Satisfaction measurement in the sustainable public transport of Budapest

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ABSTRACT

The study examines to what extend the public transport users are satisfied with the service in Budapest. The unrepresentative survey was carried out electronically. The study was meant to be the starting point for the next milestone of the research in which, by using the results of this study and assessing the relative significance of the most important factors, we can make proposals for the decision makers for specific intervention points. Furthermore, this article, as part of a doctoral thesis of one of the discoursers aims to provide assistance to create an assessment system for the public transport service providers. For today we already know that a sustainable metropolis can only exist with sustainable public transport and a fundamental condition for this is that the number of passengers must not fall. It needs investments like any other sectors economic sectors and the first step is to be aware of the expectation of users – here passengers –, which are the most crucial factors, what are the most important factors that make them choose public transport, and what are the factors that make them turn to other transport alternatives because of their absence or low quality. The research results show that respondents consider the following factors to be important: cleanliness and equipment of vehicles and stops, frequency of vehicles and their correspondence to the timetable, passenger information and barrier-free accessibility.

Introduction

For today, satisfaction measurement (van Lierop et al., 2017; Mouwen, 2015; Jin et al., 2008) in urban public transport has become as important as in any other service sector. Satisfaction, as one of the main component of travel behaviour (Lee et al., 2021; Feng and Yang, 2015; Hu et al., 2013) has been influenced by social, cultural, economic etc. factors also (Metcalfe and Dolan, 2012; Abou-Zeid and Ben-Akiva, 2012; Ajzen, 1991). However, with a significant difference: when the customers are dissatisfied here – instead of choosing another service provider, having little or no choice in this sector –, they switch to individual mode of transport (Liu et al., 2021; Liu et al., 2020; Fang et al., 2020; Khoo and Ong, 2015). This, nevertheless, is a vicious circle, which has negative effects on everything. In most cases, it does not mean a switch to cycling or other environmentally friendly means of transport, but rather to private cars, increasing the proportion of private cars in traffic. Because of the resulting congestions, journey times get longer, urban air pollution becomes harmful to human health, at the expense of green spaces parking lots are created, and everything intensifies the tendency: the liveable city remains an illusion. The study is based on a non-representative survey, which is intended as a starting point for the

following research. The primary aim of the survey was to find out whether the same attributes are considered important by our respondents as are defined by the customer as quality requirements in the public service contract of the service provider, and what the results of our hypotheses are. In Part 2 of the paper, we review the relevant literature, present some good examples of sustainable transport from around the world, analyse the impact of the pandemic on the area under study, and then provide an insight into transport in Budapest. In Section 3, the details of the survey and the methods of the study are described, in Section 4 the results are presented and analysed, checking whether our assumptions were correct, and finally in Section 5 conclusions are drawn and recommendations for possible ways forward are made.

Literature review

In the following part we will – briefly, without claiming completeness – list some literature on the factors of satisfaction and their assessment, partly following the criteria compiled by Kenesei (2017), and summarise the results of some surveys conducted specifically in the public transport sector.

In the case of satisfaction, expectancy theory and the disconfirmation

paradigm are two of the most commonly used concepts (Szymansski and Henard, 2001; Oliver, 1977). The starting point of the disconfirmation paradigm is the adaptation theory, which is associated with the name of Helson (1964). Further research (Oliver, 1993) has shown that individuals use their prior expectations as a reference point. Using an experimental methodology, Churchill Jr.-Surprenant (1982) found that the source of customer satisfaction in consumer durables is performance.

Literature shows ambivalent results on the effects of performance to satisfaction with public transport. According to Barabino et al. (2012) performance has a great effect on satisfaction, while while other studies prove just the opposite (Friman and Fellesson, 2009; Fujii and Kitamura, 2003; Mackett and Edwards, 1998). It is also common to compare the price paid for a product with its performance (Johnston, 1997). According to the theory of fairness, satisfaction is based on the fairness felt by the buyer. There are three dimensions of fairness: fairness of the value received, which is the fairness of the output; fairness of the process (which shows how the product or service was received, e.g. waiting time); and interactional fairness, which shows the treatment, i.e. how polite he was treated during the purchase transaction (Kenesei and Kolos, 2008). The experts representing the emotional approach say that satisfaction is also an emotional process (Oliver, 1993; Westbrook, 1987). According to this view, satisfaction is largely determined by the emotions experienced during the purchase process, which leave an imprint in the memory. Tyrinopoulos and Antoniou (2008) defined passenger satisfaction level is an aggregated metric that the user perceives for different aspects of the transport system. Fellesson and Friman (2008) examined customer satisfaction with public transport in 9 European cities, and they defined 4 dimensions of satisfaction from a factor analysis of 17 traits: regularity, comfort, staff expertise and safety. Budiono (2009) defined two groups of the service factors in his research carried out among the Indonesian public transport users: the 'soft quality' factor includes the safety elements and convenience, while the 'functional quality' attribute includes frequency, journey time, accuracy and time. Rubinstein (2004) in Montevideo, capital of Uruguay, examined the quality of the public transport system and passenger satisfaction with the help of the Probit model. A survey in Finland showed that satisfaction was most affected by the route network, travel times and frequencies, while the most important factors were reliability and adherence to the timetable (Vanhanen and Kurri, 2005). In a research carried out at University of Calabria, Italy in 2006, the methodology of the revealed preference was used (Eboli and Mazzulla, 2008). By evaluating the results, they found that the frequency of the service was the most important factor, followed by reliability, bus cleanliness and bus stop facilities. In a study conducted in Belgrade 24 factors were predefined, along which the interview took place (Grujičić et al., 2014). The aim of the study was to identify quality factors with which it is possible to improve the level of satisfaction of public transport users with minimal investment. These are the following factors: vehicle cleanliness, ventilation in vehicles, and ticket prices. Analysing 15 years of passenger satisfaction data in Stockholm, Sweden (Börjesson and Rubensson, 2019), it was found that although overcrowding was the factor passengers were most unsatisfied with, they considered it to be much less important than reliability and frequency.

The examples listed here show that passengers essentially consider objective factors as the most important, e.g. reliability, accuracy, frequency, information, condition of stops. To measure them, there are several methodologies, as Eboli (2008). listed the methods of measuring the service quality and customer satisfaction. The former includes statistical analysis techniques (e.g. quadrant and gap analysis, factor analysis, scattering diagrams, two-variable correlation, cluster analysis). On the one hand, they assess the relationship between overall satisfaction and service characteristics, furthermore, and the latter. The other category is modeling procedures, in which case service quality (as a dependent variable) is combined with individual properties (as independent variables). These include SEM (structural equation modeling), model and logistic regression models.

The SERVQUAL (service quality) scale classifies as a one-dimensional model to measure customer satisfaction (Zeithaml et al., 1996), which measures the effect of the difference between real and expected quality, similar to the SERVPERF (service-performance) scale (Cronin and Taylor, 1994). The importance-performance analysis (IPA) method belongs here, too, because although it us-es two dimensions—performance and importance—it assumes that the relationship is linear and symmetrical (Martilla and James, 1977). Two-dimensional approaches, on the other hand, show that the relationship between the dimensions of satisfaction and general satisfaction is not linear or symmetrical. This is described in the prospect theory (Kahneman and Tversky, 1979). Other theories divided the characteristics into three dimensions: basic (basic/must), performance (performance/one-dimensional), and inspirational (excitement/value-enhancer/attractive) factors.

In addition to measuring theoretical constructs, SEM (structural equation modelling) can be used to understand the relationships between them and measure their interactions. There are two approaches for exploring the relationships: CB-SEM (covariance-based) approaches covariance-based, while PLS-SEM approaches variance-based model couplings. The former is used more to verify an established theory, while the latter has been used in the past for forecasting and has been further developed. This model is used to measure the passenger satisfaction index (Zhang et al., 2019), WOM (word of mouth communication) is an evaluation of a brand, product or service, a communication between a consumer and other people, a dimension of loyalty (Carl, 2016). Some researchers refer to it as willingness to recommend. Diab et al. (2017), argue that it should be used to attract new passengers in public transport. While for others, the model integrates both the theory of planned behaviour, customer satisfaction and personal norms (Yuda Bakti et al., 2020). The theory of planned behaviour is associated with Ajzen's theory that there are three main predictors of one's habit of performing a certain behaviour: attitude, subjective norm and perceived behavioural control. Several studies have concluded that the most important characteristics in terms of user satisfaction are accessibility metrics, including punctuality, reliability, service frequency and travel speed (de Oña et al., 2015, 2013; Eboli and Mazzulla, 2015, 2007; Fellesson and Friman, 2012; Friman and Gärling, 2001; van Lierop et al., 2017; Mouwen, 2015; Shen et al., 2016; Stuart et al., 2000; Tyrinopoulos and Antoniou, 2008; Weinstein, 2000; dell'Olio et al., 2011; Redman, 2013; Allen et al., 2018a, 2018b; Guirao et al., 2016; Román et al., 2014). While other studies highlight the importance of additional characteristics, such as comfort (de Oña et al., 2013; Fellesson and Friman, 2012; van Lierop et al., 2017; Weinstein, 2000; Redman, 2013; dell'Olio et al., 2011; Allen et al., 2018a; Guirao et al., 2016; Ingvardson and Nielsen, 2019), staff behaviour (de Oña et al., 2013; Fellesson and Friman, 2012; Friman and Gärling, 2001; van Lierop et al., 2017; Allen et al., 2018a), safety and security (Fellesson and Friman, 2012; Spears et al., 2013; Stuart et al., 2000; van Lierop et al., 2017; Allen et al., 2018b; Guirao et al., 2016; Figler et al., 2011; Nathanail, 2008; Shiwakoti et al., 2019), cleanliness (Eboli and Mazzulla, 2015; Tyrinopoulos and Antoniou, 2008; van Lierop et al., 2017; Weinstein, 2000; dell'Olio et al., 2011; Allen et al., 2018a), and information availability (Allen et al., 2018a, 2018b; Eboli and Mazzulla, 2015; Friman and Gärling, 2001; van Lierop et al., 2017; Weinstein, 2000). According to Tyrinopoulos and Antoniou (2008), satisfaction level is an aggregate measure of user perceptions of different aspects of the transport system. Researchers emphasise that users' perceptions of service quality vary depending on the circumstances of the situation, e.g. urban or rural (Taylor et al., 2009), the personal needs of users (Simons et al., 2014; Levin, 2019), and their experiences with service providers and their evaluation of the service they receive (Das and Pandit, 2013). Recent research is not only new in that it may have been conducted using a different instrument (e.g. QR code - Guirao et al., 2015) or a different method (Carreira et al., 2013; Ramos, et al., 2019.), but also in that it may have assessed a single factor in multiple ways (e.g. congestion level, travel time, waiting time - Soza-

Parra et al., 2019; Cats et al., 2016; Batarce et al., 2016; Drabicki et al., 2021; Mokhtarian et al., 2015; Meng et al., 2018; Abenoza et al., 2019) are analysed from multiple perspectives, looking for which factors influence the attributes under study and how much impact they have on overall satisfaction.

We tried to present the most important factors outlined in the above-mentioned studies when compiling parts of our questionnaire. The evaluation confirmed our assumption that the customer's requirements towards the service provider are really relevant, as these are the attributes to which the respondents are most sensitive.

