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GUIDELINES FOR RESTORING CONSUMER TRUST IN THE SERVICES PROVIDED BY THE PUBLIC TRANSPORT IN THE CITY OF SOFIA AFTER THE COVID-19 PANDEMIC AND INCREASING ITS SOCIAL EFFECTIVENESS

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ABSTRACT

After cities overcame the peaks of the COVID-19 morbidity, they encountered the negative consequences of the crisis which the transport sector was particularly affected by. The adopted measures and the implemented restrictions initiated the need for enterprises working in the field of public transport to adopt adequate management approaches for solving issues related to its normal functioning. The issue of restoring passengers' trust by providing secure and quality services is on the agenda. The present paper proposes guidelines for restoring consumers' trust and increasing its social effectiveness on the basis of the conducted analysis of the dynamics of the public transport in the city of Sofia for the 2019-2021 period.

Key words: COVID-19, public transport, consumers' trust, social effectiveness.

INTRODUCTION

Public transport holds a key position in the work, spare time and lives of millions of people around the world. It needs to be environmentally friendly, fast and accessible to all citizens. The future of this type of transport as a whole involves improving the quality of the transport services it provides, increasing its social effectiveness and its sustainable development.

For approximately two decades Europe has supported local initiatives in their efforts to make cities safer, more environmentally friendly, more inclusive and more accessible places. The goal of sustainable urban mobility is for people to maintain good physical and psychological form by moving, as well as to show concern for the environment and the health of others when they choose their mode of transportation (1). The well-organized and regular public transport is a crucial prerequisite for the normal course of life in the capital – the physical and mental health of citizens is directly affected by the quality of the provided transport services.

The public transport plays a key role in the social and economic development of cities. The significance of the passenger transport for the development of the city has social, economic, ecological and cultural aspects. The social aspect is manifested through its direct influence on the living standards of the population, as well as its impact on people's time. Each citizen takes 2-3 or more long-distance trips a day, which consumes a lot of travel time and in turn limits the time for rest, sports and satisfaction of cultural and household needs. The high quality of the transport services that the public transport provides is a prerequisite for increasing its social effectiveness (2). The enterprises working in the field of public transport continuously need to make efforts to improve the quality of the

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transport services they provide in order to fully satisfy their consumers' demands.

Over the last two years, as a result of the unprecedented consequences of the COVID-19 pandemic, indicators such as safety, security and the preservation of the physical and mental health of passengers have been enforced as a mandatory condition for restoring consumers' trust in the services that the public transport provides. In response to the difficulties they have experienced during the crisis, cities and municipalities have administrated innovative and sustainable measures to overcome it more quickly. (3-8)

ANALYZING THE DYNAMICS OF PUBLIC TRANSPORT IN THE CITY OF SOFIA FOR THE 2019-2021 PERIOD

The public transport in the city of Sofia is carried out by all primary types of transport – subway, bus transport, trolley transport and tram transport. **Table 1** presents the number of passengers carried by the separate types of transport during the 2019-2021 period (9).

Table 1. *Number of passengers carried by the separate types of public transport during the 2019-2021 period*

Types of public transport	2019	2020	2021
Subway	224 815 770	172 165 533	186 160 601
Bus transport	223 730 437	154 353 076	141 686 685
Tram transport	42 232 618	79 798 984	73 544 160
Trolley transport	42 232 618	28 248 933	26 717 629
Total:	588 616 109	434 566 526	428 109 075

Source: National Statistical Institute (9)

Based on the presented statistics, **Table 1** shows that in 2019 the number of passengers transported by the subway in the capital is 224 815 770 (38.19%), dropping by 56 250 237 after the start of the pandemic, and in 2021 a total of 186 160 601 (43.18%) passengers, or 13 995 068 more compared to 2020, have been transported by the subway.

In 2019 the number of passengers who used the bus transport in the capital is 223 730 437 (38.01%); in 2020 that number is 154 353 076, i.e. 69 377 361 less compared to 2019; and in 2021 the total number of transported passengers is 141 686 685 (33.10%), i.e. 12 666 018 less compared to 2020.

During the pandemic the number of passengers who use the tram transport diminishes – in 2019 said number is 42 232 618 (16.62%) in total, dropping by 18 038 300 in 2020, and in 2021 the number of transported passengers drops even further by 6 254 824 (17.18%).

