# SATISFACTION WITH SHARED PUBLIC TRANSPORT. CASE STUDY: TIMISOARA

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**Abstract:** Public transport in a city is a vital aspect, having multiple benefits for the environment, society and economy. But in order to effectively provide this service, it is essential that people using public transport are satisfied with its functionality, comfort, accessibility and safety. The purpose of this research is to analyze the level of satisfaction with public transport in Timişoara. The research question aims at whether the people of Timisoara are rather satisfied or dissatisfied with public transport. We adopted a quantitative method, collecting data through a questionnaire administered by field operators. Data analysis included descriptive statistics, correlational analyses, t tests, and ANOVAs. The results showed that the perception of travelers towards public transport in Timişoara tends towards satisfaction, and that age can weakly influence satisfaction towards public transport. This study also provides recommendations on increasing the general satisfaction level with public transport in Timişoara.

Keywords: public transport, passenger satisfaction, Timișoara

#### 1. Introduction

Public transport provides an accessible and efficient mode of transport in urban and suburban areas, facilitating the mobility of the population and access to various social and economic activities, along with the shift from the use of private motorized vehicles to the use of public transport and non-motorized modes of travel, such as walking and cycling (Tuan, Van Truong, Tetsuo & An, 2022). Thus, by using public transport, traffic congestion can be reduced by up to 36% (Aftabuzzaman, Currie & Sarvi, 2010), which can reduce environmental and health problems (Lopez, Jin, & Al Faruque, 2020; Farokhi & Johansson, 2015). Moreover, the level of development of public transport has a significant inhibitory effect on carbon emissions, especially if it complies with measures. Regarding regulations beneficial to the environment or are they using electric vehicles (Jing, Liu, Yu & He, 2022; Bhattacharya, Govindan, Dastidar & Sharma, 2024; Basso, Kulcsár & Sanchez-Diaz, 2021).

In addition to the positive effects it has on the environment, studies have also demonstrated a positive impact on society. According to the American Public Transportation Association (n.d.), investments in public transportation lead to job creation and job support. Thus, more than 36,000 jobs are supported for every million dollars invested in public transport. In addition, it provides access to jobs, especially for people in entry-level jobs who cannot afford a car, or for vulnerable people such as those with disabilities (for more details see Otovescu, 2006, 2009).

In fact, public transport contributes significantly to social equality by providing travel opportunities for vulnerable groups such as the disabled, the elderly and those without vehicles (Tuấn, Trưởng, Shimizu & An, 2022). Thus, public transport systems can reduce social inequalities by removing barriers to participation in activities essential to well-being especially in large cities, where many residents depend on this mode of transport due to limited financial accessibility. Therefore, improving these systems can reduce vulnerability to poverty caused by lack of access to transportation and provide more employment opportunities and health services (Bocarejo & Urrego, 2022).

According to Albalate, D., & Bel, G. (2010), public transport has a positive impact on a city's economy through its relationship with tourism. Given the significant contribution of tourism to the social dynamics and economic success of a city, and the fact that most tourists use public transport, it indirectly contributes to the city's economy. This contribution becomes even more important in the context of 2019, one of the years of the Covid-19 pandemic, a period that strongly affected all tangential areas of transport (Burgos & Ivanov, 2021), including the field of tourism (Chowdhury, Paul, Kaisar & Moktadir, 2021). However, tourism represented approximately 4% of the total gross added value in the Romanian economy (Eurostat, 2023), and at the European GDP level, tourism contributed approximately 2,100 billion dollars (Statista, 2023).

Public transport can have a positive effect on the individual, as demonstrated by the research of Ettema, Gärling, Olsson & Friman (2010). By measuring SWB (Subjective Well-Being – the extent to which a person positively assesses the overall quality of their life.), more precisely by measuring personal perception towards the public transport system, it has been observed that satisfaction with it can influence the quality of life. The results of the study were confirmed 10 years later by Olsson et. all. (2020), who demonstrated that the level of quality of public transport contributes to the improvement of the quality of life, being equally important for all generations.

But the mere presence of public transport is not enough. To ensure satisfaction in public transport travel, it is crucial to better understand which external factors are essential and which are sufficient to create a satisfactory travel experience for users of public transport services (Sukhov, Lättman, Olsson, Friman, & Fujii, 2021). Therefore, it is important to consider certain factors that influence public transport satisfaction.