Sustainable transport examples from all over the world

Investments into public transport generate a significant social profit. It brings benefits to the individual and to society, the benefits of which spill over into economic life, into the everyday life of individuals, with long-term impact on people's health, which spill over into economic life, into the everyday life of individuals, with long-term impact on people's health, which then affects all areas of life (Zulkifli et al., 2020; Nur et al., 2020). Sustainability and public transport have become non-separable concepts. As in several countries of the world, motorization in Budapest, the Capital of Hungary, has also reached the level where car users cannot enjoy the benefit, among other things and any longer, for which they choose this mode of transport, however, car-usage also causes daily difficulties for the inhabitants of the city. At the same time, as our unrepresentative survey shows, the vast majority of car users would switch to public transport if they achieved their destination without transfer and in a shorter time. Of course, we cannot ignore the advantage that comes from the convenience of this mode of travel, which also appears in the fact that one of the conditions for switching is that public transport vehicles are less crowded. The creation of a sustainable and liveable city can therefore be achieved by developing public transport in parallel with the reduction of individual transport and by supporting other alternative modes of transport (walking, cycling, electric scooter, etc.). Below we share some positive examples from around the world.

Curitiba – Brazil

The capital of Paraná State, a city of 1.9 million inhabitants, the 8th most populous city in Brazil. Thanks to the BRT (Bus Rapid Transit) system designed in the 1970′s, the city has a significant history of innovative sustainable urban planning. The special, great capacity bus system, which runs on dedicated bus lanes, made Curitiba well known all over the world and an example to follow in the fields of urban planning and intelligent environmental protection initiatives. The system was a dream of Jaime Lerner, the 3 times re-elected Mayor of the city, who despite of the private car users, dreamt about developing public transport. As a part of the future bus network, the first route was inaugurated as early as 1974, then further 4 primary routes and also the secondary routes were designed in a way that most of the people could reach them in a 15 min' walk. Besides striving to keep the fares low, innovative solutions were applied such as ticket purchase before boarding - due to which boarding times became shorter – and bus prioritization against road traffic. The vehicles are owned not by the municipality but by private companies, who are paid on the basis of km performance by the government. For the use of public transport most employers pay a contribution. The greatest strength of the system is an in-tegrated mindset. In return of collected waste materials the people could get food, public transport tickets or other basic things, this way people with lower incomes were also in-volved into the striving for a more liveable, sustainable city, and as a result, 70 % of the households collected waste selectively as early as in the 1990′s. The proportion of the green surfaces is outstandingly high in the city, which is also the achievement of the same programme: the city has 16 parks and 14 forests. However, as the number of the residents has multiplied and there is an enormous pressure from the car users' side, thus the system created almost 50 years ago needs reconsideration. There are positive

initiatives, de-velopment of a cycle path system is in progress, the aim is to build bicycle path with a total length of 408 km, its inauguration is planned in 2025. Furthermore, by widening Route Inter 2, the capacity and the speed of the BRT system can be increased, too (Leite de Almeida et al., 2021).

Bogota – Colombia

The capital city of Colombia, Bogota, with a population of more than 7 million, is also a good example for manoeuvring the life of a whole city into sustainable direction by the development of public transport. It was Enrique Peñalosa, a former mayor, who conceived the change. With man in the centre of his concept, he had the conviction that the measurement of developed democracies is the width of the pavement. He rejected development plans about underground and elevated railways, because they would have meant enormous costs for the city (Peñalosa, 2008). One focus of the development was to restructure public transport, and simultaneously, to ensure greater room for cyclists and pedestrians. TransMilenio (it means transition from one millennium to the other) was launched in 2000. It is a system of 2 times double bus lanes separated from the main road, on which great passenger capacity articulated buses run. It is a BRT system like the one in Curitiba. Secondary routes join to it, which are served with smaller capacity vehicles. The departure times are adjusted to the demands at the same time striving to reach maximal exploitage. Thanks to the outstanding structure 200 h journey time per year and because of the integrated ticket system significant costs can be spared. The on-board satellite monitor system provides real time information about the current situation. Next to the bus lanes separated bus stops with covered waiting halls were established. TransMileno has become the emblem of the city. In 2018, it was used by 33 % of the population for commuting to work, and it was the most frequently used means of transport by its proportion of 35 % (Charry, 2019). The community was given room by the means of constructing a 17 km long promenade, which can be used by pedestrians and cyclists can use detachedly. The promenade, called Alemeneida, crosses the poorer and more dangerous parts of Bogota, and after its inauguration to the public, positive changes took place even on these parts of the city. The longest cycle path and pedestrian promenade of Latin America serves as a public space, on its green surfaces family- and social parties are held, and in the future the connected infrastructure developments are gaining also a great emphasis.

European exemplars

The biggest cities of Germany, Austria and Switzerland – Munich, Berlin, Hamburg, Vienna and Zurich have reduced the proportion of the trips taken by private cars over the past 25 years. The key for the success was harmonization of transport- and land development policies, which, while making car usage more expensive and slower, improved the conditions of walking, cycling and public transport to a great extent. The methods used in the cities lightly varied: the German cities promoted cycling, while Zurich and Vienna prioritized public transport. The listed cities used mostly the same policies to inspire walking and to withdraw car usage: in the latter case, parking control was the most important factor in Vienna (Buehler, 2017; Buehler, 2013), the rate of private car trips decreased from 40 % to 27 % within 10 years (1993–2014).

In short, we can state that although big cities have different conditions concerning population, economic situation, density and available space, one factor has to be in the focus: man. Besides the resources at disposal, political will, societal pressure and the eco-nomic lobby will define which one to use from the rich treasury of means. One thing is for sure, the sustainable city and transport has to be realized, and, as it can be derived from the above examples, it is mostly the question of re-sponsibility and willpower.

The effects of the pandemic on public transport

World Health Organisation declared global pandemic in March 2020

because of SARS-CoV-2 (hereinafter referred to: coronavirus or COVID-19). In order to control the spread of the virus strict lockdown policy was applied. When the first wave was over, after loosening the lockdown severity – the second wave arrived, then, some months later, the third one came, which was followed also by a short dwell – and, at the time of writing this present article – already the fifth wave is here. All over the world, different measures were used to slow down, or, respectively, to stop spreading the pandemic: travel restrictions and lockdowns, encouraging home office and on-line teaching (Dingil and Esztergár-Kiss, 2021; Abdullah et al., 2020; Tirachini and Cats, 2020). Several studies were carried out to find out what risks the different factors mean concerning the spread of the virus. To stop the virus, reducing mobility and social interactions presented itself as one of the most obvious solutions. Keeping physical distance has a key role in slowing down the spreading of the virus, which meant a great challenge for public transport, too. Using public transport was assessed as very high risk despite the measures such as maximizing the number of passengers on board, warnings to keep distance and, respectively, various hygienic actions. Although various strategies were applied over the world, starting form reducing the number of runs to the last door boarding and to free of charge public transport service, the result was a drastic drop of the ridership. In our capital city there was an almost 90 per cent drop of passenger numbers, nevertheless, the same pro-portion of loss was experienced in the Netherlands and in Spain, e.g. in the city of Santander, while in certain regions of Sweden there was only a decrease of 40–60 % in ridership.

During the pandemic international and domestic surveys examined the correlations of spread of the virus and the ridership of public transport, what factors influenced the decisions of the users of public transport during the pandemic, and, respectively, what at-tributes were important or have become more important during the pandemic. We describe some of them here below. A research carried out in Italy at the end of 2020 showed strong correlation between the registered COVID-19 cases and the number of public transport trips made average 22 days earlier, during the pandemic. The correlation was even stronger in the regions where the proportion of public transport users was stronger. The time period, however, questions if the 10 days quarantine is really enough in case of a proven infection (Cartenì et al., 2021).

A research carried out in the South-Eastern countries of Europe tried to identify to what extent the different factors influenced the people to choose public transport during the pandemic. The examined countries are no exceptions from where the private car usage and the change to the alternative transport modes (bicycles, electric scooters) sky-rocketed. The survey touched issues like the acceptance of the crowdedness of the buses, which var-ies from country to country, it is influenced by factors like age, school education level, lo-cation of residence, gender, and, respectively, the respondent's own health status, as he himself evaluates it. It has been found that if the occupancy of a vehicle exceeded 40 % during the pandemic, the majority of the respondents would not use this service, and if this level exceeded 70 %, the decisive majority would not use it (Simoví et al., 2021). The survey conducted in Poland aimed to compile different scenarios concerning the development of the branch. The on-line questionnaire identified 10 aspects – independent from the means of transport (train, tram, bus, taxi or plane) –, which, during the pandemics significantly influenced the judgement of the service quality:

- obligatory mask wearing on board,
- ticket price,
- frequency of fare inspection,
- availability of disinfectants on boards,
- control the number of persons on board,
- on-board facilities for people with disabilities or for pregnant women,
- travel comfort,
- frequency of connections,

- possibility to travel without changing to another vehicle,
- possibility to purchase electronic ticket on public transport.

Some of these factors have become especially important during the pandemic, e.g. frequency of the connections, or the possibility to purchase electronic tickets. Availability of disinfectants on board has emerged as a new aspect. By using the results, 4 scenarios were displayed: an optimistic, a pessimistic, the most possible one and an unexpected one. Within these scenarios, the factors with the biggest effects were identified as – optimistic: availability of disinfectants and frequent connection possibilities; pessimistic: checking the number of passengers and availability of disinfectants on board; in the most possible scenario only one factor influenced negatively the development of personal transport, namely the rise of the fares. The unexpected scenario described the least possible trend, i.e. exclusively the decrease of the fares has positive effect on people choosing public transport (Cie'sla et al., 2021; Rana, 2014; Parasuraman et al., 1988).

The examples from abroad highlighted that due to the coronavirus, the number of public transport users has fallen significantly. On the other hand, as people avoided public transport vehicles, which were proclaimed to be of high risks for spreading of the corona virus, it opened a social issue, i.e. that during the pandemic, this mode of transport was used in general only by those people who had no other choice. Thus, underprivileged people –, or at least those, who could not afford to use alternative transport modes – were more adversely affected by the pandemic. To return to public transport ridership levels before the pandemic will not be an easy process. One thing is certain: reducing private car use can only be achieved by rehabilitating public transport, and by investing heavily in it, which includes increasing vehicle fleets and also a quality improvement. The specific recommendations put forward, the means to be applied in the capital city may include requiring vaccination cards from the public transport users, and defining protocols for the cleaning and disinfecting the vehicles to ensure hygiene. During the pandemic, factors of concern to public transport passengers (e.g. congestion) became more pronounced, while new safety-related elements were added to the queue. Several studies have shown that the importance of these attributes is strongly influenced by internal attitudes, circumstances, age, gender, etc. The results vary from country to country and are significantly influenced by the stage of the pandemic at which the surveys were conducted. Public transport has been the clear loser during this period, as the long-distance travel is difficult to reconcile with this mode of transport. However, the impact of this period should not be overlooked, not only to ensure continuity, but also because an exceptional event may throw new light on new factors, while the reduction in passenger numbers and the restoration of pre-pandemic levels can only be achieved by gaining maximum insight into passenger behaviour and motivations for choice. On the other hand, at the time of our interviews, the epidemic period had not yet come to an end and restrictions were still in place in certain areas of life, which gave this chapter additional relevance.

The background of public transport in Budapest

From the aspect of the Hungarian Central Statistical Office, the population of Budapest was 1.67 million on 1 January 2023. According to the city's long-term urban development concept, 13.8 per cent of the 525.13 square km administrative area of Budapest is transport-targeted public area, providing a road network of more than 4,300 km for the transport of the capital. However, the present road network is deficient: there are shortages both in the transport structure and in the urban structure. In particular, the lack of circular elements and lack of Danube bridges cause significant structural distortion with undesirable traffic overburden of the inner city. In some places, traffic demand exceeds the capacity, and for this reason congestions emerge contributing to the unpleasant image of road traffic.

