METHODS OF ANALYSIS OF FACTORS DETERMINING PASSENGER TRANSPORTATION DEMAND

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ABSTRACT

Development of passenger transportation market depends on many factors, in particular, level of regional economy and local transport capacity, conditions of labor migration, mobility of population and income level.

The main consumer factors for passenger long-distance rail transportation are:

- improving quality of passenger services;
- ensuring availability of transportation at price parameters of a trip;
- compliance with progressive standards of passenger service and transportation safety.

The objective of the author is to analyze factors, determining passenger transportation demand. To fulfill his task, the author uses comparative method, evaluation method, and analysis. In the article the author presents the results of the study of factors of passenger transportation market development on the basis of influence matrix of its parameters on the need for transportation in the regulated sector. Market indicators can be grouped into three clusters: transport mobility of citizens, population size, economic development of regions. Analysis of relationship between these indicators and the value of passenger turnover allows us to offer an approach to the determination of carrying capacity of long-distance rail transportation market, based on reference values of passenger traffic drivers.

Keywords: quality of transport services, passenger transportation market, long-distance traffic, macroeconomic indicators, drivers of market development.

Background. *To achieve positive trends in the dynamics of mentioned factors it is necessary to increase economic efficiency of a passenger company and to optimize demand for state financial support provided to attract long-term investments that contribute to build-up, renovation and modernization of production assets of a passenger complex [2–5]. Particularly acute is a problem of updating the fleet of passenger cars, applied for transportation in the regulated segment of long-distance traffic as well as the introduction of innovative transport technologies.*

Creation of predictable conditions for all market participants in order to improve the sustainability of passenger company, stimulating the growth of the efficiency of transport activities and inter-regional cooperation is of great importance. Model of business relations of a passenger company and JSC «Russian Railways' as a railway infrastructure service provider plays a special role.

Objective. *The objective of the author is to analyze factors, determining passenger transportation demand.*

Methods. *The author uses comparative method, evaluation method, analysis.*

Results. *Structuring consumer factors in the development of passenger transportation market enables to create a matrix of parameters' influence on the need for transportation in the regulated sector (Table 1).*

The matrix reflects a type of connection of factors and demand for transportation in the regulated segment of long-distance rail traffic:

G-I – growth in factor leads to an increase in demand;

G-D – growth in factor leads to a decrease in demand.

Forming an influence matrix, it should be noted that the increase in incomes of population and its separate groups is not always reflected in the growth in demand for rail passenger transportation, as in this case competition with road transport comes into effect. Preferences of passengers may determine the development of roads in the region, the purpose of a trip and its distance.

An important aspect of the impact on demand in the regulated sector is a low average income of consumers and as a result the residual principle of formation of needs for a trip and transport mobility. Therefore, the increase in consumer prices in all segments (including industrial and consumer goods), inflation has a significant constraint on the passenger transportation market.

The dynamics of macroeconomic indicators of the last decade, determining income and expenses of the population as a whole shows a consistent increase in both total gross domestic product, as well as investment in industrial facilities and transport. The level of per capita income and per capita minimum living wage reflects increase in well-being and prosperity of an average citizen of Russia, which creates prerequisites for the growth in mobility and thus to an increase in demand for passenger rail transportation.

However, increased competition [1] and organizational implications of reform and cost optimization, accompanied by the abolition of «loss' trains have led to a narrowing of long-distance rail transportation market.

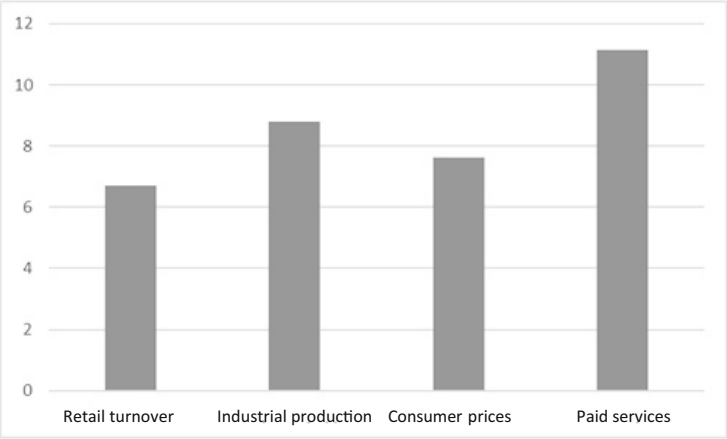
Revealed dependence between indicatorsof passenger transportation market development and the amount of passenger turnover allows us to offer an approach to determining the potential capacity of long-distance rail transportation market, based on reference values of the drivers of passenger turnover, taking into account international experience [6]. Reference values can be average values of passenger turnover relation to indicators reflecting the factors of market development for the period from 2001 to 2012, which brought together various periods of economic conjuncture. In addition, during this period passenger transportations were identified as an independent business model, designed to break-even operations. Initial data for calculations were obtained from publicly available sources of statistical information (<http://dynamicdrive.com>) for the following indicators:

- *Nominal GDP of Russia, billion rubles;*
- *Per capita income, rubles per month;*
- *Average per capita minimum living wage, rubles per month;*
- *Investments in fixed assets, billion rubles;*
- *Growth rate of retail trade turnover,%;*
- *Growth rate of industrial production,%;*
- *Overall unemployment rate (ILO methodology), million people on average for the period;*
- *Consumer price index,% to previous period;*
- *Volume of paid services to the population,% to previous period.*

Table 1

Influence matrix of indicators reflecting factors of passenger transportation market development on the level of demand in the regulated long-distance traffic segment

Group of parameters	Subgroup	Indicators	Influence degree		
			Weak	Moderate	Strong
Transport mobility of population	Income and expenses of population	Dynamics of monetary income			G-I
		Volume of nominal income		G-I	
		Volume of savings	G-I		
		Surplus of income over expenditure			G-I
		Average per capita income		G-I	
		Growth of pensions		G-D	
	Growth of consumer prices	Inflation	G-D		
		Rising prices for food products		G-D	
		Growth in utility tariffs, communication		G-D	
		Rising prices for industrial goods		G-D	
		Growth of a minimum living wage			G-D
	Increased competition in the passenger services market	Growth in paid services offer	G-D		
		Development of road transport and quality of roads			G-D
		Aviation development and introduction of low-cost transportation model			G-D
Population size	Dynamics of the population size	Growth rate		G-I	
	Migration	Resident population size		G-D	
	Urbanization	Proportion of urban population	G-I		
	Change in life expectancy	Average age	G-I		
Economic development of regions	New industrial facilities and transport construction	Volume of investments in new facilities			G-I
		Number of registered enterprises	G-I		
	Employment	Unemployment rate		G-D	
		Proportion of economically active population			G-I
	Business activity	Industrial production growth rate		G-I	
		Retail turnover		G-I	
		New housing supply			G-I



Pic. 1. Reserves for possible growth in passenger long-distance transport volume, billion passengers / km.

Calculations of passenger turnover drivers depending on the listed indicators of market development are made by the method proposed by the author as in the framework of the study of modern models of passenger tariffs formation of and are shown in Table 2. They show a decline in interest of passengers to long-distance transportation, which again confirms the importance of the problem of passenger cars fleet renewal and improvement of service quality.

Dispersion of calculated drivers is negligible, which makes it possible to consider application of average values as well-founded in determining the potential volume of passenger transportation market.

Author's calculations indicate that the potential market volume of long-distance passenger transpor-

Table 2

Drivers of passenger transportation market development in long-distance rail traffic

	Minimum living wage	Per capita income	GDP	Investment	Growth rate of retail trade turnover	Growth rate of industrial production	Consumer price index, %	Volume of paid services
2001	0,109447	0,04325	0,014807	0,088012	1,193072	1,286987	1,116619	1,3138
2002	0,083001	0,031543	0,011507	0,070643	1,139076	1,207575	1,081677	1,24005
2003	0,067063	0,023453	0,00918	0,055456	1,114427	1,113404	1,082587	1,15366
2004	0,059175	0,019497	0,00734	0,043622	1,103061	1,157193	1,118861	1,168007
2005	0,054836	0,016061	0,006029	0,03608	1,155052	1,239676	1,174841	1,211999
2006	0,045247	0,013393	0,005073	0,02887	1,196798	1,284615	1,252794	1,203124
2007	0,041203	0,011187	0,004241	0,020993	1,214431	1,320182	1,260013	1,257764
2008	0,035888	0,009236	0,003345	0,015722	1,214259	1,372379	1,218546	1,348255
2009	0,03037	0,008201	0,003594	0,017489	1,469849	1,537913	1,282065	1,354259
2010	0,023314	0,006363	0,002594	0,013127	1,129131	1,11966	1,104223	1,134462
2011	0,019365	0,005318	0,001968	0,009981	1,029418	1,049026	1,03815	1,095997
2012	0,017491	0,004881	0,00179	0,008863	1,047977	1,077369	1,045028	1,06501
2013	0,017512	0,004467	0,001708	0,008601	1,097209	1,135458	1,070423	1,096154
Average	0,046455	0,015142	0,005629	0,032112	1,161828	1,223187	1,141987	1,203272
Dispersion	0,000775	0,000137	1,66E-05	0,000655	0,01205	0,018791	0,00732	0,009248

tation market differs in several groups of indicators. Macroeconomic indicators, characterizing the growth of economic indicators, focus on high market potential, the ability to almost double passenger turnover mastered in recent years. Indicators related to «consumption» – growth rates of paid services to the population, dynamics of retail trade turnover, etc., more accurately characterize the expected target values of growth in demand for passenger transportation (Pic. 1).

Conclusions. *Implementation of the proposed approach to the study of the demand for long-distance passenger transportation comes from the fact that the transport market is directly linked to economic growth and living standards.*

There has been a change in the fundamental factors affecting the level of satisfaction of passengers with a trip quality. Along with the established requirements for scheduled traffic, travel time and comfort in cars customers have increased requirements for related services. The share of revenues from services in the general revenue receipts of the Federal Passenger Company from long-distance passenger transportation increases, but its growth rate could be much higher.

There is a need for significant changes in the management of this sphere of activity of JSC «Russian Railways' and efforts to update the fleet of passenger cars. And regardless of future transformations accompanying problems should be solved inevitably at the crossroads of economic and consumer interests.

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