# 2. Functionality

Perhaps some of the most influential factors influencing satisfaction with public transport – the overall level of fulfillment of a customer's expectations, measured as the percentage of customer expectations that were actually met (Tyrinopoulos & Antoniou, 2008) – they are temporal or those related to the functionality of public transport, such as the duration of the trip or their punctuality. Along with the cost and frequency of travel, these are also the issues that public transport policies tend to focus on (Ettema, Gärling, Olsson & Friman, 2010). After all, the feasibility of the means of transport is an element that, in addition to the traveler's satisfaction, can also influence his behavior, along with the desire to use such means in the future (Tsionas, Assaf, Gillen & Mattila, 2017). For example, if they know that a means of public transport usually arrives faster than stated in its schedule, then they will also try to get to the station faster, even if it would be an inconvenience. The importance of the feasibility of means of transport becomes more accentuated when the trip is associated with professional and study commitments, becoming a particular priority for young people and middle-aged people who have such obligations (Tavares, Lucchesi, Larranaga & Cybis, 2021).

# 3. Accessibility

Another essential aspect that influences the satisfaction of the traveler is the accessibility of public transport, which refers, first, to the distance between the place of departure and the transport station. This perceived distance is critical when low transport accessibility impedes access to economic opportunities such as jobs or other income-generating activities, as it can lead to residential stress and lower housing satisfaction, up to the point at which it can trigger residential mobility (Olfindo, 2021). However, there are other factors that can determine whether a public transport is affordable or not, such as the cost of travel (Jamei, E. et. all., 2022). Another way in which accessibility can be perceived is through the boarding and disembarking conditions, which, according to studies, are a crucial factor in keeping and attracting passengers to use the public transport service, which directly influences passenger satisfaction (Ha, Ibrahim, Lo & Mah, 2019).

# 4. Comfort

Passenger comfort can contribute to travel satisfaction and can be assessed by: seat availability (De Palma, Kilani, & Proost, 2015; Hörcher, Graham & Anderson, 2018), size and legroom, appropriate climate control for local conditions (such as heating in winter and air conditioning in summer), and smooth acceleration and deceleration. Also, vehicle technology can influence the perception of comfort, by reducing unpleasant odors and disturbing noises (Tavares, Lucchesi, Larranaga & Cybis, 2021).

# 5. Safety

Another important element related to the field of transport is road safety (Choi, 2021) or the degree of safety they feel when using public transport (Ha, Ibrahim, Lo & Mah, 2019; Lois, D., Monzón, A., & Hernández, S., 2018). The need to evaluate this element is given by the fact that public transport is closely related to human lives, on a large scale, because it is used by a large number of passengers at the same time (Joewono, & Kubota, 2006).

# 6. Socio-demographic characteristics

Other important factors that can influence satisfaction with public transportation are the traveler's socio-demographic characteristics, such as age, gender, education, and occupation (Abenoza RF et al., 2017). Silveira, TC et al. (2019) showed that there are gender differences in perception. According to this study, women are more critical of the service expected and provided. Instead, they place more importance on most service characteristics compared to men. On the other hand, men tend to place more importance on service performance attributes such as reliability, frequency, and travel time, while women tend to place more importance on comfort, such as vehicle interior conditions and safety (Silveira, TC et al., 2019). Also, age is another socio-demographic factor to consider in assessing satisfaction with public transport. For example, in terms of comfort, older adults appear to be more affected by external factors than the two younger groups. At the same time, young adults seem to be less influenced by the operational characteristics of the service in evaluating comfort (Tavares, Lucchesi, Larranaga & Cybis, 2021).

#### 7. Research methodology

Since we aimed for the highest possible validity of the data, we used a quantitative research method. More precisely, we used the social survey method, using the questionnaire as an instrument. The study sample consisted of 907 respondents. We managed to obtain this number of respondents through 46 operators, students at the Faculty of Sociology and Psychology, within the Western University of Timișoara. They collected the data between November 13 and December 3, 2023. More specifically, they went in pairs of at least 2 people to seven connection points frequently frequented by public transport, established in advance with the Timișoara Public Transport Company (STPT). Thus, the operators collected data from the areas: 700 Square, Posta Mare, County Hospital, Mocioni Square, North Station, Council of Europe Square and Soarelui area. The type of sampling used was the random one. Thus, we obtained data from people aged between 14 and 91 years, respectively data from 458 men (50.5%) and 449 women (49.5%).

The main objective of the study is to identify the degree of satisfaction of the people of Timişoara with public transport. And as for the research question, it aims at whether the people of Timisoara are rather satisfied or dissatisfied with public transport. Therefore, to measure this satisfaction, we used a scale taken from the specialized literature, found in the study Assessing travel satisfaction in public transport: A configurational approach, published in 2021 by Sukhov, Lättman, Olsson, Friman, & Fujii. The scale was slightly adapted so that its statements were measured by means of a Likert scale from 1 to 5, where 1 refers to very low satisfaction, while 5 refers to a very high one, at the expense of a Likert scale with seven points.

