CHANGES IN USE OF PASSENGER RAILWAY TRANSPORT DUE TO COVID-19 PANDEMIC AND EXPECTED PROSPECTS IN LATVIA

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Abstract. Before the COVID-19 pandemic the development and promotion of public transport, and especially rail transport, was set as one of the significant priorities of transport industry in Latvia. However, COVID-19 and the restrictions related to it have created not only a very deep but also a long-term negative effect on the use of public transport. Taking into consideration that since the beginning of the pandemic significant time has passed, and there has been a significant recovery from it over the last year, the major trends in the use of public transport in Latvia and outside are shown in the article. The paper employs both theoretical and empirical research methods. The official data on the passenger flow from 2018 till 2022 have been analysed in the research. They approve that the COVID-19 pandemic has left lasting effects on the use of public transport, including such effects that are caused by the changes of the population habits. However, the data show that the structure of demand has changed, and in some segments demand is even higher than during the pre-pandemic period. Also, the flow of passengers in different modes of transport has not recovered smoothly, but rail transport is one of the most successful in this regard. The recovery of railway transport has happened faster than of other types of transportation, although about 10% of passengers have not been regained yet. This confirms the perspective of this mode of transport in the future. We can expect to exceed the pre-pandemic passenger flow in Latvia in the coming years, but it is significantly dependent on the implemented state policy - whether it is favourable for passenger rail transport. Experience shows that in countries that take steps to popularize the railway, it recovers much faster.

Keywords: public transport, COVID-19, railway, passenger flow.

Introduction

Public transport is one of the sectors that was most widely affected by the COVID-19 pandemic. Data and research on the use of public transport indicate that the negative impact of the pandemic on passenger flow has been unprecedented at the European level. In particular, when analysing railway transport in this article, we can conclude that its use in 2020 in European countries for which Eurostat data are available was only 58% of the 2019 figures and 63% of 2021 (at the time of writing the article, data for 2022 are available only for a few countries). This indicates to a relatively long-term impact the recovery from which has been relatively slow and incomplete.

The impact of COVID-19 on passenger mobility has been analysed in several studies, but research on the initial impact in the first stage of the pandemic (2020) is met more frequently [1-3]. This paper analyses the situation in Latvia, placing emphasis not only on the development of the initial situation, but also on the passenger behaviour during the entire period of the pandemic, from the beginning of 2020 till the end of 2022. Taking into consideration that there are practically almost no restrictions related to the COVID-19 pandemic already from the second quarter of 2022, the consequences expressed in the passenger flow until the end of 2022 and even longer can be evaluated as long-term. Namely, during this period we can evaluate what consequences the pandemic has left on the habits of public transport use long-term, and which have not disappeared along with the removal of the restrictions. The author has not found similar research about Latvia in this context. The research available for Latvia looks at the impact of COVID-19 mainly from the macro-economic perspective, evaluating the overall sectors of economy [4]. Whereas research on transport is not usually directly linked with the impact of the pandemic. However, the data obtained by the author indicate that COVID-19, especially together with further challenges, creates significant complications to transportation policy, which impact this sector on a much wider scale, and the mentioned impact is most likely to be long-term. That, in turn, creates challenges to consider the new reality in developing the national policy and to find solutions acceptable both financially and socially.

Materials and methods

The present paper uses a broad set of available data on the train passenger flow in the territory of Latvia. The base of the research is formed with the data of the Road Transport Administration on the number of passengers carried both in trains and regional buses by month from 2018 till 2022. This allows the author to track the trends observed in passenger service before the pandemic and how they changed

when various restrictions were introduced, and the emergency situation was announced. The results of an empirical survey on the passenger flow in domestic trains in Latvia from 2017 till the beginning of 2023 are used as an additional data source. This provides an opportunity to perform a detailed analysis of various passenger flows as well as conduct a more precise analysis by routes. The official statistics on the distribution of main train routes is used. The obtained results are similar, which approves the reliability of the empirical observations. Scientific literature and publications about both Latvia and other European countries were analysed during the research process. Official statistical data (Central Statistical Bureau (CSB) of Latvia, Eurostat) were also used. A comparison of Latvian data at an international level as well as with the other Baltic countries was performed to evaluate the similarities and differences in the trends of the passenger flow.