Providing local public transport for the city belongs to the

responsibilities of the Budapest Municipality. Budapest Közlekedési Központ Zrt. (Centre for Budapest Transport) as Transport Organizer, practices the rights to control the Service Provider on behalf of the owner Budapest Municipality on an Assignment Agreement concluded with the Municipality. A Public Service Contract prescribes the conditions to be fulfilled by the Service Provider: in the administrative area of the capital, he has to provide public transport ser-vices with bus, tram, metro and boat by himself or by subcontractors. Upon the ordered performance of scheduled transport services (place kilometre or operating hours performance) the Transport Organizer pays public service fee to the Service Provider. Besides the quantitative requirements, the Service Provider is obliged to fulfil the qualitative public service requirements in SLA (Service Level Agreement) system, besides which the Transport Organizer evaluates the appropriate service level in the frame of a penalty system. The Annual Agreement concluded between the Transport Organizer and the Service Provider defines the details, which includes the following qualitative criteria:

- indicator of cancelled runs,
- transport safety (accident) indicator,
- timetable accuracy indicator,
- vehicle and station technical, aesthetic and passenger comfort indicator,
- travel information appropriateness indicator.

The greatest Service Provider of the capital is BKV Zrt., transporting annually 1.4 bil-lion passengers in 4 big branches (bus, tram, metro and trolleybus) in an integrated system. Furthermore, BKV Zrt. operates the cogwheel railway, funicular, chairlift and boat services, which are of primarily touristic importance. Our online survey is not representative and is intended as a baseline for further research. It is the responsibility of the transport customer to understand passenger preferences, which are essentially a means of assessing the performance of the service provider and periodically reviewing and possibly revising expectations. Our questionnaire also follows this line of thought, but the hypotheses we formulate go beyond this framework and are partly aimed at understanding the travel habits (e.g. transfers) and attitudes of passengers. To the best of our knowledge, no such research is available in our country. Between the hard factors of frequency, journey times and punctuality and the soft factors of safety as a condition in public service contracts and the fact that the customer selects the service providers on the basis of these criteria, it is a guarantee that the attributes that passengers consider most important are guaranteed to an adequate standard. On this basis, customers will in the majority of cases receive the quality they expect, which will help to ensure that the number of passengers does not fall. In addition, however, there is scope to investigate other factors, but possibly also the preferences of those who have so far chosen to use private transport. This could lead to a long-term sustainable transport system for the capital.

Materials and methods

The survey took place electronically, by completing an online questionnaire, which was published on the Facebook page of the public transport company. This way, the answers have to be considered as non representative. We are aware that through this type of the survey we could not reach the part of the population who do not have internet access or who are not Facebook users. Electronic questioning also seemed to be one of the most obvious solutions because at the time of the survey the coronavirus emergency had not yet ceased, which made it difficult to interview public transport users in other ways, either in person or by phone. Furthermore, in areas where it was possible to work from home, workers took advantage of the opportunity and the number of trips was significantly reduced.

Therefore, the research results and findings presented in this study are relevant for commuters who use the official Facebook page of the

Budapest Transport Centre. For regular transport users, this page is a primary information platform where they can keep up to date with current transport information (timetable changes, other service announcements affecting passengers, etc.) and exchange experiences with the travelling community. The community has 179,000 fans and 184,000 followers (7 November 2023). At the time of the study, the demand for information on the site had increased even more due to the epidemic measures. Of course, the opinions of occasional users and non-users are also very important for improving the quality of the service, which will be the subject of further research.

Taking into account these research limitations and opportunities, as the "location" of the survey, we chose the most popular platform on Hungarian social media, which according to a 2020 survey is used by 85 % of the Hungarian population on a weekly basis.

There were 4 weeks for response in May and June 2021. 274 people filled in the questionnaire. The central question of the survey was whether the respondents also consider the same attributes to be important as those defined by the customer as quality requirements in the public service contract of the service provider. The vast majority of the questions (39 out of 42) were closed questions, and the respondents in relation to this research question could say their own opinions in 3 topics. They could share their standpoints concerning connections, the ideal stop and vehicle. Analysing the 274 responses received, the areas for improvement are clearly identified (e.g. cleanliness of vehicles and stops, vehicle fleet). In the satisfaction measuring survey, the respondents had to respond to specific statements in a way that on a scale of 5 from 'I totally agree' to 'I to-tally disagree' they had to mark one answer. Concerning the conditions of the journey and its other parameters there were a 6th possible answer: 'I cannot judge' - with this option we wanted to give a possibility to answer for those who did not encounter that factor during their trips. Nevertheless, for almost all 8 questions, the proportion of those choosing this option is below 5 %. We also asked responders who owned vehicles regarding the use of their vehicles and the possibility of change for public transport. By this, our aim was to map out what purpose they use their vehicles for and in which case they would be willing to switch to public transport. For the respondents who – to the question on the frequency of using public transport – marked the answer less than monthly or never, the questionnaire was completed here, so the actual number of real respondents was 257.

During the evaluation of the questionnaire results based on the findings of the literature we looked for confirmation for the following hypotheses, which we formulated before the survey:

- Hypothesis 1: Travel without transfers has a more positive impact on the perception of travel time.
- Hypothesis 2: The assessment of travel time significantly affects the frequency of complaints to customer service.
- Hypothesis 3: Departure and delay information are more important for those who live further away from the stop.
- Hypothesis 4: Those who choose a full-price monthly pass judge the cleanness and aesthetics of vehicles to be less favourable than those who travel with discounts.

In addition to the descriptive presentation of the results, we also sought to present the relationships found, and therefore tested the hypotheses with a cross-tabulation using the statistical software package IBM SPSS Statistics 20. Cross tabulation analysis is a widely used method of analysis that examines the relationship between two or more variables or their combined frequency distributions. The simplicity of the analysis and the ease with which the information obtained can be interpreted are major advantages for both researchers and users and are therefore one of the most commonly used methods. The cross-tabulation analysis was carried out to find out how the variables that determine the quality of transport (e.g. does transit influence the experience of journey time?) are related to each other, based on the responses obtained.

According to H0, there is no correlation between the variables under study. If H0 is rejected in the analysis, a significant relationship was identified. The existence of a relationship was tested using Pearson's Chi-square. If the significance level of the indicator (Asymp.Sig. (2-sided)) is below the accepted 0.05 % in the social sciences, there is a relationship between the variables under study. The quality of the relationship was tested using the Eta Coefficient. The study is important because if there is a statistical correlation between the individual variables, then these are findings that can be generalised to the population at large, in this case the regular users of public transport in Budapest, and therefore these satisfaction factors should be given more attention and correlation in the development process.

Formula for the Pearson correlation coefficient:

$$r = \frac{\sum XY - \frac{(\sum x)(\sum Y)}{n}}{\sqrt{\left(\sum X^2 - \frac{(\sum x)^2}{n}\right)\left(\sum Y^2 - \frac{(\sum Y)^2}{n}\right)}}$$

Interpretation of the Pearson Correlation Coefficient:

- $r > 0$ denote positive linear correlation
- $r < 0$ denote negative linear correlation
- $r = 0$ denote no linear correlation
- the closer the value r is to 1 or –1, the stronger the linear correlation

Significance test for the Pearson Correlation (ρ):

o $\rho <= 0,05$: there is correlation in the population
o $\rho > 0,05$: there is no correlation in the population

Formula for the Eta Coefficient test:

$$\eta = \sqrt{\frac{SSB}{SST}}$$

Interpretation of the Eta Coefficient:

o SSB = between sum of squares.
o SST = total sum of squares.

Eta correlation coefficients:

- 0.00 – 0.19 very weak;
- 0.20 – 0.39 weak;
- 0.40 – 0.59 moderate;
- 0.60 – 0.79 strong;
- 0.80 – 1.0 very strong (Akoglu, 2018; Sajtos and Mitev, 2007).

Results and discussions

General characteristics of public transport users in Budapest

The characteristics of the respondents and the use of public transport are included in Table 1. According to this, slightly more than two-third of the respondents were men, and nearly 80 % of them belong to the active age group (20–60 years), almost 60 % were full-time employees, and almost a quarter of them were students. 44 % of the respondents are car-owners. More than 87 % use public transport several times a day or a week, a significant proportion of them use it in the morning (66 %) and, respectively, in the afternoon (61 %), and, besides this, the proportion of the evening public transport users, who use it after 17.00, is also significant (almost 41 %).

There is no significant difference in the frequency of public transport use by gender of respondents but there is a significant difference by age. The most frequent users are those aged 20–29 ($\eta = 0.175$) and full-time employees and students ($\eta = 0.240$). A quarter of those with a private car also use public transport on a daily basis, with a strong statistical relationship ($\eta = 0.323$). This proportion is significant even when taking into account the pandemic situation which has affected the use of public

Table 1
Characteristics of respondents and the use of public transport. (N = 274) (Own research data (2021).

Respondents' characteristics	Number of responders	%	Characteristics of the use of public transport	Number of responders	%
GENDER			**FREQUENCE**		
Male	186	67.9	Daily/almost daily	204	74.5
Female	88	32.1	Several times a week	35	12.8
			Several times a month	12	4.4
AGE			Once monthly	6	2.2
15–19	45	16.4	Less, than monthly	14	5.1
20–29	69	25.2	Never	3	1.1
30–39	52	19.0			
40–49	59	21.5	**TIME OF DAY**		
50–59	33	12.0	Morning (till 11:00 a.m.)	170	66.1
60–69	12	4.4	Midday (11.00–14.00)	68	26.5
70+	4	1.5	Afternoon (14.00–17.00)	157	61.1
			Evening (17.00 or later)	105	40.9
			Without a certain time	59	23.0
OCCUPATIONStudent					
Full-time employee	164	59.9	**PURPOSE OF THE TRIP**		
Part-time employee	16	5.8	To and from work	177	68.9
Unemployed	5	1.8	To school, education	78	30.4
Housewife	2	0.7	Shopping, administration	145	56.4
Pensioner	12	4.4	Leisure time trips	176	68.5
Entrepreneur	7	2.6	Other	7	2.7
CAR-OWNER			**MOST FREQUENTLY USED TRANSPORT MODES**		
Yes	121	44.2	Railway	42	15.3
No	153	55.8	HÉV Suburban Railway	48	17.5
			Metro	159	58,0
			Tram	186	67.9
			Bus	206	75.2
			Trolleybus	47	17.2
			Other (boat, cogwheel railway, etc.)	5	1.8

transport.

Concerning the purpose of the trip – where the respondents had the opportunity to choose several options – the rate of the respondents who choose public transport for travelling to work and for leisure activities is almost equal, 70–70 %, and slightly more than half of the respondents (56 %) choose it for administration and shopping, too. These data differ significantly from the data received by BKK for a telephone survey at the end of 2020, where approximately 30–30 % of the respondent use it for work and shopping and 20 % for fun and relaxation. One of the reasons was that the survey conducted by the transport organizer company was representative, only one option could be chosen, on the other hand, at the end of 2020 the rate of the people working in home office was still significant.

The proportion of choice of the different transport modes shows some similarities to the data of the representative survey, 80 % of the respondents choose the bus, 72 % tram, 62 % metro, while in 2020 these ratios were 82 %, 68 % and 66 %. The proportion of respondents choosing the HÉV suburban railway (18 %) and those who choose the trolleybus (18.3 %) does not show a great difference from the results of the BKK survey (22 % −27 %). 16.3 % of the respondents travelled by train, which is 7 % lower than the data of the several months earlier survey.

44 % of the respondents are car owners. When the purpose of the use was asked, it was possible to indicate more answers: 83.5 % uses it for weekend/family programs. 76 % for shopping and 43 % uses it for commuting. Almost 30 % uses it as a complement to public transport, which in our case probably means commuting from the agglomeration. It is striking, however, that for the last three questions, i.e. whether he used public transport if he could reach his destination without transfer, if the journey time was more favourable or shorter, or, respectively, if the vehicle was less crowded, almost 90 % answered yes. Starting from these favourable rates, with a significant development of public transport there is a possibility to attract the passengers towards public transport and to establish a more sustainable transport and environment. This is, however, only a theoretical possibility, since the completely direct transport cannot be achieved, and reducing journey times can be achieved only by the prioritizing of the rail-bound transport modes, or, possibly by shaping bus lanes. These possibilities cannot be realized in any case due to lack of sources and lack of physical space.

