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The impact of the COVID-19 pandemic on the behavior of ground public transport users

Elena Elkanova^{a*}, Alexey Malov^a, Valery Dzyuban^b, Oleg Epkhiev^a, Farid Guseynov^c

^a *Financial University under the Government of the Russian Federation, 49, Leningradsky Avenue, Moscow, 125993, Russian Federation*

^b *OANO VO MPSU, 9A, 4th Roshchinsky proezd, Moscow, 115191, Russian Federation*

^c *Plekhanov Russian University of Economics, 36, Stremyanny Lane, Moscow, 115093, Russian Federation*

Abstract

This scientific work is devoted to the analysis of the impact of the COVID-19 pandemic on the behavior of public transport consumers in world practice. The modern world is characterized by qualitatively new conditions for using public transport – the risk of being infected by a new coronavirus infection has a significant impact on passenger behavior. The issue of identifying social behavioral characteristics of public transport users for further adaptation of the sector under consideration to social strategies of consumer behavior is up to date. The following theoretical research methods are used in this work: analysis of statistical data of studies conducted in various countries of the world; review of scientific literature on the selected issues; classification of factors of behavior of public transport users in the conditions of the COVID-19 pandemic. The results make it possible to identify trends in the behavior of public transport passengers and adjust some aspects of the functioning of public transport to increase demand for this type of transport services.

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1. Introduction

The global transport and logistics system turned out to be one of the most affected areas because of the COVID-19 pandemic. The negative consequences are based on various factors. There are: the closure of state borders, the introduction of restrictions on the movement of people and goods, the rupture of supply chains, a decrease in demand and purchasing power. The combination of these factors has affected all types of transportation - from the use of personal and public transport in cities to passenger and freight transportation both within and between countries. The outbreak of the COVID-19 pandemic dramatically affected the world's population in early 2020.

* Corresponding author: Tel: +79035311126

E-mail address: EAElkanova@fa.ru

Mobility was particularly affected, since the governments of all states were forced to impose certain restrictions, such as the need to transfer employees of enterprises and companies to a remote format of work and the closure of shops, as well as the requirement to observe social distance. As a result, people tried to reduce their movements and social contacts in order to reduce the risk of infection. Public transport has been particularly affected by the pandemic, as passengers perceive the public transport system as unsafe and a possible source of infection.

The first wave of the COVID-19 pandemic dates back to March 2020, when governments around the world were forced to introduce forced measures to combat the spread of coronavirus infection by imposing strict sanitary restrictions on the movement of people not only in public places, but also in general outside their own homes. It is natural that the restrictions adopted have a huge impact on the transport sector – for example, in Italy, transport accessibility has about 40% regressive weight compared to other factors contributing to the spread of the virus (Marra *et al.*, 2022).

In 2020 in Germany was guided research showed that during the pandemic, people feel safer using a bicycle or their own car, compared to the times before COVID-19 (Dlr, 2020).

In Canada, a questionnaire survey (2020) was also conducted on the issue of passenger behavioral strategies, which revealed that most passengers intended to increase the use of cars and bicycles, but to reduce the use of other modes of transport (in particular, metro, buses and taxis). Such changes were mainly due to the risks of health safety, peace of mind and based on the experience of previous trips (Labont'e-LeMoyné *et al.*, 2020).

In addition, a study conducted in the UK showed that the confidence of car drivers in public transport has sharply decreased – for example, the percentage of drivers who would reduce the use of cars decreased from 57% in 2019 to 43% in 2020 (Rothengatter *et al.*, 2021).

Another sample survey in China showed that more than 80% of respondents believe that public transport and taxis are associated with a high infectious risk (Tan, Choice). Moreover, a nationwide survey conducted in Japan in October 2020 shows that the majority of respondents believe that the risk of infection is higher when using overloaded public transport vehicles (Ding *et al.*, 2021).

Norwegian researchers Barbieri, D.M., Lou, B., Passavanti, M. reported that, according to their survey conducted on the territory of six continents: Australia, Brazil, China, Ghana, India, Iran, Italy, Norway, South Africa and the United States believe that plane and bus are the two most dangerous types of transportation, followed by metro/tram and trains (Barbieri *et al.*, 2021).

In a worldwide expert survey conducted in May 2020, Zhang, J., Hayashi, Y., Frank, L.D. also shows a significant transition from public transport to walking (42.3%) and cycling (35.6%). and also, to the use of a personal car (64.8%) (Zhang *et al.*, 2021).

Countries that did not introduce a strict lockdown regime also faced a loss of income as people avoided public transport.

2. Materials and methods

During writing this scientific article the authors studied materials from many studies conducted in China (Lin *et al.*, 2021; Tan *et al.*, 2021), Pakistan (Abdullah *et al.*, 2021), Latvia (Paltins, 2021), Germany (Dlr, 2020), Canada (Labont'e-LeMoyné *et al.*, 2020), Italy (Marra *et al.*, 2022; Bazzana *et al.*, 2022), Great Britain (Rothengatter *et al.*, 2021), Japan (Ding *et al.*, 2021), Norway (Zhang *et al.*, 2021) and some others. The review of the above studies was carried out in order to identify social strategies of behavior of passengers of public land transport and their attitude to its use in the modern realities of the COVID-19 pandemic.