Thus, the paper employs both theoretical and empirical research methods. Graphical methods are used to summarize the data. The analysis and synthesis methods are applied to develop conclusions.

Results and discussion

Total data about the passenger flows indicate that COVID-19 significantly affected all types of public transport. Table 1 summarizes data on all types of transport (data about 2022 are not yet published when the article was prepared).

Table 1

Passenger service in 2019-2022 (mill. of people) distributed by types of transport in Latvia [5]

Type of transport	2019	2020	2021	2022	2020/2019	2021/2019	2022/2019
Railway	18.6	12.9	11.2	15.7	69%	**60%**	**84%**
Air transport	5.2	1.4	1.9	3.8	27%	37%	73%
Regular traffic buses	140.0	86.7	72.7	91.8	62%	52%	66%
Trams	40.8	24.0	19.5	24.7	59%	48%	61%
Trolleybuses	39.9	28.4	23.4	30.2	71%	59%	76%

The data in the table above show that the impact of COVID-19 is visible in the entire period, with the most significant impact in 2021, when in total the passenger flow has been almost twice lower than in 2019. Comparing the types of transport, aviation is most affected because it performs international transportation, which experienced the strictest regulations, including the ones with administrative methods. In comparison with other types of transport, railway suffered relatively less; most likely because passengers consider that there is more space per passenger in a train. In addition, in 2021 investment was made in the development of the railway network (new train schedules etc.); thus, in 2022 the number of carried passengers already reaches 84% of 2019 level, which is much more than in other types of transport. A relatively low drop in the number of trolley-bus passengers can be explained by the fact that Riga city substituted bus serviced routes by trolley-buses. However, in 2021, the decrease in the number of trolley-bus passengers was even bigger than that of bus passengers, while in September 2022 again another part of bus routes was substituted by trolley-buses, which is reflected in statistics.

The fact that also in 2021 in all types of transport, except aviation, the number of passengers continues decreasing is important. Summarising data about rail transport in other European countries, it can be observed that, in total, in European countries about which Eurostat collects data a slight rise (by 9%) is present in 2021. As Figure 1 shows, there were only 6 countries in which the number of railway passengers decreased in 2021 if compared to 2020. They were Greece, Ireland, Sweden, Slovakia, Finland and Latvia. In addition, it is exactly in Latvia where the drop is the largest (by 13% from 2020 to 2021). In the other countries it does not exceed 8%. Moreover, in 2021, several countries experienced a significant recovery of passenger flow, for example, Slovenia (by 47%), Spain and Italy (by 26%), France (by 24%) and Lithuania (by 22%) [6]. These countries, however, already in 2020 (in difference from Latvia) faced radical restrictions, which later were relaxed.