We made this change to be able to reduce the time to complete the questionnaire as much as possible, since they were applied in public transport stations and there was a possibility that the respondent had to interrupt the completion of the questionnaire, as he was obliged to leave immediately to catch means of transport.

By operationalizing the general objective, the following secondary research objectives can be identified:

1. Evaluation of factors influencing satisfaction with public transport in Timişoara, focusing on payment methods, distance to transport stations, driver behavior, punctuality, waiting times, air quality and vehicle noise levels.

2. Investigating the relationship between satisfaction levels and specific dimensions of public transport, such as comfort, information provision and courtesy.

3. Analyze the modal choice preferences of the inhabitants of Timişoara and identify the factors that influence the selection of their mode of transport.

4. Assess the popularity and effectiveness of different payment methods for public transport and identify potential areas for improvement.

5. Exploring the demographic characteristics of public transport users in Timișoara and their impact on satisfaction levels, especially by gender and age.

6. Identify areas of public transport infrastructure and services that require attention and improvement based on user satisfaction levels and usage patterns.

7. The proposal of recommendations to increase the degree of general satisfaction with public transport in Timișoara, including strategies to address areas of dissatisfaction and to promote underutilized modes of transport and payment methods.

These research objectives aim to provide a comprehensive understanding of the current state of public transport in Timisoara, identify areas for improvement and provide recommendations to improve the overall transport experience for residents.

To ensure that we have achieved our overall objective, we have formulated the following specific objectives and assumptions:

Ob1. Identifying satisfaction with aspects of the public transport system:

Ip1.1. Travelers who use public transport in Timișoara have a high degree of satisfaction with the elements related to courtesy.

Ip1.2. Travelers who use public transport in Timișoara have a high degree of satisfaction with the elements related to functionality.

Ip1.3. Travelers who use public transport in Timișoara have a high degree of satisfaction with the elements related to security.

Ip1.4. Travelers who use public transport in Timișoara have a high degree of satisfaction with the elements related to information.

Ip1.5. Travelers who use public transport in Timișoara have a high degree of satisfaction with the elements related to comfort.

Ob2. Identifying the link between respondents' socio-demographic characteristics and satisfaction with public transport:

Ip2.1. There are statistically significant differences between respondents according to their gender in terms of satisfaction with public transport.

Ip2.2. There are statistically significant differences between respondents based on their age in terms of satisfaction with public transport.

Ip2.3. There are statistically significant differences between respondents according to the most frequently used means of transport in terms of satisfaction with public transport.

Ip2.4. There are statistically significant differences between the respondents according to the payment method predominantly used, in terms of satisfaction with public transport.

#### 8. Research results

Following a frequency analysis, it emerged, that among the first most satisfying aspects of shared public transport in Timișoara is the way to pay for the trip (m = 3.82; Std = 1.103), the

distance from home to at the nearest transport station (m = 3.69; Std = 1.129), respectively the driver's attitude and behavior (m = 3.63; Std = 1.164). At the opposite pole, respondents are less satisfied with the punctuality of means of transport (m = 2.79; Std = 1.103), the waiting time between connections (m = 2.92; Std = 1.129) and with air quality (m = 2.96; Std = 1.164), respectively the noise level (m = 2.96; Std = 1.143) from public transport (see table 1).

Public transport satisfaction items (Attributes)	Ν	Mean	Std
How I pay for the trip	907	3.82	1.103
Distance to nearest transport station?	907	3.69	1,129
Driver's attitude and behavior?	907	3.63	1,164
The quality of lights in public transport?	907	3.55	1,143
Written information provided on public transport?	907	3.41	1,149
The announcements within the means of transport?	907	3.40	1,181
The boarding and disembarking conditions of public transport?	907	3.39	1,093
Length of trip?	907	3.33	0.979
The usefulness of the information provided at bus stops?	907	3.27	1,162
Security	907	3.26	1,024
Comfort level?	907	3.19	1,114
Cleanliness inside public transport?	907	3.17	0.98
The usefulness of the information on the website of the STPT company?	907	3.15	1,203
The usefulness of public transport mobile apps?	907	3.14	1,178
Frequency of departures of means of transport from the station?	907	3.13	1,168
The physical space inside public transport?	907	2.97	1,109
Noise level in public transport?	907	2.96	1.107
Air quality in public transport?	907	2.96	1,088
Latency between links?	907	2.92	1,157
Punctuality of means of transport?	907	2.79	1,228