3. Results

As a result of the analysis of the literature on the chosen topic and the study of statistical data from studies conducted in various countries of the world, it became clear that the key aspect influencing the behavior of public transport passengers is their level of mobility. The mobility of people in the modern realities of the pandemic is significantly reduced. It is connected with restrictive measures on account of which people have reduced the number of opportunities to move outside their own apartment. People are significantly limited not only in traveling to other

countries or cities, but also in the opportunities to go shopping using public transport. The spread of infectious diseases is directly related to the mobility of people.

Continuing the controversy of the need to introduce restrictive measures on travel sector, it is necessary to refer to statistical and official data that confirm the relationship between the use of public transport and an increased risk of COVID-19. The first case of COVID-19 infection was detected in Wuhan, China, but the spread of the virus from one country to another occurred through a commercial air flight. Researchers found that there were 1,392 times more cases of COVID-19 near the airport (25 miles) and 1,545 times more deaths due to COVID-19 compared to places more than 50 miles away from the airport (Lin et al, 2021).

Ground traveling within the city was also associated with the risk of a pandemic. To limit the spread of the virus, governments have input restrictive measures to the transport sector. Different countries have adopted different degrees of restrictions to combat the spread of COVID-19, which has greatly affected people's lifestyle. Despite the fact that restrictive measures in public transport have a positive effect on reducing the incidence rate, on the other hand, the introduction of lockdown and the restriction of the number of trips due to COVID-19 have led to long-term damage in the transport sector.

Transit service operators have reduced the frequency of service due to lower demand and revenue. In developing countries, a significant part of the population uses public transport. Since private modes of transport are used in limited numbers, people have to choose public transport to travel even in times of difficult epidemiological situation (Abdullah et al, 2021). Nevertheless, public modes of transport can incite the transmission of viruses, since transit operators do not often observe precautions, especially for developing countries. Thus, rules and restrictions are necessary to combat the transmission of viruses associated with the use of public transport. On the other hand, people's travel needs must be met even during a pandemic. For such purposes, it is extremely important to understand the features of travel models, in particular, related to various types of travel.

It was also noted that low-income groups tend to prefer public transport to single modes of transport, even during pandemics. This may be connected with the lack of alternative transport options available for such groups and the difference in cost between public and individual trips. This implies the need for government intervention to provide vehicles, especially for low-income groups. Previous studies conducted before COVID-19 also emphasized that public transport policy should be aimed at providing for groups in an unfavorable transport situation, those who cannot own and drive a car (Abdullah et al, 2021).

The main trend observed in almost all the analyzed studies is that citizens were the wary of using public modes of transport, especially buses and subways, mainly because of the risk of infection that their use entails. Passengers' perception of the safety of modes of transport from the virus affects their choice, therefore, in order to achieve a successful recovery in the public transport sector, it is necessary to take appropriate hygienic measures to ensure the safety of users from the virus. In addition, passengers should be aware of the existing security measures, so appropriate communication efforts are needed to inform travelers that appropriate hygiene measures are being applied.

Speaking about the various types of travel, it is clear that business and leisure trips have shown a similar trend in terms of reducing the use of public transport and increasing the use of private vehicles. The results of the analysis show that, although there is a tendency to return to normal life, this transition will not be instantaneous once the lockdowns are over and the pandemic situation improves with the help of vaccines. However, it is worth noting that it will take some time until the situation normalizes. The return to normal life may be affected by further outbreaks of the virus, which will lead to the need to maintain certain levels of restrictions in some areas.

The change in the existing purchasing habits of the population has become another important consequence of the virus, closely related to the restrictive measures introduced. Firstly, the frequency of purchases by citizens was reduced – for example, in Italy, consumer priorities were directed towards abandoning daily purchases and increasing attention to weekly purchases. In addition, the places visited have also changed – a tendency has been revealed among consumers to avoid, as far as possible, large retail stores, where you can encounter a large crowd of people (Marra et al, 2022).

Another aspect that has changed significantly during the COVID-19 pandemic is the daily commute. Among the restrictions aimed at reducing the incidence of coronavirus infection, governments have introduced standards for the number of employees who are required to work in an online format. In addition, according to a study conducted in

Italy, those employees who were not transferred to remote work were still more skeptical about public transport – their preferences were directed in favor of using a personal car or taxi services (Marra et al, 2022).

Confirmation of this strategy of passenger behavior is also reflected in another study conducted in January 2022. According to the results, connected with the urban transport, the COVID-19 pandemic can lead to a constant, moderate increase in demand for private modes of transport and a more significant reduction in the use of public transport. This tendency can have a negative impact on traffic congestion, as well as on energy consumption and emissions. Therefore, a resolute, targeted policy is needed to provide citizens with viable alternatives that will create a more sustainable transport system and reduce the impact on the environment, while guaranteeing equality in access to modes of transport. The best practices of supporting eco-friendly modes of transport are already being supported in various European cities, and it is important not to lose this positive momentum (Bazzana et al, 2022).