A similar trend of diminishing numbers of transported passengers is observed in the trolley transport. In 2019 the number of passengers carried out by the trolley transport is 42 232 618 (7.17%) in total, 28 248 933 in 2020, and 26 717 629 in 2021, which is merely 6.24% of the total number of passengers carried by public transport. **Table 2** shows the percentage change in the number of transported passengers for each individual type of transport operators working in the field of public transport (2020/2019) and (2021/2020).

Table 2. *Percentage change in the number of passengers carried by each individual type of transport for the (2020/2019) and (2021/2021) period*

	2019/2020	2020/2021
Subway	-23,42%	8,13%
Tram transport	-18,44%	-7,84%
Trolley transport	-33,11%	-5,42%
Bus transport	-31,01%	-8,21%

Source: National Statistical Institute (9)

INFERENCES

The capital's subway carries the largest number of passengers compared to other types of electrically driven transport. What makes it the most preferred mode of transportation for citizens is its high speed of 80 km/h, which is of primary importance for the conditions in the big city. Another advantage it has over all other types of public transport is its large capacity of 21 000-50 000 passengers per hour in one direction alone. The subway is effective only along directions with the strongest passenger flows in the capital. It is the only type of transport in the capital that has marked a significant growth in every single aspect since its commissioning up until 2019. Approximately 600 000 people use the capital's subway on a daily basis. The increased number of transported passengers in 2021 can be explained with the commissioning of the first 8 subway stations of the third metro diameter (Stage 1) on August 26, 2020 and 4 more subway stations (Stage 2) on April 24, 2021 by "Metropoliten" JSC. There is a positive fact that can be taken into account, namely - the transference of people who use bus transport towards services provided by the capital's subway, which is the most environmentally friendly type of transport. The bus transport is the primary and most preferred mode of transportation for the capital's residents. Approximately 250 million passengers are transported by the bus transport on an annual basis. The passenger services for those who use bus transport within Sofia Municipality are provided on the basis of contracts for provision of public services between "Metropolitan Road Transport" SJSC, the operator of bus transport, and the three bus operators. The analysis of the state of the public transport in the capital shows that during the crisis there has been a sizable percentage of citizens who prefer to use the services provided by the bus transport in the capital. Although the drop in the percentage of passengers who use bus transport services can be explained with the opening of the third metro diameter of the subway, the percentage of passengers transported by the bus transport still remains high compared to other types of transport. Unfortunately, this type of transport and the citizens' personal vehicles are the primary cause of air pollution. There is another fact that needs to be taken into account, namely that approximately 55% of Sofia's bus fleet is morally obsolete, which involves constant repair costs – running ones and capital ones, as well as the necessity for maintenance of a larger number of spare buses. In recent years the percentage of people who use the tram transport in the capital has dropped significantly. This is mainly due to the morally obsolete vehicles whose number has diminished doubly over the last 15 years, as well as the poor condition of the rail track. The qualitative indicators for transported passengers are extremely unsatisfactory – the schedule is not observed regularly and lacks rhythm, disadvantaged people do not have access, safety is low, and waiting intervals reach up to 30 minutes along certain lines (10). The urban trolley transport is secondary and an alternative to the bus transport for people who use urban public transport to travel. The annual trolley trips comprise a mere 7% of the total number of passengers carried out by public transport. The available rolling stock of the trolley transport has diminished significantly in recent years, as the average age of the vehicles is ten years (9).

GUIDELINES FOR RESTORING CONSUMER'S TRUST AFTER THE COVID-19 PANDEMIC AND INCREASING THE SOCIAL EFFECTIVENESS OF THE PUBLIC TRANSPORT IN THE CITY OF SOFIA

The only possible way to restore consumers' trust in the public transport in the city of Sofia after the crisis caused by the COVID-19 pandemic is to fully satisfy consumers' criteria regarding the quality of the provided transport services, which will lead to a multitude of positive social effects as a result of its functioning. The more widespread and more high-quality the services are and the higher the culture of the passenger service is, the greater these effects will be. A high quality public transport in the capital will overcome the social isolation during the crisis and will provide citizens with better mobility and easy access to professional, educational and recreational facilities outside their homes. When it comes to leading a healthy lifestyle, the ability to move quickly and safely has always played a substantial role. The social effects of using sustainable and qualitative public transport in cities are multilateral: satisfying various needs of the population – strengthening physical and mental health, increasing the amount of spare time, elevating the cultural and educational level of the population, increasing the quality of life,

expanding the nomenclature of utilized material goods and services, etc.

