ANALYSIS AND EVALUATION OF RAILROAD TRANSPORT IN BULGARIA

(Under The Example of BDZ "Passengers")

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Abstract -
Railway transport is a convenient, reliable, safe and, above all, environmentally sustainable mode of transport. With its socio-economic benefits and environmental efficiency, it contributes to the achievement of the EU's cohesion policy objectives for the transport systems of the different Community Member States. Improving railway passenger transport services is one of the aspects of sustainable development that covers the process of satisfying the needs of public services, work practices and enterprise management. This report presents the main indicators for assessing the quality of transport services and specifies the principles that must be followed in order to provide a better transport service to the population of the country.
An evaluation matrix for the transport service of BDZ Passengers is presented and recommendations on the possibilities for increasing the efficiency of the functioning of passenger rail transport in the country in economic and social terms are summarized.

Keywords - Strategy, Assessment Methods of External Aerie, Analysis of Transport System.

I. INTRODUCTION

Achieving *quality transport services* is the most important prerequisite for building a coherent policy for the development of passenger railway transport. The users of the passenger railway transport want a reliable, convenient, affordable and well worth the price transport. Society as a whole wants transport that contributes to economic growth and helps to meet the environmental challenges. Therefore, BDZ Passengers can only meet these needs if they have a quality and well-maintained fleet required to meet the demand of customers who wish to use their services.
The economic, social and environmental dimensions of sustainable railway development are interdependent and cannot exist without one another. The country's railway system, which is in a poor condition, due to the fact that it is economically unsustainable and permanently underfunded, cannot meet the demand of the population and often has various negative effects on the environment and the society.

The social dimension of the sustainable development of railway transport is linked to establishing fair social conditions for all categories of the population, improving security and improving the quality of life. Social sustainability refers to the right of the separate individuals and social groups to live in healthy and socially acceptable conditions without discrimination, harmful influences and anti-social manifestations. Environmental sustainability is measured by paying the full external costs of other modes of transport.
The main factors that determine the quality of the railway service offered are - speed, comfort, rolling stock capacity, frequency, accessibility and cost.

II. ANALYSIS OF THE QUALITY AND COMFORT OF PASSENGER SERVICES

The motivation of passengers to choose another mode of transport over the railway is related to the use of old wagons by BDZ "Passengers", poor hygiene in them, inconvenient connections, timetable and frequency of trains, lack of air conditioning, inability to pay with bank cards in station ticket offices and advance booking of tickets, overcrowding of trains in some destinations and lack of passengers in others.
A key factor in the poor quality of the transport service offered by BDZ Passengers is the poor condition of the rolling stock. This has led to a sharp increase in delays of passenger trains in the last years (Table 1).[1].

2018/Train category	International trains	Domestic long-distance trains	Regional city-outskirts trains
Total delays, %	35.90 %	25 %	11.20 %
% delay up to 60 min at the final station	26.70 %	21.30 %	7.20 %
% delay from 60 to 120 min at the final station	6.10 %	2.80 %	0.50 %
% delay over 120 min at the final station	3.10 %	0.90 %	0.10 %

Table 1
Source: BDZ Passengers

[1] Report on the quality of the transport services performed in accordance with the requirements of Article 28 of Regulation 1371/2007

As one can seen from the table, the longest delays were being found at domestic and international long distance trains within up to 60 min at the final station. An additional disadvantage for long-haul passengers is the prolonged travel time due to the low speeds that lead to these train delays due to the disruption of train schedules. A large part of the rolling stock is also operationally incompatible with European standards and requirements. This rolling stock cannot make full use of the opportunities not only of the rehabilitated and upgraded railway infrastructure, but also of the one where there have been no investments yet.

As visible from table 2, the fact that in 2018 continues the tendency of a low share of persons who state that they have experienced train delays, is a positive indication. It is noteworthy, however, that BDZ's customers are less likely to say that there was a delay than the adult population, which may be the result not only of an objective delay of the trains concerned, but also of the anticipated expectation of such a delay.