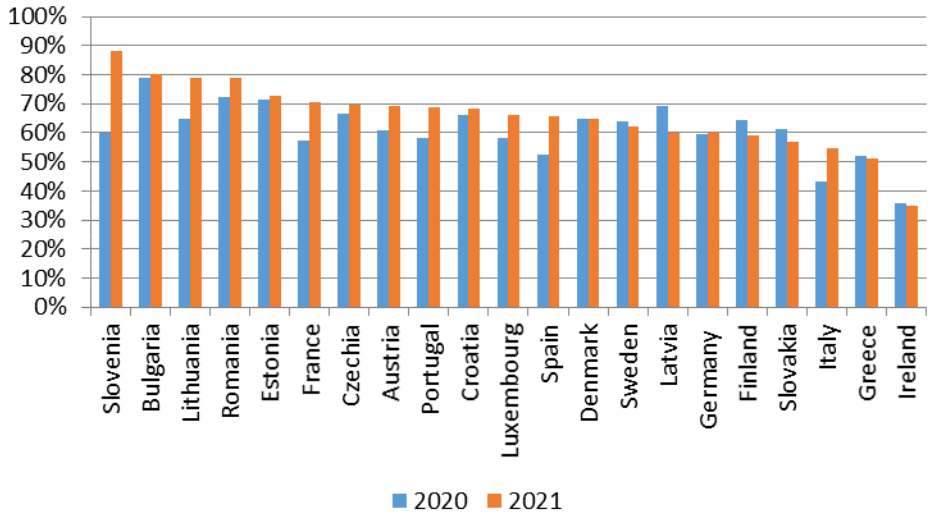

Fig. 1. **Number of passengers carried by railway compared to 2019 (%) [6]**

Thus, as it is visible in the summary, in 2020 the total results in Latvia were better than in most other European countries, but in 2021 – already worse. Considering both 2020 and 2021, the least impact on the number of passengers is observed in Bulgaria, Rumania and Estonia, where in none of these years the reduction against 2019 exceeds 30%. As at the moment Eurostat data on 2022 are not available yet, the analysis of further situation can be performed only about the Baltic States. In 2022 the fastest recovery was in Latvia, where the number of passengers increased by 40%, but in Estonia and Lithuania only by 17% and 13% respectively [7,8]. Whereas, in comparison with 2019, in Lithuania there were only by 11% less passengers in 2022. In addition, the decrease refers almost only to international transportation, but in 2022 inside Lithuania 98% of the number of passengers of 2019 were carried [8]. In comparison with 2019, the situation in 2022 in Latvia and Estonia is similar – the decrease of the number of passengers by 16% and 15% respectively. Taking into account that at the beginning of 2022 there still were significant restrictions in Latvia, such a result indicates to a rather good recovery. However, it shows that in both countries, irrespective of the type of COVID-19 restrictions (overall in Latvia they were stricter), the lasting effect is approximately similar, and that is not related to the restrictions but to the changes in people's habits.

To better evaluate short-term and long-term effects on the passenger flow, we will look at the dynamics of the number of train passengers in Latvia since 2018 (Fig. 2).

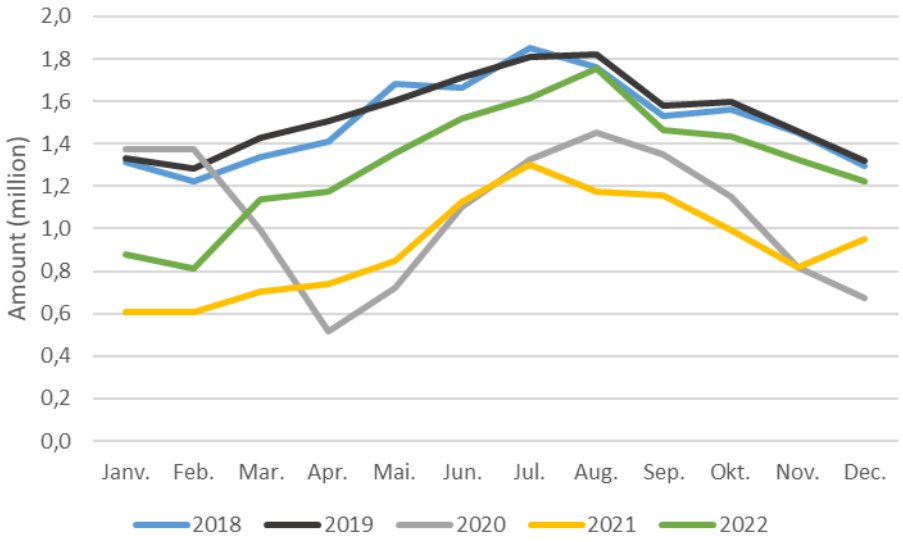

Fig. 2. **Number of carried passengers by domestic trains in Latvia by month in 2018-2022 [9]**

The figure demonstrates that before COVID-19 (until February 2020) the number of passengers was stable, even a slight growth trend can be seen. Whereas along with the first wave of the pandemic starting in March 2020, the number of passengers dropped fast, and in April it was only 34% of the respective month in 2019. A significant regain started in June (after cancelling the emergency situation), but the best result was achieved in September (85% of September 2019 figure) when educational establishments were opened and the morbidity rate continued to be low. However, later the morbidity started to grow rapidly, and restrictions increased, including stopping studying face-to-face (in fact, this restriction was in force until the end of the study year 2020/2021). As a result, from November 2020 till May 2021, the number of passengers continued to be only about 50% of the "regular", i.e. the level of 2019. The lowest point was reached in January – February 2021 when the number of passengers increased the minimum of 2020 April by only 18%. However, as it can be observed, the increase was slow also in some following months. The number of passengers increased more rapidly in June – July, when the morbidity rate dropped significantly, but also in summer (June – August), at a rather low morbidity rate, the number of passengers was only 67% of the indicators of the summer of 2019. Later in September, when educational institutions started working, it increased to 72%, which is significantly lower than 85% achieved in September 2020.