Asking about habits of buying tickets and passes, the proportion of customers buying full price and discount price passes is almost identical (cca. 30 %), which is followed by the customers travelling with annual passes (13.6 %), then only the proportion of the passengers using single tickets is significant (7 %). Our study confirmed that types of tickets and passes are highly influenced by profession ($\eta = 0.414$) and age ($\eta = 0.183$) of passengers. In the survey of BKK the latter was 20 %, while the proportion of monthly pass users was 46 %. This difference is probably due to different travel- and ticket buying habits during the pandemic emergency period.

Evaluation of public transport stops

Concerning questions about evaluation of a stop, respondents had to respond to the statements we made. We corresponded the five possible answers on a scale from 1 to 5, with the meanings of 5 as'I agree' and 1 as'I do not agree at all'. Fig. 1 displays the evaluation of stops according
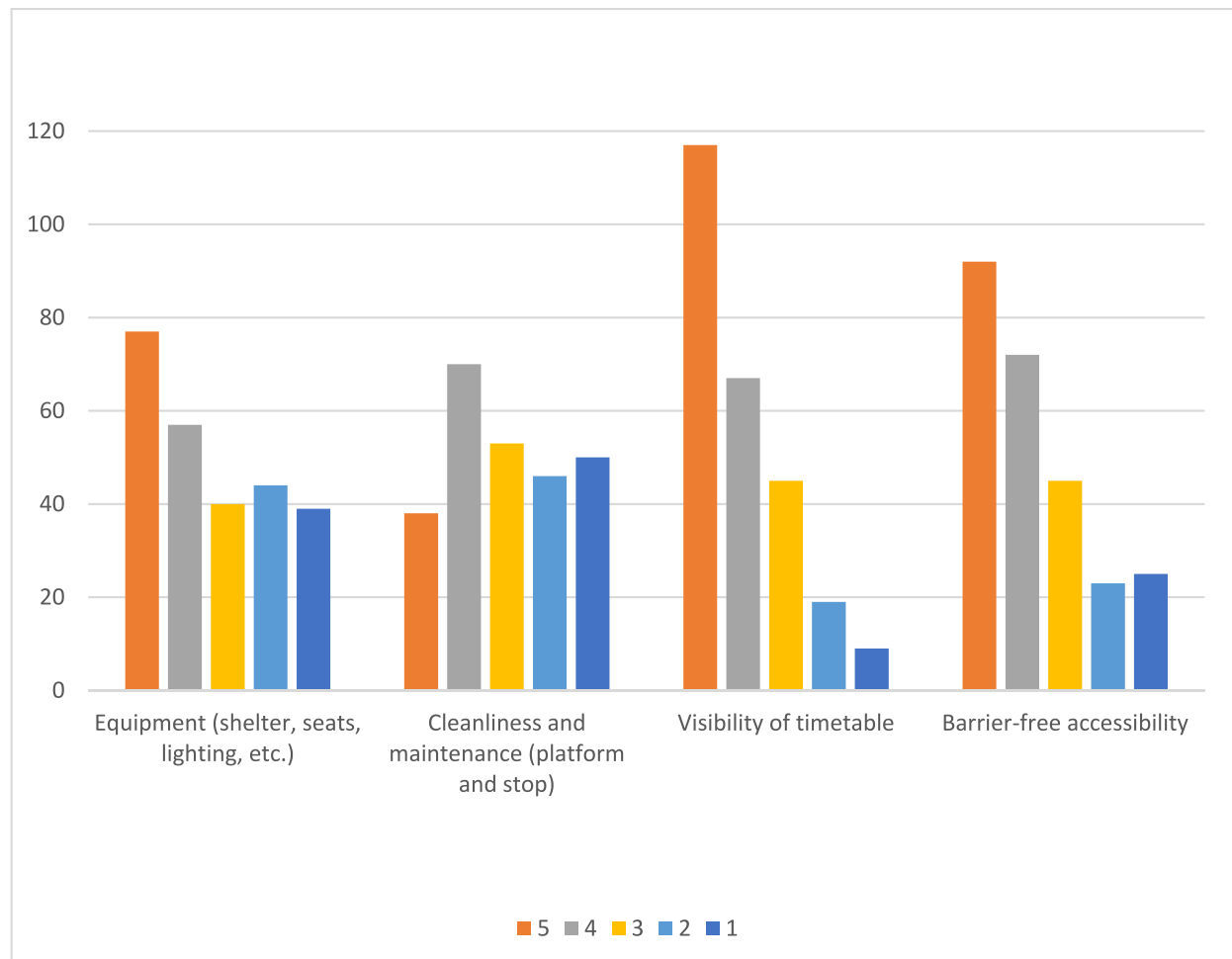

Fig. 1. Assessment of stops (Head). (N = 274) (Own research data (2021).

to the given criteria. Answers appearing at the ideal stop are in accordance with the answers for the statements we made. Here, cleanliness and equipment were estimated lowest, so the average values are 3, and, respectively, 3.3 was the proportion of the respondents who gave neutral of even worse answers, in the former case 58 % and in the latter 48 %. Visibility of the timetable information was rated as good overall, with 4 points average, while the accessibility of the stop was average, slightly more than 65 % considered it adequate. Respecting the evaluation of the stops according to the given criteria, the proportion of the answers with points 4 and 5 was 63 %.

For open-ended questions concerning the ideal stop was arrived 154 answers. Most respondents would like stop with shelter against rain and wind, besides of this, many criticized cleanliness, which can be traced back to the lack of cleaning and garbage bins. Besides this, they would like easy, barrier-free access to the stops and electronic information boards. The respondents regard convenience to be important, which means more benches, and in summer, shaded stops and appropriate lighting.

The crosstabulation analyses found that men are significantly more satisfied with the facilities, cleanliness, visibility and timetable information of stops than women. They were almost the same perception about the accessibility of stops. 81 % of the respondents consider the distance between the place of residence and the public transport stop very good or appropriate.

Furthermore, it has been proven (Table 2.) that departure and delay information are of greater significance for passengers living farther from the stop. (**H3**) ($\eta = 0.174$).

Public transport vehicles evaluation

Concerning questions about the vehicles (Fig. 2), primarily the temperature (63.8 %), and secondarily, in roughly equal proportion (45–45 %), cleanliness and seat comfort (which was asked together with the adequate space capacity, this way, supposedly congestion was factor here) were not considered satisfactory by the respondents.

The descriptive statistics confirmed that in the case of our research sample passengers choosing full price monthly passes judge the cleanliness and aesthetics of the vehicles to be more dissatisfying (68.6 %) than passengers using discount passes (53.5 %) (**H4**).

Even the proportion of users who object to boarding the vehicle was relatively high (42 %), which overlapped the answers received in open questions about the demand for barrier-free vehicles. However, satisfaction with the on-board travel information is outstanding, 79 %, which is preceded only by the sufficient number of handrails, which is above 80 %. The proportion of respondents satisfied with the number of seats places for standees is relatively high (67.7 %), and the proportion of those who find the vehicle to be modern and safe is over 60 %, and, respectively, of those, who consider that there is sufficient space for passengers using wheelchairs or travelling with strollers (62.6 %).

Speaking about the ideal vehicle, most respondents would like low-floor, air-conditioned, state-of-the-art vehicles. Since the survey was conducted in summer, air-conditioning was the main criterion, but keeping the winter period also in mind, most respondents would prefer to use heated/cooled vehicles. Cleanliness and demand for displays appeared here, too, just like concerning the stops. Further comfort consideration includes more comfortable seats and environmentally friendly vehicles, which are equipped with cameras, too. Several responses included specific types, which identified the state-of-the-art vehicles of the existing fleet as the ideal means of transport.

Women are also more critical about the cleanliness of vehicles. The perception of seats, standing places and handholds is similar. Female respondents have the opinion that the number of places for prams and wheelchairs is not enough. They have almost equal opinion about the onboard passenger information and luggage space. Women have a lower perception of safety when travelling than men. They are equally dissatisfied with the temperature of vehicles.

Evaluation of travel conditions on public transport

To examine the travel circumstances (Fig. 3) and other parameters (Fig. 4) we used the 6-grade evaluation scale giving a wider opportunity to the respondents. With the option 6 (I can not judge), we thought that even those can give an answer who did nor encounter certain circumstances during their trip. In spite of this, this option was marked by less than 5 % of the respondents. The passengers were most satisfied with the driving style (69 %) and politeness (67 %) of the drivers, which is surprising because most passengers do not encounter the latter during metro- and tram trips. Comfort and sufficient space were more agreed (61 % and 63 %), while the respondents found the sound effects of the vehicle and of the passengers most disturbing. Getting on and off is more difficult for women, who are more sensitive to noise.

Among'the other parameters' (Fig. 4) such important parameters are to be evaluated, that are specified in the Public Service Contract for the Service Provider, such as frequency – this is related to the cancelled departure indicator – and timetable accuracy (these are handled together), as well as information on departures and delays. The planned development of the trip suggests a kind of complex satisfaction, which, however, can be influenced by several factors, and does not fully reflect the overall satisfaction with the service. The figure shows the proportions, 65 % of the respondents is mostly satisfied with the frequency of the vehicles, and 70 % is satisfied with the information on the start and delay of the vehicles, too. In this survey, only 21 % of the respondents did not travel according to plan, but this also means that 4 out of 5 passengers reached his or her destination by a public transport vehicle according to his or her concept.

Three quarters of the respondents find the journey time appropriate or short, at the same time one fifth of the respondents find it too long. We could not show any connection in perception of journey length regarding demographic characteristics. 75.5 % of the respondents have to change during their trips. For the open-ended question 'How do you think the connection possibility you use could be made more convenient/practical?' 97 responses were received. The most responses mentioned timetable harmonization, longer, interconnected lines (mentioning intertwined tramlines as positive), placing the stops closer to each other and making the stops more convenient and cleaner. 68 % perceived the waiting times at transit as short or suitable, and less than a quarter of the respondents found it too long. Twice as many men have to change lines as women at the most frequent destinations ($\eta = 0.108$). This may be explained by the fact that men choose jobs farther from their home more often than women.

Based on our research results (Table 3.) it has been proven that journey without transfer is valued more positively concerning journey time (**H1**) ($\eta = 0.225$).

Evaluation of the public transport complaint handling service

Only 16.3 % of the respondents had to turn to the customer service. Respondents, who considered the travel time too long, tended to resort to customer service in a bigger proportion ($\eta = 0.180$) (**H2**), as it is outlined in the Table 4. In their case, the rate of the satisfied and the dissatisfied is approximately equal in the answers to the question, whether their problem could be solved or not. Almost 70 % thought the customer service representative was helpful and polite. At the same time, the satisfaction with this factor was found to be 41 % satisfied, while 59 % were neutral or dissatisfied with the experience of using the customer service. The method of contact was 50 % electronically, 42 % by phone, and only less than 30 % approached the customer service in person.

Conclusions and recommendations

The evaluation of our questionnaire confirmed the findings of the international literature on which attributes are most important to

Table 2
The effect of distance between the place of residence and public transport stop on the assessment of departure and delay time. (Own research data (2021).