Train category	International trains	Domestic long-distance trains	Regional city-outskirts trains
year	Delays in percentage		
2013	73.50%	27%	10.00%
2014	36.20%	27.50%	10.80%
2015	55.13%	41.10%	14.28%
2016	47.90%	37.30%	14.00%
2017	39.25%	28.60%	12.65%
2018	35.90%	25%	11.20%

Table 2
Source: BDZ Passengers

Cancellations or delays of trains are a common occurrence, with the main reason being the lack of serviceable rolling stock. A considerable part of the rolling stock does not meet the European standards in terms of comfort, hygiene and quality, and the maintenance and repair of the old fleet requires considerable resources. One of the major drawbacks that needs to be overcome and can be addressed is the hygiene of trains, which is a major source of discontent among target groups.

The main problems that worsen the quality of the transport service offered are expressed in:

- Delays, irregular schedule of the local connections;
- Cancellation of trains without preliminary announcement;
- unclear pricing;
- unsuitable platforms or such that do not meet the hygiene standards;
- problematic access to information as well as problems with booking options;
- Conditions on trains and stations;
- difficult access of people with disabilities to the platform, the station, the service facilities, the trains;
- not taking into account the change of platforms at the connections;
- poor organization and management and even lack of connection with other modes of transport - lack of multimodality;
- insufficient care for the passengers;

Another problem associated with reducing the usefulness of the railway service offered is the lack of information systems. This leads to the failure to meet the requirements for interoperability and the inability to apply modern information technologies in transport planning and management of the transport process. A weak spot is also the marketing activity. The transport service is not regarded as a product obtained on the basis of market segmentation and is not justified by the adequate application of the marketing mix. The existing structure of trains by type can be improved by applying appropriate marketing approaches and tools and technological design of transports.

In order to solve such problems, investments, appropriate schemes for their provision and financing are needed. These resources should be used in several directions:

- improving the parameters of passenger rolling stock related to the development of a strategy and plan for its replacement and replacing it;
- design, development and putting into operation passenger transport management information systems;
- analyzing the market and identifying prospective transport segments, as well as technological design of the transportation related to these segments;
- reassessment and simplification of the tariffs and tariff policy of the passenger railway transport company;
- development of a package of investment projects for the implementation of the measures by BDZ Passengers EOOD;
- developing measures for drawing up a common transport scheme for bus and railway transport;

These problems are intrinsic to the railway transport sector. There are also external problems with railway transport, which are also quite important for the losing position of passenger railway transport. One of these problems is the inconsistency of train and bus schedules, the low levels of intermodality and multimodality, and the increased competition between bus and railway transport in the main and busy routes.

III. ANALYSIS OF THE MAIN INDEXES FOR THE PASSENGERS TRANSPORT

The utility for customers using BDZ Passengers' transport services will be presented as a function of the following indicators:

- Speed (time of traveling);
- Frequency;
- Price;
- Rolling stock capacity (volume);
- Comfort;
- Access.

These indicators, based on the surveys made among the passengers of BDZ "Passengers", are estimated with values from 1 to 5 depending on the quality of the service provided. Table 3 shows the estimates corresponding to each value.

rating	quality
1	bad
2	satisfactory
3	good
4	very good
5	excellent

Table 3

The sum of the scores on the different indicators shows what the quality of the overall service for the passengers using railway transport is. Table 4 shows the function between the values of the passenger rating and the quality corresponding to that rating.

rating	**quality**
0 - 5	bad
5.1 - 15	satisfactory
15.1 - 20	Good
21.1 - 25	Very good
25.1 - 30	Excellent