Then, in the autumn of 2021, another great wave of morbidity started, and the emergency situation was announced for the third time, and the restrictions became stricter than the previous, including for several weeks prohibiting to be outside the house after 8 p.m. As a result, the number of passengers again dropped rapidly, in November 2021 making only 56% of 2019 level. Later, in December 2021 the number of passengers reached already 72% of December 2019 indicator.

However, during the first months of 2022, while significant COVID-19 restrictions were in force, the number of passengers stayed low – only at about 65% level of the respective months of 2019. The fastest changes occurred in March 2022 when many significant restrictions were removed. Within a month, the number of train passengers grew by 40%. The increase is observed also in the following months until August, as depicted in Fig. 2. The negative difference against 2019 reduced significantly, reaching only 4% in August. It was also facilitated by the warm weather why there were many vacationers who use trains. Nevertheless, the levelling trend of passenger flow against the pre-pandemic situation stopped, and in September 2022 the flow was 92% of the respective month of 2019, but in October it was 90%. Approximately the same level (90% of 2019) regarding the number of passengers has remained also for the end of 2022 and the first months of 2023. Thus, we can observe a tendency that after removing all restrictions and the return of the life to its "normal course", the number of train passengers has returned only to 90%.

Data about the passenger flow in regional buses (excluding the traffic of state cities) until September 2021 demonstrate a similar picture (Fig. 3).

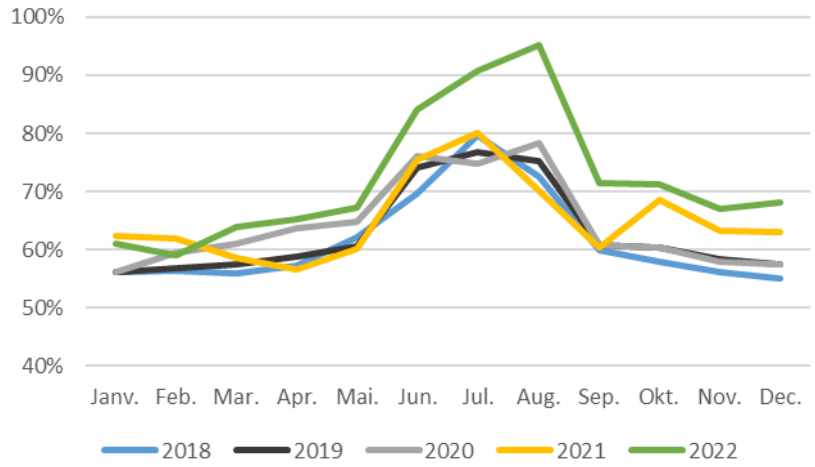

Fig. 3. **Number of train passengers in% from the number of passengers in regional buses by month in 2018-2022 [9]**

After that, backwardness in percentages from train transportation started to express itself, which is partly related to the reduction of transportation intensity in the routes that were parallel to train routes.

If until 2021 train passengers were about 60-64% of the regional local and intercity buses, then in 2021 on average it was 66%, but the most significant changes occurred in 2022 when the average level a year reached already 72%, with the highest increase being in the second half of the year Data on the passenger flow in regional buses compared to 2019 also indicate that from June till December 2022 the figure has stayed almost unchanged at the level of about 78%; thus, buses have lost more passengers due to the pandemic than trains.

This means that when all restrictions were cancelled, in Latvia (and also in Estonia) the passenger transportation by rail has returned to about 90% of the pre-covid period, but in Lithuania to even 98% in domestic transportation. To explain this better, the structure of transportation should be analysed. In Lithuania, the average length of a journey is bigger than in the other Baltic States, which means that regional transportation instead of daily commuting to work, studies and back occupies a larger place in the structure. Whereas in Latvia an average length of a journey is only 32 km, and 90% of the journeys occur in the electrified area where people usually have return trips on the same day.