Table 1: Descriptive statistics on public transport satisfaction items in descending order

We continued to conduct descriptive analyzes on the scale dimensions. Thus, we noticed that, depending on the mean, the lowest value was registered by comfort (m = 3.13; Std = 0.81), while the highest was obtained by the degree of courtesy (m = 3.45; Std = 0.75). Regarding the satisfaction index with public transport, it registered the value of 3.25. In other words, as a rule, the people of Timişoara have a neutral opinion, which tends towards satisfaction vis-à-vis the means of public transport. Continuing the analysis, following some t-tests, we observed statistically significant differences between this index and the dimensions related to comfort, information, and courtesy; the mean of the first two being lower than the value of the public transport satisfaction index, while the value of the last dimension is higher. In other words, in relation to the general level of respondents' satisfaction with public transport, aspects related to information and comfort can be improved, while those related to courtesy are optimal (see table 2).

Table 2: Descriptive statistics on scale dimensions in descending order and t-test significance threshold values

Scale dimensions	N	Mean	Std.	The significance threshold value of the t-test
Courtesy	907	3.45	0.75888	<0.005
Functionality	907	3.28	0.73946	0.230
Security	907	3.26	1,228	0.845
Information	907	3.19	0.82765	0.021
Comfort	907	3.13	0.81230	< 0.005

Following some frequency analyses, we noticed that the most frequented means of public transport is the bus (N = 823; m = 90.7%), followed by the tram (N = 662; m = 73%), respectively by the trolleybus (N = 497; m = 54.8%). Continuing the analysis, in an independent sample t test, we noted that there are no statistically significant differences between people who use the bus, tram or trolleybus in terms of satisfaction with public transport (p > 0.05). Also, in the case of other means of transport provided by STPT, we noticed that they are less used. In fact, almost all respondents claim to use the VeloTM bicycle (N = 849; m = 93.6%), the TroTM scooter (N = 836; m = 92.2%) and the vaporeto (N = 874; m = 96.4%) less than a once a week. Carrying out the same analyzes in the case of the routes used, we noticed that the most frequented route is the strictly urban route (N = 873; m = 96.3%), followed by the urban-rural route (N = 328, m = 36.2%), respectively of the strictly rural one (N = 161; m = 17.8%). We did not proceed with an independent sample t test analysis because there is a very high discrepancy between people who strictly use urban routes and those who also use rural routes.

Following a frequency analysis, we noticed that the most used means of payment is the STPT subscription (N = 415; m = 45.8%), followed by contactless payment via bank card (N = 181; m = 20%). At the opposite pole, the least used means of payment is represented by the tariff application "Electronic Wallet" (N = 21; m = 2.3%). Following an ANOVA analysis, we observed that there are no statistically significant differences between people who use the subscription, ticket and contactless card, respectively other payment methods in terms of public transport satisfaction.

By means of some frequency analyses, we noticed that the majority of respondents do not belong to a category that benefits from discounts or freebies for using public transport (N = 457; m = 50.4%). Conversely, among those who benefit from such discounts or freebies, most claim to be pensioners (N = 183; m = 20.2%), followed by students (N = 155; m = 17.1%). Beneficiaries of special laws register the lowest share (N = 4; m = 0.4%). Continuing the interpretation, following a t-test, we noticed that there are no statistically significant differences between those who benefit from discounts/freebies and people who do not have such benefits, in terms of public transport satisfaction.

In terms of proximity to the nearest station, most respondents mention that it takes about 5 minutes (N = 242, m = 26.7%, md = 5). However, there are also cases where respondents claimed that the travel time from home to the most frequently used station is greater than 30 minutes (N = 22, m = 0.23%). In fact, the longest walking time from the respondent's home to the most frequently used station is about 90 minutes. The respective case claims that he lives in the Steaua-Fratelia area, but also that he uses rural transport routes almost daily. Regarding the journey from home to work/school/college, etc., most respondents say it takes about 30 minutes (N = 171, m = 18.9%, md = 30). In the case of the return trip, most respondents claimed that it also takes about 30 minutes (N = 186, m = 20.5%, md = 30). The longest round trip clocks in at 150 minutes. This respondent claims that he lives in Moşniţa Noua and uses rural routes almost daily. Also, taking into account the respondent's age, he most likely uses public transport to go to school.