Table 4

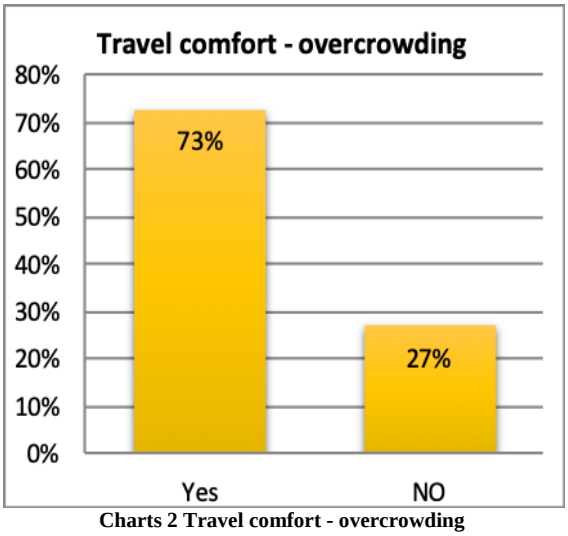
The two main indicators that determine travelers' attitudes when choosing which type of transportation to travel with are ***travel time (speed) and comfort.*** These indicators have the greatest influence on the passenger's choice on which mode of transport to travel with on long-distance and suburban trips. The same indicators will be the most changed when new rolling stock is put into service.

The remaining indicators will not be considered, due to the fact that they will not change significantly when new rolling stock is put into service. And to date, with the available rolling stock, BDZ Passengers can provide capacity, frequency of movement and accessibility. With the "price" indicator the trend will be reversed - the prices for the use of the new rolling stock will be higher than the current ones. However, the "price" indicator will have a positive effect (relative to road transport) in the positive direction if the full cost of running a car with an average occupancy of two passengers is calculated. This is an additional potential (10-15%) of travelers who will rethink their utility from the use of transport service based on the indicators of comfort, travel time and price.

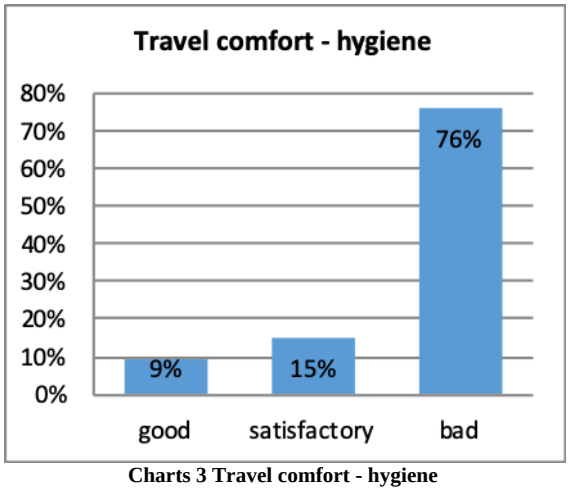
Surveys conducted among passengers traveling on trains and waiting at railway stations clearly indicate their attitude and assessment of the usefulness of using railway transport.

Charts 1, 2, 3 and 4 summarize the results of the survey among passengers who use railway transport.