Thus, it can be concluded that the average difference between the "pre-" and "post-" pandemic situation is to large extent determined by the structure of the journey. Data of Table 2 indicate that the number of passengers carried in interregional transport (between Riga and further destinations – Daugavpils, Rezekne, Krustpils, Liepaja, Gulbene) was even larger in 2022 than in 2019, but it has reduced in the lines of electric trains.

Table 2

Number of passengers in particular railway lines in 2019 and 2022 (mill. of people) [9]

Route	2019	2022	2022/2019
Riga-Tukums	6.58	5.48	83%
Riga-Aizkraukle	4.60	3.86	84%
Riga-Jelgava	3.09	2.56	83%
Riga-Skulte	2.34	2.06	88%
Riga-Valga	1.02	0.81	79%
Riga-Krustpils, Daugavpils, Zilupe, Gulbene, Indra	0.79	0.88	112%
Riga-Liepaja	0.03	0.04	119%
Total	**18.46**	**15.69**	**85%**

Such a situation has developed because the demand for trips for closer distances has reduced due to remote work as well as face-to-face activities not having regained the previous level – various courses, seminars, training and other activities, and shopping trips because all these activities are currently partly organized remotely. However, for longer distances, the number of trips has rapidly increased because they are more frequently related to the desire to meet, travel, relax. This assumption is approved by the analysis of the structure of the trips in 2020-2022: initially (in 2020) longer journeys dropped even more rapidly than short trips, whereas in 2021, the number of passengers began to grow slowly in longer journeys, but in short trips it still continued to fall. In 2022, the number of passengers recovered in all routes, but it happened much faster in longer journeys exceeding even the pre-pandemic level. It had several additional facilitating factors, such as increased fuel prices, additional train schedules and elimination of parallel bus routes. The railway line Riga-Valga has lost most passengers, but in this line, trains run mainly between Riga-Sigulda, which has lost many passengers due to the drop of tourist numbers.

Taking into consideration that at present there have been no significant changes in passenger flows due to COVID-19 restrictions for about half a year, we can evaluate that the present situation that has developed in the public transport demand is relatively persistent in these new "post-covid" circumstances, and rapid changes related to recovery after the pandemic are not expected, however, we can still expect some continuation of the return trend.

The results of this study largely coincide with studies in other European countries. Thus, a study that collects data on several large European countries reveals that by the 2nd quarter of 2022, when the

restrictions practically no longer existed, public transport traffic has surpassed 80% of pre-pandemic levels. But large differences among countries remain. Travel figures range from -20% to +10% compared to previous levels. In the countries that boosted use of public transport, we see even exceeded pre-pandemic levels. For example, with biggest increase is France, where domestic air travel for durations of up to two-and-a-half hours was banned in 2021 on trips with a rail alternative, and Germany with 9 EUR tickets for full-day train travel. On the other hand, in the United Kingdom we still see shortage by 21% due to work-from-home policy. Also, this research shows that leisure travel bounced back stronger than commuting as we see it in Latvia [10].

Conclusions

1. COVID-19 restrictions created unprecedented decrease in the use of public transport for about two years in entire Europe, including the decrease in the use of railway transport. The decrease in Latvia was similar to the average indicators in other European countries, but, in difference from other countries, it was more expressed in 2021.
2. The recovery of railway transport has happened faster than of other types of transportation, although about 10% of passengers have not been regained yet in Latvia. The same level is in Estonia, but in Lithuania domestic traffic has reached 98% of pre-pandemic level.
3. The mentioned shortage has to be evaluated as an effect of the change of population habits and it is not related to the previous restrictions.
4. However, the return trend continues and can be expected to exceed the pre-pandemic level in the coming years, but it is significantly dependent on the implemented state policy - whether it is favourable for passenger rail transport.
5. A change in the journey structure has taken place. The demand for longer journeys has increased while the number of shorter trips has decreased, which is related to daily migration.

Author contributions

This article has one author. Conceptualization, methodology, literature review, data collection, formal analysis, writing and visualization, A.V.

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