Crosstab (N = 258)

		What is your opinion about the distance between your residence and the public transport stop?				Total
		Too long (more than 500 m, or more than 5 min' walk)	Acceptable (less than 500 m, or less than 5 min' walk)	Very good (within 100 m or less than 3 min' walk)	I cannot judge	
I received enough information on the departures of the vehicles and on eventual delay	**Strongly agree**	17.8 %	**37.6 %**	**42.6 %**	2.0 %	100.0 %
	Somewhat agree	7.5 %	**46.3 %**	**43.8 %**	2.5 %	100.0 %
	Neither agree nor disagree	15.8 %	57.9 %	21.1 %	5.3 %	100.0 %
	Somewhat disagree	**40.0 %**	20.0 %	33.3 %	6.7 %	100.0 %
	Strongly disagree	**22.7 %**	54.5 %	22.7 %	0.0 %	100.0 %
	Cannot judge	0.0 %	50.0 %	50.0 %	0.0 %	100.0 %
Total		15.9 %	43.8 %	37.6 %	2.7 %	100.0 %

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.808[a]	15	0.068
Likelihood Ratio	24.499	15	0.057
Linear-by-Linear Association	3.273	1	0.070
N of Valid Cases	258		

Directional Measures

			Value
Nominal by Interval	Eta	I received enough information on the departures of the vehicles and on eventual delay Dependent	0.137
		What is your opinion about the distance between your residence and the public transport stop? Dependent	0.174

Symmetric Measures

		Value	Asymp. Std. Error[b]	Approx. T[c]	Approx. Sig.
Ordinal by Ordinal	Gamma	-0.130	0.081	−1.590	0.112
N of Valid Cases		258			

[a] 11 cells (45,8%) have expected count less than 5. The minimum expected count is, 05.
[b] Not assuming the null hypothesis.
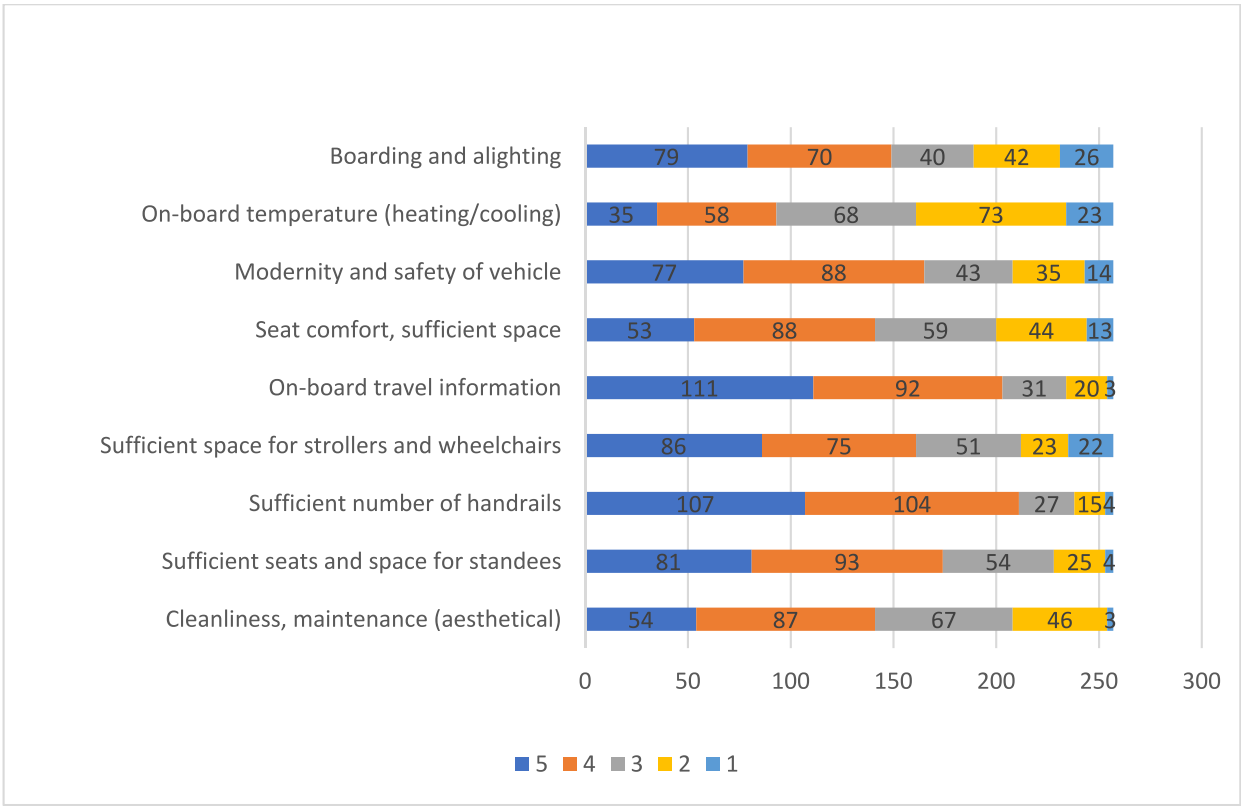[c] Using the asymptotic standard error assuming the null hypothesis.

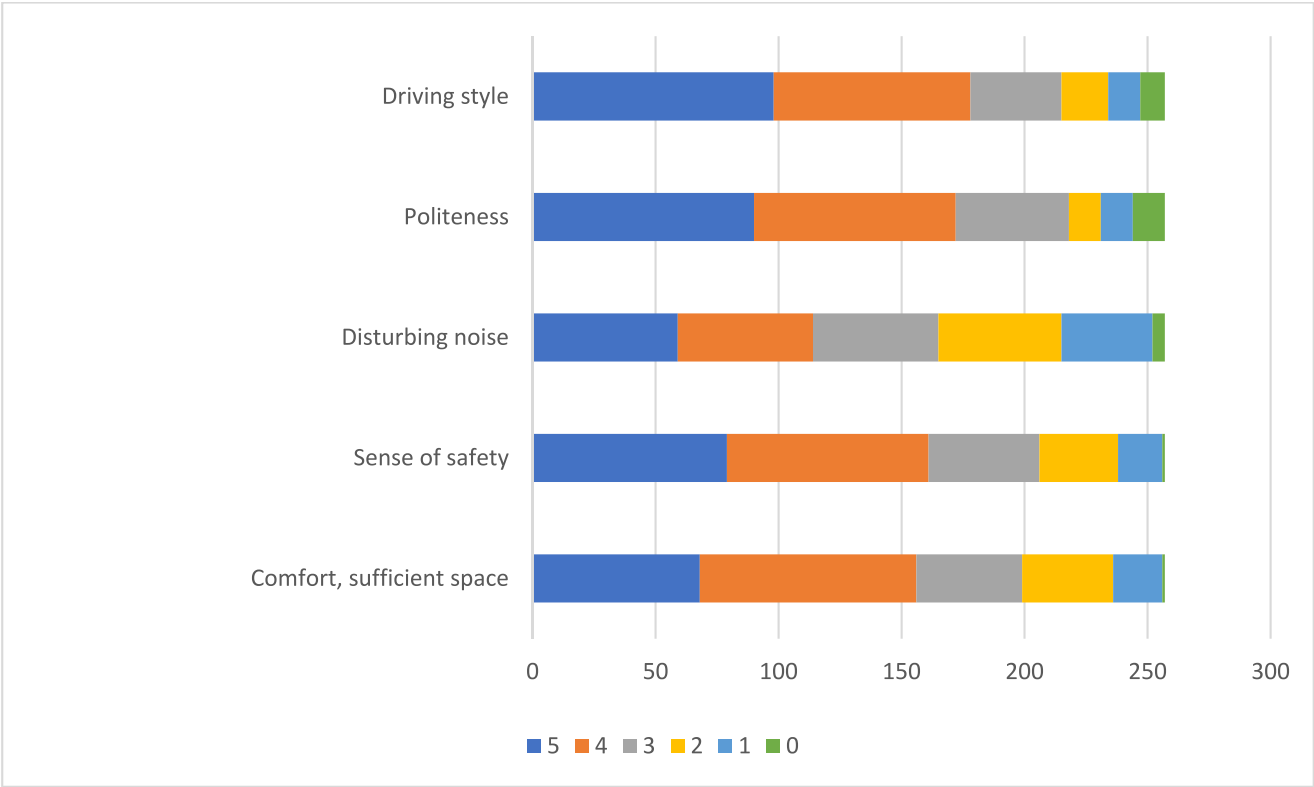**Fig. 2.** Assessment of vehicles (N = 274) (Own research data (2021).

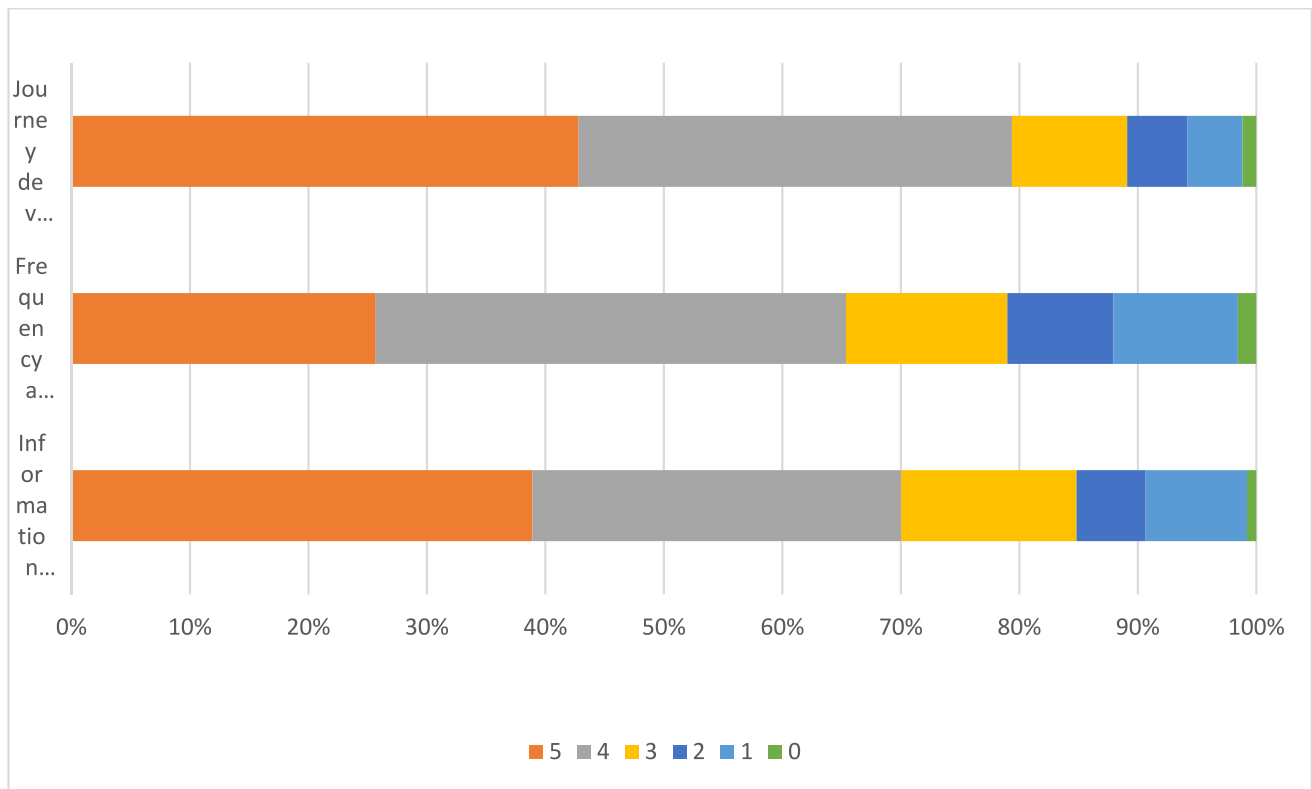**Fig. 3.** Evaluation of the travel circumstances (N = 274) (Own research data (2021).

Fig. 4. Evaluation of the other parameters of the trip (N = 274) (Own research data (2021).

Table 3
The relationships between non-transfer travel and travel time judgments. (Own research data (2021).

