

QUALITY STANDARDS FOR MEASURING THE LEVEL OF SERVICE IN PUBLIC TRANSPORT

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Summary: Based on the results of the experimental verification methodology of measuring customer satisfaction and quality evaluation of public transport, quality standards for services' level measuring have been proposed. Quality standards which I recommend to set legal regulations should be defined by law or binding regulation. Setting standards for the criteria of time availability in the transport network is recommended to transfer in the responsibility of municipal authorities.

Key words: Quality standards , Measuring the level of service, Public transport

INTRODUCTION

Quality of service in public transport is determined by standards. The proposal of quality standards for measuring the level of service in public transport is necessary to establish insurmountable qualitative and quantitative limits. These data can be used as a comparative base for assessing the current state of public transport. Service quality standards are processed to use the providers (carriers) to present and monitor their services. The aim is to create conditions for ensuring a high proportion of public transport in the modal split.

The proposal of quality standards for measuring the level of service in public transport is necessary to establish with respected the fact that public transport must meet specific functions:

- ecological,
- reduce traffic congestion,
- social.

Furthermore, it should also not be forgotten the basic principles of democratic society:

- solidarity principle (people with disabilities),
- the principle of equal conditions of access to public services, which are tied to transportation, such as:
 - use of health care facilities of primary health care which are located in larger towns or cities,
 - attendance at government offices especially. These are all services which contribute as a citizen taxpayer can not provide at home and their location can not practically influence.

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The introduction of quality standards for measuring the level of service in public transport is to expensive and time consuming actions. Often means that carriers implement organizational changes and becomes an economic category. It is expected that it will improve the quality of economic and non-economic effects. Quality standards must comply with the requirements of passengers. Passengers expect to meet these requirements at a price that meets their expectations.

Quality standards are set and controlled according to quality criteria. Quality criteria have been defined for setting standards. Criteria were assessed by questionnaire in evaluating passenger satisfaction with the quality of public transport services in Ostrava. These criteria were supplemented by quality components (culture services, security) that were not included in the evaluation of satisfaction but the monitoring is recommended.

Standards for assessing the quality of public transport are divided into two categories:

1. Quality standards which I recommend to set legal regulations (by law or binding regulation)
2. Quality standards which I recommend to set the municipality of the city

1. QUALITY STANDARDS WHICH I RECOMMEND TO SET LEGAL REGULATIONS

Quality standards which I recommend to set legal regulations are enforceable by citizens. These terms must be defined by law or binding regulation. Individual agencies or organizations are trying to define their own definitions of "standards", which is the source of inaccuracies in the later evaluation and comparison.

The group of criteria, quality standards which I recommend to set legal regulations, include the following criteria of quality public transport:

1. Regularity and accuracy
2. The solution of stops
3. Information about the operation of public transport
4. Solution presale tickets
5. Comfort in the vehicle
6. Culture of Services
7. Passenger safety

For each criterion of quality has been developed standards that contains:

- standard definition (this characterizes provided service),
- parameters of the desired state (this characterizes the quality in relation to standard),
- threshold of unacceptability (this characterizes the situation completely unacceptable to be seen as a failure to provide services that produce immediate response to restore service),
- the level of intensity (determined the proportion of services performed in the desired quality and compliant state to the total number of tested samples),
- the measurement method (provides guidance for selecting appropriate methods of measurement),

- frequency (provides guidance for determining the number of measurements).

2. QUALITY STANDARDS WHICH I RECOMMEND TO SET THE MUNICIPALITY OF THE CITY

Municipality of the city has the function of the transport authority for the city bus and taxi services, railway office for tramway and trolleybus (in terms of Ostrava). Public transport network is specific to each city where public transportation is operated. Setting standards for the criteria of time availability in the transport network I recommend to transfer in the responsibility of municipal authorities.

Criteria of time availability in the transport network:

1. Travel time
2. Accessibility of stops
3. Waiting for connection
4. Changing in traffic network

Quality standards for criteria of time availability in the transport network of public transport for commuting to work can be defined on the base of the results of a survey of passenger satisfaction. Passengers evaluated the quality of public transport services in Ostrava. Quality standards for criteria of time availability are presented below.