Following the COVID-19 pandemic, the European cities, including Sofia, have had to work even harder to create regions where citizens will be able to move in a sustainable and safe way whenever they wish. Inconvenience during travel, which is due to large groups of people or insufficient travel information, has made passengers lose their trust in public transport to an extent. Therefore, the enterprises working in the field of public transport need to strive towards creating a prerequisite for sustainable mobility, reducing the risk of social exclusion, and a healthy lifestyle for citizens. They need to guarantee the preservation of people's physical and mental health first and foremost, as well as security and comfort during travel.

The crisis caused by the COVID-19 pandemic had a negative impact on the public transport in the capital. At the start of 2020 it reported a 26.17% drop in the number of transported passengers compared to 2019, and a 1.49% drop in 2021 compared to 2020. The substantial drop in the passenger flow was mainly due to concerns regarding the risk of transmitting virus in the public transport vehicles. In order to overcome more quickly the negative consequences of the pandemic, consumers' trust in the services, provided by the public transport needs to be restored, first and foremost. To that end, the first step will require the quality of the provided transport services to be enhanced to the necessary level, so as to fully satisfy the passengers' demands in terms of reducing travel time and preserving their physical and mental health, as well as guaranteeing safety, security and comfort during travel. In summary, it can be said that the sustainable improvement of the state of Sofia's public transport will secure easier and more timely access to work places and services for all citizens, guarantee higher level of safety and security for passengers during travel, minimize pollution, greenhouse effects and energy consumption, and overall ensure sustainable urban mobility and higher quality of life for the citizens.

In the context of creating sustainable urban mobility, the following organizational, technical and technological measures can be adopted in order to improve the quality of public transport and the mobile situation in the city of Sofia:

Selecting a rational route system is one of the most important questions regarding the achievement of good organization of urban passenger transport which the reduction of travel time and improving the quality of the provided transport services as a whole depend on. In order to reduce travel time and minimize the transfer of passengers from one route to another, the outline of the route network and the definition of its spatial configuration need to be consistent with the directions of the passenger flows. This requirement is of paramount practical importance, as it reflects the necessity for providing fast and comfortable travel with mass urban passenger transport. Another essential requirement is that the transmissivity of the individual elements, resp. each individual route be examined during the formation of the route system. Sometimes it is impossible to direct routes along the shortest distances due to lack of transmissivity in the respective streets. When it comes to traveling over long distances, the routes need to be selected in a way that will ensure travel without transfers to other routes, i.e. the passengers should be serviced along this route from the point of departure all the way to the final destination. When it comes to traveling over relatively short distances, the routes can comprise two sections with passenger flows that are aproximately equal in power. In so far as the direction of the routes needs to be consistent with the directions of the passenger flows, generally all larger residential areas and labor application places in the city, as well as recreation areas, need to be connected to the mass urban passenger transport routes.

Introducing an accelerated mode of vehicle traffic, which involves the removal of part of the stops along the route. This guarantees that the operating speed of the urban passenger transport will be increased, which is essential for reducing travel time and accelerating vehicle turnover. The introduction of an accelerated mode is possible along certain directions where several bus routes or routes of bus transport and other types of transport, i.e. trams or trolleys, converge. This produces the best results when there is significant concentration of the passenger flows between a comparatively small number of stops, or when the average travel distance is long.

Increasing the transmissivity of intersections – this can be achieved by undertaking the following actions: extending traffic light cycles by increasing the duration of green lights along the directions which the urban passenger transport routes pass through; improving the organization of vehicle passage; widening the cross-points of intersections and marking off a separate right-turn lane; maintaining the good condition of all cross-points at intersections, etc.

Improving and replacing the rolling stock of public bus transport – the fastest and most radical way to reduce the harmful emissions of the bus transport in the city of Sofia is to commission new buses with better ecological indicators based on new or improved technological solutions. It should be noted, however, that the new technology is more expensive and could increase the operating costs, as well as necessitate further construction of the existing infrastructure or the creation of an entirely new one.

At present, the actual options for the commissioning of new, environmentally friendly buses include: diesel-engine buses; buses fueled by natural gas; buses with hybrid propulsion systems; buses with electric propulsion systems or electro-buses.

Incorporating Intelligent Transport Systems in the Organization of Urban Transport Systems

In order to improve the safety and security and guarantee the regularity and reliability of the bus transport in the capital, the modern rolling stock needs to be incorporated and the slightest prerequisites for the occurrence of traffic accidents on the city's streets need to be eliminated. To that end, the effective organization and management of the passengers' transportation process need to be secured first.