Crosstab (N = 107)							
		What do you think about journey times?					Total
Do you have to transfer to your most frequently visited destination?	Yes	Too long 96.6 %	Reasonable/average 70.4 %	Short 37.5 %	I cannot judge 83.3 %		75.6 %
	No	3.4 %	29.6 %	62.5 %	16.7 %		24.4 %
Total		22.5 %	72.1 %	3.1 %	2.3 %		100.0 %

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.976[a]	3	0.000
Likelihood Ratio	27.562	3	0.000
Linear-by-Linear Association	13.038	1	0.000
N of Valid Cases	258		

Directional Measures			
			Value
Nominal by Interval	Eta	Do you have to transfer to your most frequently visited destination? Dependent	0.298
		What do you think about journey times? Dependent	0.225

Symmetric Measures				
		Value	Asymp. Std. Error[b]	Approx. T[c]	Approx. Sig.
Nominal by Nominal	Phi	0.298			0.000
	Cramer's V	0.298			0.000
Ordinal by Ordinal	Gamma	0.700	0.097	5.340	0.000
N of Valid Cases		258			

[a] 3 cells (37,5%) have expected count less than 5. The minimum expected count is 1,47.
[b] Not assuming the null hypothesis.
[c] Using the asymptotic standard error assuming the null hypothesis.

passengers. On the one hand, these coincide with the quality requirements that public transport customers impose on their operators and regularly monitor. At the same time, the answers to the open-ended questions show that there is also a need for greater emphasis on the coordination of timetables at transfer points and on making stops more comfortable and cleaner. Literature on travel time perception (Yarmey, 2000; Hall, 2001; Hess et al., 2004; Walle-Steenberghen, 2006; Fan-Machemehl, 2009; Psarros et al., 2011; Watkins et al., 2011; Yoh et al., 2011; Dewulf et al., 2012; Millonig-Sleszynski, 2012; Parthasarathi et al., 2013; Cheng-Tsai, 2014; Cascetta-Carteni, 2014; Varotto

Table 4

The relationship between travel time and the use of customer services. (Own research data (2021).

Crosstab (N = 258)					
		Was it necessary to turn to customer service concerning any issue?			**Total**
			Yes	**No**	
What do you think about journey times?	**Too long**		**38.1 %**	19.4 %	22.5 %
	Reasonable/ average		61.9 %	74.1 %	72.1 %
	Short		0.0 %	3.7 %	3.1 %
	I cannot judge		0.0 %	2.8 %	2.3 %
Total			16.3 %	83.7 %	100.0 %

Chi-Square Tests				
	Value	df		Asymp. Sig. (2-sided)
Pearson Chi-Square	8.885[a]	3		0.031
Likelihood Ratio	10.417	3		0.015
Linear-by-Linear Association	8.340	1		0.004
N of Valid Cases	258			

Directional Measures				
				Value
Nominal by Interval	Eta	What do you think about journey times? Dependent		0.180
		Was it necessary to turn to customer service concerning any issue? Dependent		0.186

Symmetric Measures					
		Value	Asymp. Std. Error[b]	Approx. T[c]	Approx. Sig.
Nominal by Nominal	Phi	0.186			0.031
	Cramer's V	0.186			0.031
Ordinal by Ordinal	Gamma	0.485	0.126	2.815	0.005
N of Valid Cases		258			

[a] 2 cells (25, 0%) have expected count less than 5. The minimum expected count is 98.

[b] Not assuming the null hypothesis.

[c] Using the asymptotic standard error assuming the null hypothesis.

et al., 2015; Lagune-Reutler et al., 2016; Fan et al., 2016; Nesheli et al., 2016; Ji et al., 2017) most focus on waiting time. Their general finding is that passengers easily perceive waiting times to be longer than actual while waiting for public transport services, especially when real-time travel information is not available. In our survey, 75 % perceived the journey time as adequate or short, while 20 % perceived it as long. Although the majority of transfer passengers perceived the waiting time as favourable, the literature shows that factors affecting the perception of waiting time vary by city, with age and peak period being the most common factors. Passengers perceive time spent in the vehicle as more acceptable than time spent outside the vehicle (Chapman et al., 2006).

EN 13816:2002 standard defines a quality criteria system for public transport services. Its 8 dimensions fully define the parameters, according to which quality needs to be assessed. However, the actual quality and passenger satisfaction may differ. The latter can be truly determined only by satisfaction assessment. We could get the most complete picture by comparison of the observed and measured service indicators, for which a good example is the survey conducted in Campagnia region, Italy, the guidelines for selection of measurement methods of which we intend to use in our next research (Cascetta and Cartenì, 2014a). This present study is confined to the topic of the quality of transport and the new quality measures. It does not include a detailed analysis of the behaviour of passengers, i.e., how the specific quality attributes influence the habits or behaviour of passengers. With this unrepresentative online survey we assessed satisfaction with a few quality criteria, without focusing on the estimation of its relative importance (Cascetta and Cartenì, 2014b).

We made an attempt for this with our non-representative online survey. With the closed questions of the research – more precisely, with the given statements – we partly controlled the answering process; the respondents could express their own opinion only in their answers to the open questions. However, these confirmed our preliminary assumptions, which we formulated in our questions, i.e., what are the parameters that are considered significantly more important by the passengers and that fundamentally influence the perception of the travel. These attributes,

which we listed here on the basis of their non-relative importance, are: the cleanliness and equipment (i.e. the aesthetic appearance) of the vehicles and the stops; frequency and accuracy of the vehicles, passenger information at stops and on board of the vehicles, the barrier-free access to stops and vehicles and other vehicle comfort parameters (air conditioning, comfort, modernity). The assessment of journey times and waiting times – as decisive factors – is mostly positive for those who fill in the questionnaire, so keeping them at the same level, or respectively, reducing them by improving the service is the goal to be achieved.

We deliberately did not ask the assessment of the fares, as the judgement of this is beyond the competence of the Service Provider. No questions were put up about the passengers – except for the noises – however, these factors may have a great impact on the assessment of the travel. At the same time, a specific examination of this when traveling on certain routes could provide important feedback to the Service Provider on achieving his goal of creating a sense of security. The inquiry about congestion was indirect, as congestion is (in our view) also a function of destination and travel time, on the other hand, it is a problem difficult to solve other way than concentrating frequencies and shifting the start of school and of working hours.

These are basically manifested in extreme values, where there is the greatest satisfaction (visibility of schedule information, passenger information received in the vehicle) and where there is the least satisfaction (cleanliness of stops and vehicles, vehicle parameters). These parameters are included in the requirements imposed on the service provider without exception. The demands for more modern vehicles are also reflected in the answers to open questions, which confirms the direction emphasized and represented by one of the authors as the responsible decision-maker of the service provider, as an urgent development of the service in this regard.

We consider our electronically analysed, unrepresentative survey analysed in the framework of this article as a starting point for our next relevant survey. The present survey did not include a definition of the importance of individual factors, but it is of fundamental importance if actual points of intervention are to be identified to make public

transport competitive. The significance of our article lies in the fact that the results of public transport satisfaction surveys are not or partially public in Hungary. One of the reasons for this is the specificity of the system, that the market is not or only partially open, and secondly, it stems from the lack of this research. For the preparation of a representative survey, there is usually only a demand and a source on the customer side, and it is primarily used to formulate and enforce the requirements imposed on service providers, and the financial resources available mostly limit the drawing of larger conclusions and the enforcement of the resulting changes.

During the evaluation of the questionnaire, we have already identified the need to refine the questions and the answers given in the next survey, mainly in order to draw more accurate conclusions from the data received. In the future, we would like to continue our research in particular in the direction of investigating the reasons why people who occasionally switch to alternative modes of transport do so. The most important element of this will be to assess the factors that most influence the decisions of people who use motorised transport from time to time. Of course, we are aware that public transport cannot compete with its convenience and full door-to-door transport. However, if we can convince some motorists with public transport alternatives that are better suited to their needs, preferably with no transfers, less congestion and shorter journey times - as shown by the preferences revealed in the questionnaire - then we will have taken another step towards a more liveable city.

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CRediT authorship contribution statement

Anikó Khademi-Vidra: Methodology, Validation, Formal analysis, Investigation, Resources, Writing – original draft, Writing – review & editing, Supervision. **Gábor Nemecz:** Methodology, Validation, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision. **Izabella Mária Bakos:** Methodology, Software, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

References

Abdullah, M., Dias, C., Muley, D., Shahin, M., 2020. A COVID-19 utazási viselkedésre és módpreferenciákra gyakorolt hatásainak feltárása. Transp. Res. Interdiscip. Nézzétek Meg. 2020 (8), 100255.

Abenoza, R.F., Cats, O., Susilo, Y.O., 2019. How does travel satisfaction sum up? An exploratory analysis in decomposing the door-to-door experience for multimodal trips. Transportation 46, 1615–1642. https://doi.org/10.1007/s11116-018-9860-0.

Abou-Zeid, M., Ben-Akiva, M. Utazási mód váltás, 2012. Két tömegközlekedési kísérlet eredményeinek összehasonlítása. J. Transp. Policy 2012(24), 48–59. [Google Tudós].

Ajzen, I., 1991. A tervezett viselkedés elmélete. Orgona. Viselkedjen. Hümm. Decis. Folyamat. 1991(50), 179–211. [CrossRef].

Akoglu, H., 2018. Felhasználói útmutató a korrelációs együtthatókhoz. Turkish Journal of Emergency Medicine 18 (3), 91. https://doi.org/10.1016/J.TJEM.2018.08.001.

Allen, J., Eboli, L., Mazzulla, G., de D. Ortúzar, J., 2018a. Effect of critical incidents on public transport satisfaction and loyalty: an Ordinal Probit SEM-MIMIC approach. Transportation. Springer, US. https://doi.org/10.1007/s11116-018-9921-4.

Allen, J., Muñoz, J.C., de Ortúzar, J., D., 2018b. Modelling service-specific and global transit satisfaction under travel and user heterogeneity. Transp. Res. Part A Policy Pract. 113, 509–528. https://doi.org/10.1016/j.tra.2018.05.009.

Barabino, B., Deiana, E., Tilocca, P., 2012. A szolgáltatás minőségének mérése a városi autóbusz-közlekedésben: módosított SERVQUAL megközelítés. Int. J. Qual. Serv. Sci. 4 (3), 238–252.

Batarce, M., Muñoz, J.C., de Ortúzar, J., D., 2016. Valuing crowding in public transport: Implications for cost-benefit analysis. Transp. Res. A Policy Pract. 91, 358–378. https://doi.org/10.1016/j.tra.2016.06.025.

Börjesson, M., Rubensson, I., 2019. Elégedettség a Zsúfoltsággal És a Tömegközlekedés Egyéb Jellemzőivel, Közlekedéspolitika 79, 213–222. https://doi.org/10.1016/j.tranpol.2019.05.010.

Budiono, O., A.,, 2009. Ügyfél-elégedettség a tömegközlekedésben: Tanulmány az utazók észleléséről Indonéziában. Diplomamunka, Karlstad Egyetem.

Buehler, R., Pucher, J., Altshuler, A., 2013. Bécs útja a fenntartható közlekedéshez. Int. J. Sustain. Transp. 11 (4), 257–271. https://doi.org/10.1080/15568318.2016.1251997.

Buehler, R., Pucher, J., Gerike, R., Götsci, T., 2017. Az autófüggőség csökkentése Európa szívében: tanulságok Németországból. Ausztriából És Svájcból, Transport Reviews 37 (1), 4–28. https://doi.org/10.1080/01441647.2016.1177799.

Carl, W.J., 2006. What's all the buzz about? Everyday communication and the relational basis of Word-of-Mouth and buzz marketing practices. Manag. Commun. Q. 19 (4), 601–634.