2.1 Standard of travel time

Travel time is an important criterion of public transport quality. This is a decisive criterion in choosing the mode of transport. Passengers can choose the transport connection with the shortest transfer from source to their destination. Travel time consists of walking time to the boarding station, waiting time at the connection, transport time (stay in the vehicle), the time required to change between connections and walking time from the output station to your destination. This standard can be characterized as time availability of the city center.

Time availability of the city center can be evaluated graphically using isochrons time availability. Isochron time availability is the line (discontinuous) from which the travel time to the city centre. Time availability of the city center can be represented in two ways like:

- a) travel time; for the construction of isochron is necessary to proceed from the city center and find items with the same travel time from the city center. Walking time and waiting time for connection is established from the data of the transport network of public transport and traffic intervals. Transport time and transfer time is obtained from the timetable,
- b) the sum of transport time and transfer times is obtained from the timetable.

For determining of travel time standard is necessary to take into account the total travel time (i.e. including the walking and waiting time at the connection) using specific data on individual components of travel obtained from the passengers in the questionnaire.

Criterion travel time was measured in passenger satisfaction survey in terms of time spent traveling from home to workplace. The values listed in the table 1 shows how passengers evaluate the time spent traveling from home to workplace.

Tab. 1 - Means of items up of quality of travel time transformation

Means of items up	Nominal value intervals [min]	Limiting nominal values [min]
very favourable	15-27	19
favourable	28-45	36
neither favourable – nor unfavourable	46-67	57
unfavourable	68-95	83
very unfavourable	96-120	120

Time travel evaluation can be evident from values set forth above. Highest utility answer the purpose of destination by 27 minutes. Time travel 45 minutes is evaluated by passengers “favourable”. Increase of time spending by travelling is evaluated neutral – “neither favourable – nor unfavourable” (by 67 minutes). Next extension of travel time is unfavourable from passengers’ point of view.

Municipality of the Ostrava city should guarantee commuting to work in 57 minutes. This value is standard of travel time of public transport in Ostrava.

2.2 Standard of accessibility of stops

Every travel by public transport vehicles begins and ends with walking. Continuity of pedestrian paths and approaches must to be logical, short, clear and as safe as possible. The standard of accessibility of stops determines distance in terms of spatial and in terms of time spent walking to the stop (from home to the starting stop and destination stop to work) on the way to work.

The walking distance is a standard whose settings affect citizen access to public transport. When determining the limit of walking distance to stop, respectively to public transport, it is necessary to take into account the fact that time spent walking is part of the time spent to achieve the objective. This standard can be characterized as a time availability of stops.

Time availability of stops is generally a function of average distance between stops and public transport network density. Time availability of stops corresponds to the mean length of the walk of passenger to the next stop in the monitored traffic area and walking speed. Graphically it is possible to evaluate the time availability of stops using isochrons time availability. Isochron time availability of stops is the line of which is the same time of the walk to stop.

For determining of standard of accessibility of stops is necessary to take into account specific data on individual components of walking time (from home to the starting stop and destination stop to work) on the way to work obtained from the passengers in the questionnaire.

Criterion accessibility of stops was measured in passenger satisfaction survey in terms of time spent of walking on the way to work. The values listed in the table 2 shows how passengers evaluate the walking time.

Tab. 2 - Means of items up of quality of walking time transformation

Means of items up	Nominal value intervals [min]	Limiting nominal values [min]
very favourable	4-11	5
favourable	12-18	15
neither favourable – nor unfavourable	19-23	21
unfavourable	24-27	26
very unfavourable	28-30	30

Evaluation of walking time can be evident from values set forth above. Highest utility answer the accessibility of stop by 11 minutes. Walking time 18 minutes is evaluated by passengers “favourable”. Increase of time spent walking to the bus stop is evaluated neutral – “neither favourable – nor unfavourable” (by 23 minutes). Next extension of walking time is unfavourable from passengers’ point of view.

Municipality of the Ostrava city should guarantee accessibility of stops in 21 minutes. This value is standard accessibility of stops in Ostrava.