The effective management includes the establishment of optimal connections and a high level of coordination between the various types of urban transport, as well as the incorporation of Intelligent Transport Systems in the organization and management of the urban passenger transport. These systems use information and communication technology to collect and process transport data and aid the decision-making process, as well as assess the effects of transport projects. All traffic participants can take advantage of them before and during travel. The collected information is used for preliminary optimization of transport operations of varied nature from the public sector and the private sector. Part of the ITS systems serve to measure various parameters of the road traffic, drivers' behavior, and the state of the environment.

Improving Information about the Public Transport Traffic

In order for possible disruptions in the regularity of the vehicle traffic to be duly averted, the services of operation in the system of mass passenger transport need to be systematically studied and the reasons that cause such disruptions along any specific route to be disclosed.

CONCLUSION

The development of high-quality, socially efficient and integrated public transport is consistent with the EU's transport policy for achieving sustainable urban mobility of citizens. It consists of encouraging the use of environmentally friendly public transport, ensuring accessibility and mobility for the citizens and reducing the use of their personal vehicles. The European Green Package supports the post-COVID-19 recovery by aiding the creation of more sustainable EU economy. The purpose of the European Commission's strategy for sustainable and integrated mobility is to help the European transport system recover more quickly after the severe consequences of the crisis caused by the COVID-19 pandemic and become more sustainable, more intelligent and more resilient to shocks.

In order for public transport in the city of Sofia to overcome the negative consequences of the COVID-19 crisis more quickly and resume its normal functioning, it needs to provide high-quality transport services that are accessible to all citizens, as this will guarantee the preservation of people's physical and mental health.

The international experience in the management of companies working in the field of urban bus transport shows that the measures for preserving the physical and mental health of passengers, renewing the rolling stock, providing passengers with information about the right of way at intersections regulated by traffic lights, improving electronic charging, etc., can produce significant results in terms of restoring

consumers' trust and increasing the number of citizens who use public transport to travel. This in turn will ensure the successful social and economic development of cities, high quality of life for their residents, reduce traffic jams and protect the environment. Special attention needs to be focused on providing more high-quality and more accessible urban transport for disadvantaged people, people with limited mobility, people with disabilities, elderly people, and families with small children.

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REFERENCES

1. International Transport Forum. Safe Micromobility [Internet]. OECD/ITF; 2020. Available from: https://www.itf-oecd.org/sites/default/files/docs/safe-micromobility_1.pdf
2. Tzvetkova S. INCREASING THE SOCIAL EFFECTIVENESS OF PUBLIC TRANSPORT IN THE CITY OF SOFIA. *Int J Qual Res*. 2020 Mar 1;14(1):79–92.
3. Polis. Catalonia launches app to show passengers bus occupancy levels [Internet]. Covid-19: Keeping things moving. 2020. Available from: https://www.polisnetwork.eu/article/catalonia-launches-app-to-show-passengers-bus-occupancy-levels/?id=122791
4. Coignac F. Bordeaux unveils emergency cycling plan to combat COVID-19 [Internet]. 2020. Available from: https://handshakecycling.eu/news/bordeaux-unveils-emergency-cycling-plan-combat-covid-19
5. Adams R. Krakow makes cycling safer through bike service checks [Internet]. Civitas: Sustainable and Smart Mobility for All. 2020. Available from: https://civitas.eu/news/krakow-makes-cycling-safer-through-bike-service-checks
6. PUMS. Sustainable Urban Mobility Plan of metropolitan Bologna [Internet]. Città metropolitana di Bologna; 2019 Nov. Available from: https://pumsbologna.it/Engine/RAServeFile.php/f/documenti_approvazione/RELAZIONE/Relazione.pdf
7. Sunday driving bans in Paris and Bordeaux [Internet]. Green-zones.eu. 2021. Available from: https://www.green-zones.eu/en/blog-news/sunday-driving-bans-in-paris-and-bordeaux
8. Rupprecht Consult. Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan, Second Edition [Internet]. Rupprecht Consult - Forschung & Beratung GmbH; 2019. Available from: https://www.eltis.org/sites/default/files/sump_guidelines_2019_interactive_document_1.pdf
9. National Statistical Institute. National Statistical Institute [Internet]. NSI; 2022 [cited 2022 Aug 2]. Available from: https://www.nsi.bg
10. Tzvetkova SD. Guidelines for Improving the Quality of Urban Passenger Transport in the City of Sofia within the Context of Stable Urban Mobility. IOP Conf Ser Earth Environ Sci. 2018 May;151:012032.