Carreira, R., Patrício L., Jorge R., Magee C., Hommes Qi. 2013. Towards a holistic approach to the travel experience: A qualitative study of bus transportation. Transport Policy 25: 233–43. ISSN 0967-070X, https://doi.org/10.1016/j.tranpol.2012.11.009.

Cartenì, A., Di Francesco, L., Henke, I., Marino, T.V., Falanga, A., 2021. A tömegközlekedés szerepe a második COVID-19 hullám idején Olaszországban. Fenntarthatóság 2021 (13), 11905. https://doi.org/10.3390/su132111905.

Cascetta, E., Cartenì, A., 2014. A tömegközlekedés tervezésének minőségalapú megközelítése: elmélet és esettanulmány. Int. J. Sustain. Transp. 8 (1), 84–106. https://doi.org/10.1080/15568318.2012.758532.

Cascetta, E., és Cartenì, Armando, 2014. A vasúti terminálok hedonikus értéke. Az állomások minőségének az utazók viselkedésére gyakorolt hatásának kvantitatív elemzése. Transportation Research Part a: Policy and Practice, Elsevier 61 (C), 41–52.

Cats, O., West, J., Eliasson, J., 2016. A dynamic stochastic model for evaluating congestion and crowding effects in transit systems. Transp. Res. B Methodol. 89, 43–57. https://doi.org/10.1016/j.trb.2016.04.001.

Chapman, B., Iseki, H., Taylor, B. D., and Miller, M. (2006). The effects of out-of-vehicle time on travel behavior: Implications for transit transfers (Deliverable# 1). Access from: http://www.its.ucla.edu/wp-content/uploads/sites/6/2014/06/Appendix-A.pdf.

Bogotá 2030, 2019 (Szerkesztő: Laura Charry, Publicaciones Semana S. A.) https://bogota.gov.co/sites/default/files/pdf/Especial-Bogota-2030-english.pdf.

Cheng, Y.H., Tsai, Y.C., 2014. Train delay and perceived-wait time: passengers' perspective. Transp. Rev. 34 (6), 710–729.

Ifj. Churchill, G. A., Surprenant, C., 1982. Az ügyfél-elégedettséget meghatározó tényezők vizsgálata. Marketingkutatási folyóirat. 19. kötet. 4. szám. 491–504. oldal. https://doi.org/10.2307/3151722.

Cie'sla, M., Ku'snierz, S., Modrzik, O., Niedo'spiał, S., Sosna, P., 2021. Forgatókönyvek a lengyel személyszállítási szolgáltatások fejlesztésére pandémiás körülmények között. Fenntarthatóság 2021 (13), 10278. https://doi.org/10.3390/su131810278.

Cronin, J. J., Taylor, S. A., 1994. SERVPERF versus SERVQUAL: A teljesítményalapú és az észlelés-mínusz-elvárások mérésének összehangolása a szolgáltatás minőségében. Marketing folyóirat. 58. kötet. 1. szám. 125–131. oldal. https://doi.org/10.2307/1252256.

Das, S., Pandit, D., 2013. Importance of user perception in evaluating level of service for bus transit for a developing country like India: a review. Transp. Rev. 33 (4), 402–420. https://doi.org/10.1080/01441647.2013.789571.

de Oña, J., de Oña, R., Eboli, L., Mazzulla, G., 2013. Perceived service quality in bus transit service: a structural equation approach. Transp. Policy 29, 219–226. https://doi.org/10.1016/j.tranpol.2013.07.001.

de Oña, J., de Oña, R., Eboli, L., Mazzulla, G., 2015. Heterogeneity in perceptions of service quality among groups of railway passengers. Int. J. Sustain. Transp. 9, 612–626. https://doi.org/10.1080/15568318.2013.849318.

dell'Olio, L., Ibeas, A., Cecin, P., 2011. The quality of service desired by public transport users. Transp. Policy 18, 217–227. https://doi.org/10.1016/j.tranpol.2010.08.005.

Dewulf, B., Neutens, T., Van Dyck, D., De Bourdeaudhuij, I., Van de Weghe, N., 2012. Correspondence between objective and perceived walking times to urban destinations: influence of physical activity, neighbourhood walkability, and socio-demographics. Int. J. Health Geogr. 11 (1), 1–10.

Diab, E., van Lierop, D., El-Geneidy, 2017. Recommending transit: disentangling users' willingness to recommend transit and their intended continued use. Travel Behav. Soc. 6, 1–9.

Dingil, A.E., Esztergár-Kiss, D., 2021. A Covid19-világjárvány hatása a mobilitási mintákra: az első hullám eredményei. Ford. Lett. 2021(13), 434–446.

Drabicki, A., Kucharski, R., Cats, O., Szarata, A., 2021. Modelling the effects of real-time crowding information in urban public transport systems. Transportmetrica a: Transport Science 17 (4), 675–713. https://doi.org/10.1080/23249935.2020.1809547.

Eboli, L., Mazzulla, G., 2007. Service quality attributes affecting customer satisfaction for bus transit. J. Public Transp. 10, 21–34. https://doi.org/10.5038/2375-0901.10.3.2.

Eboli, L., Mazzulla, G., 2015. Relationships between rail passengers satisfaction and service quality: a framework for identifying key service factors. Public Transp. 7, 185–201. https://doi.org/10.1007/s12469-014-0096-x.

Eboli, L.- Mazzulla, G., 2008. Kifejezett preferenciakísérlet a szolgáltatás minőségének mérésére a tömegközlekedésben, a közlekedéstervezésben és a technológiában, 31:5, 509-523, DOI: 10.1080/03081060802364471.

Fan, Y., Guthrie, A., Levinson, D., 2016. Waiting time perceptions at transit stops and stations: effects of basic amenities, gender, and security. Transp. Res. A Policy Pract. 88, 251–264.

Fan, W., Machemehl, R., 2009. Do transit users just wait for buses or wait with strategies? Some numerical results that transit planners should see. Transportation Research Board: Journal of the Transportation Research Board 2111, 169–176.

Fang, D., Wang, X., Nap, G., 2020. A busztranzit szolgáltatás minőségének optimalizálási stratégiái az IPA-Kano modell alapján - esettanulmány Harbin város tömegközlekedéséről. Sci. Technol. Eng. 2020(20), 13454–13459. [Google Tudós].

Fellesson, M., Friman, M., 2008. Érzékelt elégedettség a tömegközlekedési szolgáltatással kilenc európai városban. A Közlekedéskutató Fórum Folyóirata 47 (3).

Fellesson, M., Friman, M., 2012. Perceived satisfaction with public transport service in nine european cities. J. Transp. Res. Forum 47. https://doi.org/10.5399/osu/jtrf.47.3.2126.

Feng, J., Yang, Z., 2015. A nankingi városi idősek utazási viselkedését befolyásoló tényezők. J. Prog. Geogr. 2015 (34), 1598–1608. [Google Tudós].

Figler, S.A., Sriraj, P.S., Welch, E.W., Yavuz, N., 2011. (2011): Customer loyalty and Chicago, Illinois, transit authority buses: results from 2008 customer satisfaction survey Transport. Res. Rec. 2216 (1), 148–156.

Friman, M., Fellesson, M., 2009. Szolgáltatáskínálat és ügyfél-elégedettség a tömegközlekedésben: a minőségi paradoxon. J. Tömegközlekedés. 12 (4), 4.

Friman, M., Edvardsson, B., Gärling, T., 2001. Frequency of negative critical incidents and satisfaction with public transport services. I. J. Retail. Consum. Serv. 8, 95–104. https://doi.org/10.1016/S0969-6989(00)00003-5.

Fujii, S., Kitamura, R., 2003. Mit tesz az egy hónapos ingyenes buszjegy a szokásos sofőrökkel? A szokások és attitűdváltozások kísérleti elemzése. Közlekedés 30 (1), 81–95.

Grujičić, D., és mtsai, 2014. A szolgáltatás minőségének fogyasztói megítélése a tömegközlekedésben. Transport 29 (3), 285–295. https://doi.org/10.3846/16484142.2014.951685.

Guirao, B., García, A., López, M.E., Comendador, C.A.J., 2015. New QR survey methodologies to analyze user perception of service quality in public transport: the experience of Madrid. Journal of Public Transportation 18 (3), 71–88. https://doi.org/10.5038/2375-0901.18.3.5. ISSN 1077-291X.

Guirao, B., García-Pastor, A., López-Lambas, M.E., 2016. The importance of service quality attributes in public transportation: Narrowing the gap between scientific research and practitioners' needs. Transp. Policy 49, 68–77. https://doi.org/10.1016/j.tranpol.2016.04.003.

Hall, R.W., 2001. Passenger waiting time and information acquisition using automatic vehicle location for verification. Transp. Plan. Technol. 24 (3), 249–269. https://doi.org/10.1080/03081060108717670.

Helson, H., 1964. Az adaptációs szintű elmélet aktuális trendjei és kérdései. Amerikai pszichológus. 19. kötet. 1. szám. 26–38. oldal. https://doi.org/10.1037/h0040013.

Hess, D.B., et al., 2004. Waiting for the Bus. J. Public Transp. 7 (4), 67–84. https://doi.org/10.5038/2375-0901.7.4.4.

Hu, X., Wang, J., Wang, L., 2013. Az idős emberek utazási viselkedésének megértése a fejlődő országban: esettanulmány Changchunról, Kínáról. Procedia-Soc. J. Viselkedjen. Sci. 2013(96), 873–880.

Ingvardson, J.B., Nielsen, O.A., 2019. The relationship between norms, satisfaction and public transport use: a comparison across six European cities using structural equation modelling transport. Res. Pol. Pract. 126 (2019), 37–57. https://doi.org/10.1016/j.tra.2019.05.016.

Ji, Y., Zhang, R., Gao, L., & Fan, Y. (2017). Perception of transfer waiting time at stops and stations in Nanjing, China. Transportation Research Board 96th Annual Meeting, No. 17-01983.

Jin, N., Juan, Z., 2008. Tömegközlekedési szolgáltatási szint az ügyfelek elégedettsége alapján. J. Jilin Univ. 2008(38), 63–66.

Johnston, R., 1997. A lakossági banki szolgáltatások minőségét meghatározó kritikus tényezők azonosítása: fontosság és hatás. Nemzetközi Bank Marketing folyóirat. 15. kötet. 4. szám. 111–116. oldal. https://doi.org/10.02652329710189366.

Kahneman, D., Tversky, A., 1979. Prospektuselmélet: A kockázat alatt álló döntés elemzése. Ökonometria. 47. kötet. 2. szám. 263–291. oldal. https://doi.org/10.2307/1914185.

Khoo, H.L., Ong, G.P., 2015. A fenntartható közlekedési elfogadási magatartás megértése: Esettanulmány a malajziai Klang-völgyről. A Fenntartható Közlekedés Nemzetközi Folyóirata. https://doi.org/10.1080/15568318.2012.757401.

Lagune-Reutler, M., Guthrie, A., Fan, Y., Levinson, D., 2016. Transit stop environments and waiting time perception: impacts of trees, traffic exposure, and polluted air. Transportation Research Record: Journal of the Transportation Research Board 2543, 82–90.

Lee, K.S., Eom, JK, Lee, J., Ko, S., 2021. Az idősek aktivitásának és utazási szokásainak elemzése mobiltelefon-alapú óránkénti helymeghatározási pályaadatok felhasználásával: Kangnamgu esettanulmánya, Korea. Fenntarthatóság 2021(13), 3025.

Leite de Almeida, C.M., Silveira, S., Jeneulis, E., Fuso-Nerini, F., 2021. A fenntartható fejlődési célok felhasználása Curitiba városának lehetséges közlekedési politikáinak értékelésére. Fenntarthatóság 2021 (13), 12222. https://doi.org/10.3390/su132112222.