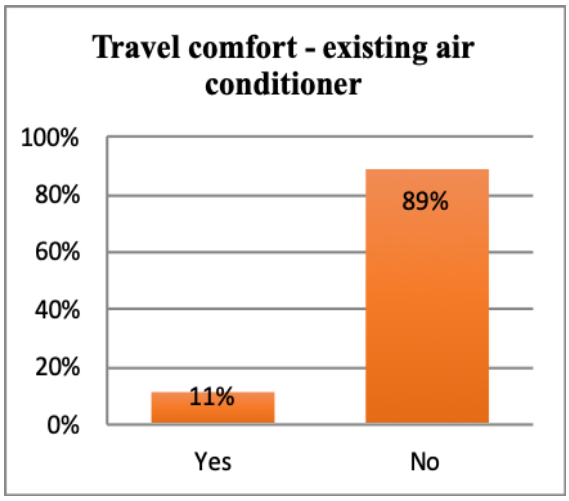




Charts 2 Travel comfort - overcrowding



Charts 3 Travel comfort - hygiene



Charts 4 Travel comfort – existing air conditioner

The dissatisfaction of passengers using railway services is mainly related to train speed and accuracy. As one can see from graph 1, nearly ¾ of the passengers are not satisfied with the travel time, which is a consequence of the slow speeds and delays of trains. Regarding the comfort of traveling, regular railway users have complaints mainly about the overcrowding of the wagons, especially in the direction Sofia - Vratsa - Vidin. Figure 2 shows that only ¼ of the respondents did not complain about overcrowding on the train, while dissatisfaction with the lack of air conditioning was approximately 90%. Chart 3 illustrates the comfort of travel from a hygienic point of view - 2/3 of passengers are not satisfied with the hygiene in the compartments and toilets of the train.

In summary it can be said that the decrease in the value of the utility function is the reason for the decrease in the quality of the offered service by BDZ "Passengers", which is expected to affect the level of satisfaction of the passengers over the years, which leads to a withdrawal from the use of railway services as a way of moving and deteriorating the financial performance of the company.

IV. CONCLUSION

In conclusion, it can be said that the conventional train currently used on the main lines of the railway network does not create conditions for improving the quality of passenger services offered. The average technical speed for the movement of passenger trains in Bulgaria is one of the lowest in Europe. At design speeds of 120-140 km/h, trains run at 60-90 km/h, and at separate sections of the network at 40-50 km/h to ensure safe movement. There is also a large difference between the permitted speeds and the technical speeds specified in the regulatory schedule for running trains. This is due to the fact that the railway infrastructure offers operating conditions (high permissible speeds and capacity) that cannot be effectively used by BDZ Passengers because they do not have rolling stock that can benefit from the conditions of transportation offered by the railway infrastructure. Increased permissible speeds of up to 160 km/h for passenger trains in railway sections where rehabilitation or upgrading projects are being implemented cannot improve the railway service unless the technical characteristics of the rolling stock are improved. Capacity is defined by the technical speds, and they depend on the rolling stock.

The summary of the derived indicators for assessing passenger satisfaction and the factors that characterize the public benefits of using railway transport make it possible to draw the following main conclusions:

- The provision of quality railway service to the public requires greater safety and reliability of transport, higher speeds and greater comfort;
- Improving the quality of railway service, including personal security, reducing the number of delays, protecting the rights of passengers and access to public transport from remote and peripheral areas are extremely important and should be prioritized in the country's transport policy;
- People with reduced mobility must be provided with flexible transport solutions when using railway transport;
- The construction, maintenance and extension of the railway infrastructure must be timely and of good quality;
- Priority financing of railway infrastructure projects which will contribute to the reduction of congestion and harmful emissions and have a positive effect on human health and well-being;
- The railway system should be developed in such a way as to guarantee compliance with and improve working conditions in the transport sector.

REFERENCES

[1] Rail Transport and Environment FACTS & FIGURES. UIC / CER – Paris, 2015.,in http://www.cer.be/sites/default/files/publication/Facts%20and%20figures%202014.pdf

[2] http://www.bdz.bg/en/

[3] Report on the quality of the transport services performed in accordance with the requirements of Article 28 of Regulation 1371/2007, https://ec.europa.eu/transport/sites/transport/files/themes/passengers/studies/doc/2012-07-evaluation-regulation-1371-2007.pdf

[4] http://www.bdz.bg/bg/prava-i-zaduljeniia-na-putnicite/prava-i-zaduljeniia-na-putnicite.html

[5] White Paper 2011 "Roadmap to achieving a Single European Transport Area - towards a competitive, resource efficient transport system". EU, 2011, https://ec.europa.eu/transport/sites/transport/files/themes/strategies/doc/2011_white_paper/white-paper-illustrated-brochure_en.pdf

[6] Report N6 “Draft final report of the integrated transport strategy for the period up to 2030, https://www.eufunds.bg/sites/default/files/uploads/optti/docs/2019-06/Integrated_Transport_Strategy_2030_eng_28-06-2017.pdf

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