In order to verify whether there are differences between respondents according to their socio-democratic characteristics in terms of the degree of satisfaction with public transport, we performed a t-test between male (N = 484, m = 3.27) and female gender (N = 449, m = 3.23). Following this analysis, we did not notice significant differences between the two groups (p = 0.228). However, following a correlational analysis, we noticed that there is a link between the age of respondents and satisfaction with public transport (p = 0.019). This correlation is directly proportional, meaning that satisfaction with public transportation increases with age. On the other hand, the strength of this correlation is very weak (r = 0.078), which means that there will not be very large differences between the satisfaction of younger and older people in terms of satisfaction with public transport.

#### 9. Conclusions and recommendations

The analyzes carried out on the variables regarding public transport in Timișoara revealed some key perspectives on the satisfaction levels and usage patterns of the inhabitants.

First, it is evident that certain aspects of public transport are particularly satisfying for residents, particularly payment methods, proximity of transport stations to homes and driver behaviour. Instead, there are areas of dissatisfaction such as punctuality, waiting times between connections, air quality and noise levels in transport vehicles. In addition, while overall satisfaction tends towards neutrality, with the value of the traveler satisfaction index having a value of 3.25, specific dimensions such as comfort and information provision require improvement, while politeness is perceived as satisfactory.

In terms of modal choice, buses are the most used mode of transport, followed by trams and trolleybuses. However, other transport options offered by STPT are underutilized, suggesting potential areas for promotion and improvement.

Payment methods vary in popularity, with subscriptions being the most frequently used, followed by contactless payments via bank cards. The least preferred method is the "Electronic Wallet" application, indicating the need for re-evaluation or marketing efforts.

Socio-demographic characteristics such as gender do not significantly influence the level of satisfaction, while age shows a weak correlation, with satisfaction increasing slightly with age.

In conclusion, although there are aspects of public transport in Timişoara that are satisfactory, there are also areas that require attention and improvement. Addressing the issues of punctuality, convenience and information provision could increase overall satisfaction and contribute to a smoother transport experience for residents. In addition, promoting underutilized modes of transport and payment methods could lead to a more diverse and efficient transport network in the city.

We suggest that to improve passenger satisfaction in local public transport contexts, it is crucial to first focus on understanding how satisfaction with various service quality characteristics are interconnected to provide the greatest value.

Based on the findings and conclusions of the research report, we formulate some recommendations to increase the degree of general satisfaction with public transport in Timişoara:

1. Improving punctuality: Addressing dissatisfaction with punctuality should be a priority. Implementing a strategy to increase the timeliness of public transport services, such as optimizing schedules, increasing fleet capacity during peak hours and using real-time tracking systems to provide accurate arrival times to passengers.

2. Reducing waiting times: reducing the waiting time between connections by making routes more efficient, improving frequency and improving coordination between different modes of public transport. This can be achieved through better planning and integration of services.

3. Improving comfort: Since comfort has been identified as an area with room for improvement, efforts should be made to improve the comfort level of public transport vehicles. This could involve improving seat comfort, ensuring adequate ventilation and temperature control, and reducing noise levels inside vehicles.

4. Information provision: Improving the provision of information to passengers, including real-time updates on timetables, service disruptions and alternative routes. Using digital displays, mobile apps and announcements to inform passengers and reduce uncertainty during their journey.

5. Promotion of underutilized modes of transport: raising awareness and promoting underutilized modes of transport such as bicycles, scooters and vaporetto through marketing campaigns, incentives and infrastructure improvements. Encouraging multi-modal transport options to give passengers more flexibility and choice.

6. Diversification of payment methods: offering a wider range of payment options to meet passenger preferences. Although subscriptions and contactless bank card payments are

popular, efforts should be made to promote the use of e-wallets and explore innovative payment solutions to improve convenience and accessibility.

7. Addressing air quality issues: measures to improve air quality in public transport vehicles by implementing better ventilation systems, reducing emissions from vehicles and promoting green transport technologies. This will contribute to a healthier and more pleasant environment for passengers.

8. Improving driver training: Investing in training programs to improve the attitude and behavior of drivers towards passengers. Focus on customer service skills, professionalism and empathy to create a positive and welcoming atmosphere on public transport.

9. Accessibility improvements: make public transport services accessible to all members of the community, including disabled and elderly passengers. Implementation of measures to improve accessibility in stations, stops and on vehicles, such as ramps, priority seats and audiovisual announcements.

10. Continuous Feedback and Evaluation: Mechanisms to collect feedback from passengers on their satisfaction levels and preferences with public transport services. Using this feedback to identify areas for improvement and make data-driven decisions to improve overall service quality.

By implementing these recommendations, the public transport authorities in Timișoara can contribute to improving the overall level of passenger satisfaction and to provide residents with a more efficient, comfortable and pleasant transport experience.

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