Levin, L., 2019. How may public transport influence the practice of everyday life among younger and older people and how may their practices influence public transport? Soc. Sci. 8, 96. https://doi.org/10.3390/socsci8030096.

Liu, J., Hao, X., Shi, W., 2020. A COVID-19 hatása az idősek buszos utazási szokásaira. J. Transp. Syst. Eng. Inf. Technol. 2020 (20), 71–76.

Liu, W., Li, W., Die, Q., Zhou, Q., Pan, Z., 2021. Idősek buszos utazási szokásainak kutatása IC kártya adatok alapján. Syst. Eng. 2021 (39), 90–100.

Mackett, R.L., Edwards, M., 1998. Az új városi tömegközlekedési rendszerek hatása: teljesülnek-e az elvárások? Szállítás. Res. Pol. Pract. 32 (4), 231–245.

Martilla, J. A., James, J. C., 1977. Fontosság-teljesítmény elemzés. Marketing folyóirat. 41. kötet. 1. szám. 77–79. oldal. https://doi.org/10.1108/03090569310026402.

Meng, M., Rau, A., Mahardhika, H., 2018. Public transport travel time perception: effects of socioeconomic characteristics, trip characteristics and facility usage. Transp. Res. A Policy Pract.

Metcalfe, R., Dolan, P., 2012. Viselkedési közgazdaságtan és következményei a közlekedésre. J. Transp. Geogr. 2012 (24), 503–511.

Millonig, A., Sleszynski, M., Ulm, M. (2012, September). Sitting, waiting, wishing: Waiting time perception in public transport. In Intelligent Transportation Systems (ITSC), 2012 15th International 26 IEEE Conference on (pp. 1852-1857). IEEE.

Mokhtarian, P., Papon, F.P., Goulard, M., Diana, M., 2015. (2015): What makes travel pleasant and/or tiring? An investigation based on the French National Travel Survey. Transportation 42 (6), 1103–1128.

Mouwen, A., 2015. Drivers of customer satisfaction with public transport services. Transp. Res. Part A Policy Pract. 78, 1–20. https://doi.org/10.1016/j.tra.2015.05.005.

Nathanail, E., 2008. Measuring the quality of service for passengers on the Hellenic railways Transport. Res. Pol. Pract. 42 (1), 48–66.

Nesheli, M.M., Ceder, A.A., Estines, S., 2016. Public transport user's perception and decision assessment using tactic-based guidelines. Transp. Policy 49, 125–136.

Nur, W., Wan, S., Tajuddin, A., Nayan, S., 2020. Növekvő ügyfél-elégedettség. Journal of Undergraduate Social Science and Technology 2 (2).

Oliver, R. L.,1977. Az elvárások és a cáfolatok hatása az expozíció utáni termékértékelésekre: Egy alternatív értelmezés. Alkalmazott Pszichológia folyóirat. 62. kötet. 4. szám. 480–486. oldal. https://doi.org/10.1037/0021-9010.62.4.480.

Oliver, R. L., 1993. Az elégedettségi válasz kognitív, affektív és attribútum alapjai. Journal of Consumer Research. 20. kötet. 3. szám. 418–430. oldal. https://doi.org/10.1086/209358.

Own questionnaire research data (2021). N=274.

Parasuraman, A., Zeithaml, V.A., Berry, L.L., 1988. SERVQUAL: Több elemből álló skála az ügyfelek szolgáltatásminőséggel kapcsolatos felfogásának mérésére. J. Retail. 64 (1), 12–43.

Parthasarathi, P., Levinson, D., Hochmair, H., 2013. Network structure and travel time perception. PLoS One 8 (10), e77718.

Peñalosa, E., 2008. Experiencia de Bogotá in Fenntartható városfejlesztés Regionális Közlekedés Ázsiai Fejlesztési Bank. http://hdl.handle.net/11540/2721.

Psarros, I., Kepaptsoglou, K., Karlaftis, M.G., 2011. An empirical investigation of passenger wait time perceptions using hazard-based duration models. J. Public Transp. 14 (3), 109–122.

Ramos, S., Vicente, P., Passos, A.M., Costa, P., Reis, E., 2019. Perceptions of the public transport service as a barrier to the adoption of public transport: a qualitative study. Soc. Sci. 8, 150. https://doi.org/10.3390/socsci8050150.

Rana, I., 2014. A tömegközlekedéssel kapcsolatos elégedettség mérése a felhasználók körében végzett felmérésből. International Journal of Business and Management), 9. évf., 6. szám, ISSN 1833-3850.

Redman, L. -Friman, M.- Gärling, T. -Hartig T. (2013): Quality attributes of public transport that attract car users: a research review Transport Pol., 25 (2013), pp. 119-127 https://doi.org/10.1016/j.tranpol.2012.11.005.

Román, C.– Martín, J.C.- Espino R. (2014): Using stated preferences to analyze the service quality of public transport Int. J. Sustain. Trans., 8 (1) (2014), pp. 28-46.

Rubinstein, E., 2004. A buszos tömegközlekedés minőségének értékelése Montevideo városában. Porto Alegre: UFRGS, 141. o., Elérhető: http://hdl.handle.net/10183/6849.

Sajtos, L., Mitev, A., 2007. SPSS kutatási és adatelemzési kézikönyv. Alinea Kiadó, Budapest, p. 402.

Shen, W., Xiao, W., Wang, X., 2016. Passenger satisfaction evaluation model for Urban rail transit: a structural equation modeling based on partial least squares. Transp. Policy 46, 20–31. https://doi.org/10.1016/j.tranpol.2015.10.006.

Shiwakoti, N.- Stasinopoulos, P.- Vincec, P. - Qian, W.- Hafsar R. (2019): Exploring how perceptive differences impact the current public transport usage and support for future public transport extension and usage: a case study of Melbourne's tramline extension Transport Pol., 84 (2019), pp. 12-23.

Simons, D., Clarys, P., De Bourdeaudhuij, I., de Geus, B., Vandelanotte, C., Deforche, B., 2014. Why do young adults choose different transport modes? A focus group study. Transp. Policy 36, 151–219. https://doi.org/10.1016/j.tranpol.2014.08.009.

Simović, S., Ivaniševi, T., Bradič, B., Cičevič, S., Trifunovic, 2021. A. Mi okozza az utasok viselkedésének változását Délkelet-Európában a COVID-19 világjárvány idején? Fenntarthatóság 2021 (13), 8398. https://doi.org/10.3390/su13158398.

Soza J. -Parra, S., Raveau, J.C., Muñoz, J.C., 2019. Cats the underlying effect of public transport reliability on users' satisfaction. Transp. Res. A Policy Pract. 126, 83–93.

Spears, S., Houston, D., Boarnet, M.G., 2013. Illuminating the unseen in transit use: a framework for examining the effect of attitudes and perceptions on travel behavior. Transp. Res. Part A Policy Pract. 58, 40–53. https://doi.org/10.1016/j.tra.2013.10.011.

Stuart, K.R., Mednick, M., Bockman, J., 2000. A structural Equation model of consumer satisfaction for the New York City subway system. Transp. Res. Rec. 1735, 133–137. https://doi.org/10.3141/1735-16.

Szymansski, D. M., Henard, D. H., 2001. Ügyfél-elégedettség: Az empirikus bizonyítékok metaanalízise. A Marketingtudományi Akadémia folyóirata. 29. kötet. 1. szám. 16–35. oldal. https://doi.org/10.1177/009207030102900102.

Taylor, B., Miller, D., Iseki, H.F., C., 2009. Nature and/or nurture? Analyzing the determinants of transit ridership across US urbanized areas. Transp. Res. A Policy Pract. 43, 60–77. https://doi.org/10.1016/j.tra.2008.06.007. ISSN 0965–8564.

Tirachini, A., Macskák, O., 2020. COVID-19 és tömegközlekedés: Jelenlegi értékelés, kilátások és kutatási igények. J. Public Transp. 2020 (22), 1–34.

Tyrinopoulos, Y., Antoniou, C., 2008. Public transit user satisfaction: variability and policy implications. Transp. Policy 15 (4), 260–272. https://doi.org/10.1016/j.tranpol.2008.06.002.

van Lierop, D., Badami, M.G., El-Geneidy, A.M., 2017. What influences satisfaction and loyalty in public transport? A review of the literature. Transp. Rev. 1–21. https://doi.org/10.1080/01441647.2017.1298683.

Vanhanen, K., Kurri, J., 2005. Minőségi tényezők a tömegközlekedésben. WSP Finland Ltd Helsinki Műszaki Egyetem.

Varotto, S. F., Glerum, A., Stathopoulos, A., Bierlaire, M., & Longo, G. (2015). Modelling travel time perception in transport mode choices. In 94th Annual Meeting Transportation Research Board, Washington, No. 15-2045.

Walle, S.V., Steenberghen, T., 2006. Space and time related determinants of public transport use in trip chains. Transp. Res. A Policy Pract. 40 (2), 151–162.

Watkins, K.E., Ferris, B., Borning, A., Rutherford, G.S., Layton, D., 2011. Where Is My Bus? Impact of mobile real-time information on the perceived and actual wait time of transit riders. Transp. Res. A Policy Pract. 45 (8), 839–848.

Weinstein, A., 2000. Customer satisfaction among transit riders: how customers rank the relative importance of various service attributes. Transp. Res. Rec. 1735, 123–132. https://doi.org/10.3141/1735-1.

Westbrook, R. A., 1987. Termék/fogyasztás alapú érzelmi válaszok és vásárlás utáni folyamatok. Marketingkutatási folyóirat. 24. kötet. 3. kiadás. 258–270. oldal. https://doi.org /10.2307/3151636.

Yarmey, A. D. (2000). Retrospective duration estimations for variant and invariant events in field situations. Applied Cognitive Psychology, 14(1), 45–57. https://doi.org/10.1002/(SICI)1099-0720(200001)14:1<45::AID-ACP623>3.0.CO;2-U.

Yoh, A., Iseki, H., Smart, M., Taylor, B., 2011. Hate to wait: Effects of wait time on public transit travelers' perceptions. Transportation Research Record: Journal of the Transportation Research Board 2216, 116–124.

Yuda Bakti, I.G.M., Rakhmawati, T., Sumaedi, S., Widianti, T., Yarmen, M., Astrini, N.J., 2020. Public transport users' WOM: An integration model of the theory of planned behavior, customer satisfaction theory, and personal norm theory. Transp Res. Procedia 48 (2018), 3365–3379. https://doi.org/10.1016/j.trpro.2020.08.117.

Zeithaml, V. A., Berry, L. L., Parasuraman, A., 1996. A szolgáltatásminőség viselkedési következményei. Marketing folyóirat. 60. kötet. 2. szám. 31–46. oldal. https://doi.org /10.1080/07359683.2015.1000706.

Zhang, C., Liu, Y., Lu, W., Xiao, G., 2019. Evaluating passenger satisfaction index based on PLS-SEM model: Evidence from Chinese public transport service. ISSN 0965-8564 Transportation Research Part A: Policy and Practice 120, 149–164. https://doi.org/10.1016/j.tra.2018.12.013.

Zs, K., 2017. A vevői elégedettség mérésének lehetőségei többdimenziós szemléletben. Stat. Szle. 95 (1), 29–50. https://doi.org/10.20311/stat2017.01.hu0029.

Kenesei Zs., Kolos K., 2008. A hatékony panaszkezelés lehetőségei: kompenzáció és bocsánatkérés. Vezetéstudomány. XXXIX.(5.) pp. 27–39.

Zulkifli, N.A., Faizun, M., Yazid, M., 2020. Hogyan ösztönzi a kölcsönösség elmélete az ügyfelek elégedettségét és hűségét? Journal of Undergraduate Social Science and Technology 2 (2).