

QUALITY OF TRANSPORT INTERCHANGE HUBS: INTEREST AND DEMAND

Evreenova, Nadezhda Yu., Moscow State University of Railway Engineering (MIIT), Moscow, Russia.

ABSTRACT

The efficiency of the transport interchange hubs (hereinafter -TIH) functioning is closely related to the quality of service provided to its passengers and visitors. Like any other products and services, transport services provided to customers have a qualitative component. Requests of passengers are satisfied not only in course of transportation, but also by a set of additional services in TIH, increasing the quality of the entire trip, making it less burdensome and more attractive. Quality of service of TIH users is a combination of economic, technological, technical, aesthetic, environmental indicators, enabling their needs for transport (mobility) and service (additional services) sectors of the passenger complex [see 1–6]. Along with the price and reliability of transportation, quality of services is increasingly becoming a determining factor attracting passengers, and hence

accumulating revenues of transport companies.

The objective of the author is to present a sequence of developing of a system of indicators and of evaluation of the quality of service of passengers and visitors of the transport interchange hub.

The article suggests three groups of indicators or indices (simple, complex, integral). Furthermore a coefficient of the significance of an individual quality indicator is proposed to be determined by the survey, expert assessments or statistical methods, and the values of generated indicators – through the differential estimate, characterizing the level of the actual value of private quality indicator as compared to the standard (normative) value. Development and implementation of measures to improve the quality of service in TIH is associated with significant costs, so some preliminary marketing research of demand and transport service market conjuncture, thorough economic calculations of efficiency are required.

Keywords: transportation, transport interchange hubs, interaction of transport modes, competition, demand, quality of service, economy, management, complex indicator of quality.

Background. The efficiency of the transport interchange hubs (hereinafter -TIH) functioning is closely related to the quality of service of its passengers and visitors. Additional services provided by them, will be an important marketing tool, they shape an image of interacting of modes of transport, their image in the transport market.

Like any other products, services, transport services provided to customers, have a qualitative component. Requests of passengers are satisfied not only in course of transportation, but also by a set of additional services in TIH, increasing the quality of the entire trip, making it less burdensome and more attractive.

Quality of service of TIH users is a combination of economic, technological, technical, aesthetic, environmental indicators, ensuring their needs for transport (moving) and service (additional services) sectors of the passenger complex [see. 1–6]. Along with the price and reliability of transportation, in the market conditions the quality of services is increasingly becoming a determining factor in the competition for a passenger, and hence for revenues of transport companies.

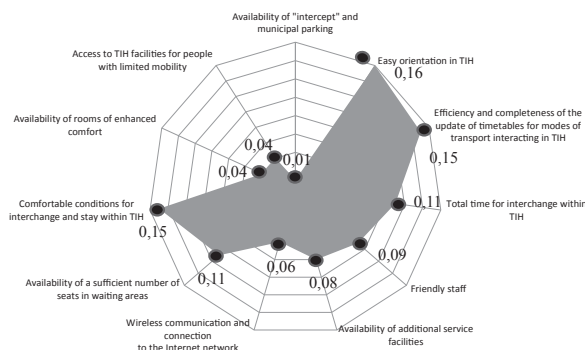
A system of indicators to measure the quality is divided into three groups:

- simple indices are characterized by a single significant natural property (speed of the passengers' movement in TIH, time for interchange, etc.);

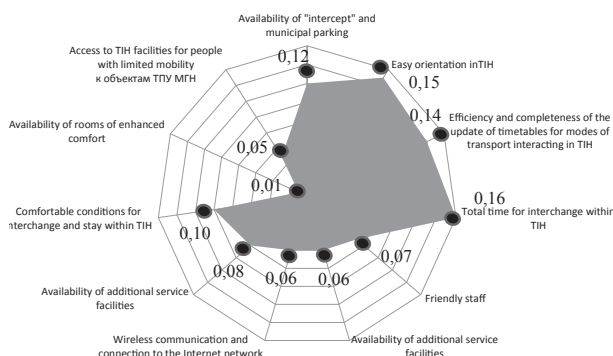
Table 1

The evaluation criteria and indicators of quality of service for passengers and visitors of TIH

№	Criteria	Indicators
1	Parking	Free parking for embarkation / disembarkation of passengers and visitors Time to enter TIH from parking areas Enough parking space
2	Orientation of passengers and visitors within TIH	Easy orientation of passengers and visitors within TIH
3	Information desks with timetables of interacting modes of transport	Efficiency and completeness of the update of timetables of modes of transport interacting in TIH
4	Pedestrian communications, speed and ease of movement	Layout of TIH premises TPU related to the movement of passengers and visitors
5	Assistance to passengers and visitors of TIH, benevolence of the staff	Appearances of the staff and culture of communication
6	Public catering and retail trade	Sufficiency of public catering and retail trade, their availability for passengers and visitors
7	Wireless communication and connection to the Internet network	Access to wireless communications and the Internet in all areas of TIH
8	Waiting areas	Availability of a sufficient number of seats in waiting areas
9	TIH safety	Ensuring the safety of passengers and visitors of TIH
10	Comfortable conditions of stay	Satisfaction of passengers and visitors with conditions of stay in TIH; the average time spent in queues
11	Rooms of enhanced comfort	Providing passenger with an access to the rooms of enhanced comfort
12	Service of passenger with limited mobility	The conditions for accessing TIH facilities for people with limited mobility



Pic. 1. Distribution of factors affecting the quality of service of passengers and visitors of TIH, for the first group (in terms of their influence).



Pic. 2. Distribution of factors affecting the quality of service of passengers and visitors of TIH, for the second group.

- complex indices have a few simple and general indicators (for example, a system that takes into account the level of lighting in the halls of TIH, temperature, humidity, etc.);

- integral indices include indicators of costs of production of services of appropriate quality, and a set of operational, technical, physical and value indicators.