2.3 Standard of waiting for connection

Waiting time for connection is the time measured from the arrival of passenger at the bus stop after the departure of means of transport required connections. The average waiting time for connection depends on the distribution of passenger arrival time of the stop and the regularity, reliability and accuracy of transport. If a passenger comes to a stop regardless of the schedule, i.e. without knowledge of the departure connections at the line, comes randomly. Providing regular and accurate traffic is the average waiting time for connection of passenger who arrives at the bus stop without knowing the schedule, half of the traffic interval. This situation occurs even if the timetable is set only interval between the connections.

For determining of standard of waiting for connection is necessary to take into account data of waiting time obtained from the passengers in the questionnaire. Criterion waiting for connection was measured in passenger satisfaction survey in terms of time spent of waiting for connection on the way to work. The values listed in the table 3 shows how passengers evaluate the waiting time.

Evaluation of waiting time for connection can be evident from values set forth above. Highest utility answer the waiting time by 2 minutes. Waiting time 5 minutes is evaluated by passengers “favourable”. Limiting nominal values of passengers’ satisfaction is 7 minutes. Evaluation "very unfavourable" was not possible to transform. This value lies outside the domain found the survey.

Municipality of the Ostrava city should guarantee waiting for connection in 7 minutes. This value is standard of waiting for connection in Ostrava.

Tab. 3 - Means of items up of quality of waiting time transformation

Means of items up	Nominal value intervals [min]	Limiting nominal values [min]
very favourable	1-2	1
favourable	3-5	4
neither favourable – nor unfavourable	6-9	7
unfavourable	10-15	13
very unfavourable	-	-

2.4 Standard of changing in traffic network

Criterion of changing in traffic network in terms of time of change is a significant part of the travel time. Number of changes and time of change has a significant impact on overall travel time. Time of change is the sum of the time walking in the change between the stop of departure and output stop of lines between which is changing and the waiting time for a subsequent connection. A higher number of changes during one trip reduce the interest of public transport.

For determining of standard of changing in traffic network is necessary to take into account data of time of change obtained from the passengers in the questionnaire. Criterion changing in traffic network was measured in passenger satisfaction survey in terms of time spent of changing on the way to work. The values listed in the table 4 shows how passengers evaluate the time of change.

Tab. 4 - Means of items up of quality of time of change transformation

Means of items up	Nominal value intervals [min]	Limiting nominal values [min]
very favourable	2-7	2
favourable	8-11	10
neither favourable – nor unfavourable	12-16	15
unfavourable	17-20	19
very unfavourable	-	-

Evaluation of time of change can be evident from values set forth above. Highest utility answer time of change by 7 minutes. Time of change 11 minutes is evaluated by passengers “favourable”. Limiting nominal values of passengers’ satisfaction is 15 minutes. Evaluation "very unfavourable" was not possible to transform. This value lies outside the domain found the survey.

Municipality of the Ostrava city should guarantee time of change in 15 minutes. This value is standard of standard of changing in traffic network in Ostrava.

CONCLUSION

The presented article is concerned to quality standards for services' level. Based on the results of the experimental evaluation of the methodology of measuring customer satisfaction and quality evaluation of public transport quality standards for services' level measuring have been proposed. I recommend that such quality standards be made part of the law (chap. 1). The quality standards for time availability have been created in chapter 2. My next recommendation is that the design of the standards for time availability criteria must be under municipality jurisdiction because of specific transport network in every city.

REFERENCES

- (1) OLIVKOVÁ, I. *Hodnocení kvality městské hromadné dopravy a návrh jejích standardů*. Habilitační práce. Ostrava: VŠB - Technická univerzita Ostrava, 2009.
- (2) OLIVKOVÁ, I. Návrh standardů kvality pro měření úrovně služeb v MHD. In *Horizonty dopravy 1/2006*. Časopis pro vědu a výzkum v dopravě. Výzkumný ústav dopravní, a.s. Žilina, 2006. s. 8-11. ISSN 1210-0978.
- (3) OLIVKOVÁ, I. Standardy kvality služeb dopravce v MHD. In *7. mezinárodní konference o veřejné osobní dopravě*. 26. – 27. 10 2004, Bratislava, Slovenská republika. s. 230-235. ISBN 80-233-0498-4.