the transport kind choice is supply and demand point of view. Supply of transport services and demand for transport are meeting at the transport market. This supply is represented by economically and legally independent business subject and the demand by customers, who are limited only by their financial possibilities. Criteria for the transport kind choice are summarized in following Table 1.

Tab. 1 - Table 1: Criteria for the transport kind choice

	Railway transport	**Road transport**	**Inland water transport**	**Sea transport**	**Air transport**
Commodity	all kinds of goods; especially bulk ones for longer distance	all kinds of goods; limited quantity for short and medium distance	bulky goods; longer distance without demand for speed of transport	bulky goods; among continents without demand for speed of transport	express goods of all kinds; long distance, speed of transport
Measurements of consigned goods (volume)	entirely according to measurements of the vehicle's loading capacity or loading gauge	limited according to the category of road communication; exceptions only with a special approval	no role at consigning goods	no role at consigning goods	limited by the type of used airplane
Weight of goods in the means of transport	about 50 tons; vehicles of a special construction more than 50 tons	up to about 25 tons; vehicles of a special construction and with a special approval over 25 tons	up to 3 000 tons; often even more; European riverboats 1 350 tons	up to 300 000 tons; often even more; piece goods about 10 000 tons	about 100 tons for cargo airplanes; for passenger airplanes about 20 tons
Speed	about 120 km/h	about 80 km/h	depending on the current of the watercourse	up to about 40 km/h	about 900 km/h
Delivery time (duration of transport)	set by an act	possibility of contractual agreement	possibility of contractual agreement	possibility of contractual agreement	very short; in accordance with the flight schedule
Price for transport	as per tariff; in special cases it is possible to negotiate tariff reduction	contractual, according to the prime cost calculation	tariff	freely negotiated price in the case of linear shipowners; tariff for others	tariff (TACT) IATA

	Railway transport	Road transport	Inland water transport	Sea transport	Air transport
Responsibility for goods	for the period from the receipt of the consignment for transport till its delivery to the consignee (carrier is responsible for partial or total loss, damage or exceeding of the delivery time limit)				

Source: Authors, Logistický management

5. CONCLUSION

Supply and demand harmony at the market of transport services is influenced by the competition among the particular transport kinds on the one hand, and inside of them on the other hand. The competition among carriers of the same transport kind means that transfer is offered by several carriers of the same transport kind, whereas the competition among carriers of various transport kinds means that there are more possibilities of transfer on a given line with the use of different transport kinds. Customers (forwarders) take into account many criteria in their decision –making process concerning the transport kind choice. The most important factors influencing the competition among the particular transport kinds were described above.

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