Also, among the results of the impact of the COVID-19 pandemic on public transport, researchers from China have identified the following feature: the COVID-19 pandemic has opened a new era of ventilation in public places, including transport (Lin et al, 2021).

It is obvious that for the stability of the public transport system in the current epidemiological conditions of uncertainty, it is necessary to reduce the negative impact of COVID-19. The World Health Organization (WHO) recommends being more active during a pandemic and preferring hiking or using bicycles/scooters to move around the city - in some cases, this can also help prevent infection. However, analyzing the situation with the rate of spread of COVID-19, it becomes obvious that simply limiting the number of trips using public transport is not enough to curb the growth of morbidity. In order to restore the economy, a comprehensive approach is needed to restore the transport sector. The authors propose some modern ways of developing the public transport system necessary to ensure its sustainability and recovery after the negative impact of the COVID-19 pandemic (see Fig. 1).

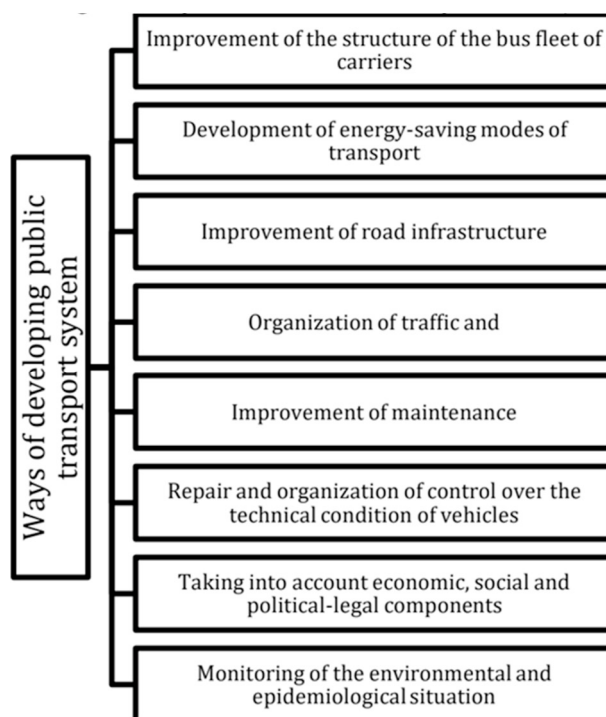


Fig. 1. Scheme of ways to improve public transport after the impact of the COVID-19 pandemic

Ensuring the mobility of citizens also increases the level of life satisfaction and allows residents to return to a more familiar rhythm of life for them. Due to the need to restore the public transport sector, the UN is actively developing a strategy to increase the sustainability and development of the transport sector in the period up to 2030 (Nundy et al, 2021).

For urban areas, sustainable public transport is crucial. Thus, a certain strategy of social behavior is required, expressed in the frequent but safe use of public transport while maintaining a safe distance between travelers as far as possible.

Sanitary treatment of buses and waiting areas helps to minimize the risk of virus spread among passengers using public transport services. The offer of a contactless dispenser of disinfectant and wash basins with soap dispensers at public transport stops can be effective. If possible, each traveler should be provided with wet disinfecting wipes with an offer to use them before touching anything inside public transport, which can be especially useful for passengers at high risk. Sanitary treatment of buses and the waiting area should become a regular procedure that increases the level of safety of using public transport in modern realities.

4. Discussion and conclusion

Summing up, we can say that in a pandemic situation like the one we faced in 2020, we can observe various strategies of behavior of public transport users, the choice of which depends on a number of factors:

- Remote/full-time working;
- Financial possibility of using your own car/taxi;
- Awareness of the security measures applied in public transport;

The level of equipment of public transport with a ventilation system, dispensers of disinfectants, a sufficient amount of space to maintain social distance.

As a result of the analysis of studies on the selected issues, it was revealed that the key strategy of social behavior of citizens is to avoid crowded places with a large number of people, which affects both the use of public transport and visits to various shops, shopping and entertainment centers, etc. In the market for the use of land transport in most countries, there is a tendency to prefer the use of personal transport or taxi, while such methods of movement as walking or using a bicycle / scooter, etc. have also gained particular popularity. Public transport is the most affected mode of transport during the pandemic, and an effective public transport safety policy is needed to return users to the pre-pandemic level.

The prospects of this study seem to be quite relevant, as far as in the post-pandemic period, the transport sector will be actively discussed by specialists, since it has a tremendous impact both on the economy of the state as a whole and on the social aspect of citizens' life. Staying at home and using less transport is obviously a reasonable solution, but it can cause serious damage to the transport industry. On the other hand, the improvement of a private vehicle will definitely increase the potential risk of road accidents and accidents.

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