Objective. The objective of the author is to present a sequence of development of a system of indicators and of evaluation of the quality of service of passengers and visitors of the transport interchange hub.

Methods. The author uses evaluation method, analysis, description.

Results. With the increasing competition in the market of passenger transportation and an increase in passenger's requirements the quality service as a set of system properties that promote their sales, gets not only a complex nature, but also is regarded as the optimizing resource at the stage of planning decisions aimed at designing of interchange hub facilities [7]. In the process of assessing the quality of service by passengers and visitors of TIH the following steps are provided:

- Criteria selection and formation of quality indicators;
- Revealing the significance of the generated indicators;
- Determination of the value of influencing factors and indicators of quality;
- Calculation of the complex index of quality.

In the criteria selection and the formation of factors affecting the quality of service in TIH, it is necessary to take into account:

- technical quality indicators, or the services, that are provided to the passenger (booking via phone with the delivery of tickets to a certain address or subsequent issuing to the customers at the box office, rest in the waiting room of enhanced comfort, availability

of suitable and safe routes for movement within TIH, taxi service, parking etc.);

- functional quality indicators – how the service is provided (individual approach to passenger, attention, courtesy, the minimum time of booking, detailed answers to questions, etc.).

In studying the needs of passengers and visitors of TIH it is possible to use questionnaires, interviews, observation, analysis, but in all cases the assessment is carried out by comparing the actual and standard quality indicators. Table 1 summarizes the criteria and indicators of quality of service provided to passengers and visitors of TIH.

With regard to identifying the importance of quality indicators, here, too, it is also impossible to avoid relativity of assessments, conditionality of numerical characteristics, and sometimes the prevalence of personal judgments, although the use of mathematical apparatus is quite legitimate here. In particular, the significance coefficient (α_i), taking into account the weight (importance) of generated indicators of the quality of service for passengers and visitors of TIH, can be determined by a survey, expert assessments or statistical methods. For different segments of the transport services market, different categories of users of the interchange hub the proportion of α_i varies.

From the point of view of economic and management efficiency it is necessary to be realistic about the value of individual factors affecting the quality. For this experience and knowledge of specialists are very valuable, which are taken into account when the management system provides a method of expert estimates [8, 9].

On the basis of generated indicators and quality evaluation parameters of Table 1 a questionnaire has been drawn up, in which 11 factors are selected. 30 experts of the transport sector have been interviewed. According to the results of expert assessments the relative importance coefficients have been revealed for two groups of factors: one for business trip; other for



private cultural and domestic travel. Distribution of factors in terms of their impact on the quality of service for passengers and visitors of TIH is shown in Pic. 1 and 2.

According to the results of expert estimates the most significant factor for business trips is the «Total time of interchange within TIH» and for culture and entertainment trips – «Easy orientation in TIH».

Values of generated indicators of quality (κ_i) are defined through the differential estimate, characterizing the actual level of private quality index as compared to the standard (normative) value [10]:

$$K_i = \frac{y_{ir}}{y_{is}}, \quad (1)$$

where y_{ir} is the actual level of the i -th property (quality indicator);

y_{is} is the standard level of the i -th property (quality indicator).

The indicator κ_i can also be found through a survey of passengers and visitors of TIH using scoring. Filling in the questionnaire, the respondent determines the quality of service (scale score of 5, 10, 100, etc.) and the share of the indicator: $00 \leq \alpha_i \leq 1$.

The next step in this evaluation logic becomes complex quality indicator. It is a set of quality indicators, which obtain a comparable form and the ability to be brought together. Complexity of the process in this case is the way to reduce the various indicators into a single indicator.

In determining the complex quality indicator a situation may arise when some low indicators «are overlapped» by higher indicators. To avoid this, for each i -th indicator it is necessary to set intervals and a comprehensive assessment should be carried out only if the quality indicator falls in this interval.

To determine a complex quality indicator, professor V. G. Galaburda proposed the following formula [10]:

$$K_o = \sum_{i=1}^n K_i \cdot \alpha_i \text{ at } \sum \alpha_i = 1, \quad (2)$$

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where K_i are indicators of quality of service of passengers and visitors of TIH;

α_i is a share of each indicator with account of mutual influence in the overall quality assessment; n is a number of quality indicators, that are taken into account ($i = 1, 2, \dots, n$).

With a relatively small number of private quality indicators (usually up to 15) a complex indicator can be represented as their weighted average sum:

$$K_o = \frac{\sum K_i \cdot \alpha_i}{\sum \alpha_i}. \quad (3)$$

With a large number of private indicators of quality of service of passengers and visitors of TIH (over 15) a complex indicator can act as their geometric mean

$$K_o = \sqrt[n]{\prod_{i=1}^n K_i} \quad (4)$$

or as a module of the vector constructed in the coordinate system of private indicators

$$K_o = \sqrt{\sum_{i=1}^n (K_i)^2}. \quad (5)$$

A complex indicator of quality of service of passengers and visitors of TIH is within the range from 0 to 1 or from 0 to 100%.

Conclusions.

1. Demonstrational methods of evaluating the system of service of TIH customers allow to develop a quality management strategy to enhance the competitiveness of public transport over the individual.

2. Implementation of the strategy to improve the quality of service of passengers and visitors of TIH is associated, usually, with considerable expense, so some preliminary marketing research of demand and conjuncture of transport services market, thorough economic calculations of efficiency of proposed actions are required.

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Information about the author:

Evreenova, Nadezhda Yu. – senior lecturer at the department of Transport business of Moscow State University of Railway Engineering (MIIT), Moscow, Russia, nevreenova@mail.ru.

Article received 10.03.2014, revised 14.12.2014, accepted 23.12.2014.