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Travel decisions in Poland during the COVID-19 pandemic

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Abstract

This paper presents the results of primary research involving a survey of travelers in Poland during the COVID-19 pandemic. The survey was conducted in January 2022 using the CAWI method on a representative sample of n = 1,129 Polish adults aged 18 to 60. As many as 74% of respondents believe that the COVID-19 pandemic has changed traveler preferences with regard to urban, regional and trans-regional transport. Two-thirds of respondents (67%) cited a car as the most common mode of transportation, 40% said they walk, and 25% use buses. Just over 10% chose a bicycle (14%) or tram (11%). The least preferred mode of transportation was the train (7%).

The three most frequently cited features of transportation services that respondents considered most important included easy ticket purchasing, ticket prices, and cost of travel. The aim of this paper is to discuss the decisions of Polish passengers using public transport during the COVID-19 pandemic. The results of the research may help to influence the passengers' purchasing decisions in accordance with the objectives of long-term transport policy of both the European Union and Poland related to sustainable transport development, as well as the decisions of transport operators as this is a stakeholder group that may be interested in applying them in their daily work and carriers themselves, competing for passengers.

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1. Introduction

The COVID-19 pandemic has radically changed the functioning of modern societies and economies. It has caused major disruptions in many markets which include transportation, tourism, hospitality, food service, educational services, sports, cultural events markets, and others. The new virus from the Chinese city of Wuhan was first reported by the media in December 2019. The first case of coronavirus in the European Union was reported on 24 January 2020, and shortly thereafter, on 30 January 2020, the WHO issued a global epidemic outbreak alert. Since mid-February, the topic of coronavirus has been capturing the headlines in Poland. On 4 March 2020, the first case of coronavirus was detected in Poland. As of 12 March 2020, schools, universities, kindergartens, and nurseries were closed in Poland by government decision, and WHO announced the global coronavirus pandemic. The impact of the COVID-19 pandemic on the passenger transport market can be seen across Europe. Compared to Q1 2020 and Q2 2019 results, the number of travelers by country was down by tens of percent, and in certain countries (Ireland, UK) even by over 90% [1]. This was due to more or less severe human mobility restrictions introduced across most European countries. Closed borders and stagnating tourism limited to a minimum the movement between countries. During the lockdown period, in April 2020, the mobility of Poles fell by more than half (55%). In the second wave of the pandemic, in autumn 2020, the mobility of Poles was further limited due to pandemic restrictions Internal regulations introducing remote working among employees, who make up the vast majority of rail and bus passengers, also contributed to the decline in traffic [1]. The aim of this paper is to discuss the decisions of Polish passengers using public transport during the COVID-19 pandemic. The research results and recommendations can be an important source of information for transport operators, as this group of stakeholders may be interested in applying them in their daily work.

2. Literature review

The pandemic has also left its mark on the behavior of public transport passengers. The closure of commercial, educational, sports, and cultural institutions resulted in significant travel restrictions. Mandatory home isolation and deluge of alarming information have caused changes in travelers' attitudes and decision-making patterns. In 2019-2022, that is during the period of the virus spread, a number of studies were conducted to examine the impact of the pandemic on the socio-economic environment, both on the global [2, 1] and national level, as well as in relation to specific markets. Publications by Polish authors [3-7], research results [8,9] and [10, p. 37, 11], as well as in publications by foreign authors [12-15], offer different takes on the passenger transport market, both rail and road. These studies were conducted before the outbreak of the pandemic and the authors did not take such risk into account. Today’s customers are more and more demanding in such issues as the quality of offered services, safety, provision of current information, and customer service [16-19]. They also expect modern services and equipment to be provided in means of transport [20]. Special requirements of travelers are also described by [20-21]: ability to check information in social media, use Wi-Fi in vehicles, track the current location of the vehicle with a mobile application [5]. With a new approach to meeting travelers' expectations, companies competing on the passenger transport market perform professional analyses of the market and customers' preferences so that they can make improvements that are most appreciated by customers. These include, above all, all solutions offered in the area of innovativeness and modern technologies [22,23] both in Polish [8,9,24,25] and foreign literature [26, -29]. However, the situation in the transport market has changed as a result of the economic downturn as well as restrictions and limitations introduced due to the spread of coronavirus. Most passenger rail and road transport operators have been forced to cut back on their services and instead of seeking to resume their normal business, they had to minimise losses due to a decrease in the number of travelers [30] which has been reflected in publications of 2020 and 2021 [1, 31 – 37].

3. Research methodology

The survey was conducted in January 2022 using the CAWI method on a representative sample of N = 1,129 Polish adults aged 18 to 60. The survey was conducted on a nationwide, random and quota sample of individuals aged 18 and over, with totals selected according to representation in the Polish population for such variables as gender * age * city/town population. In other words, the sample was divided into 50 strata resulting from the intersection of categories within the variables 2 (sex) * 5 (age) * 5 (city/town population) and for each of these strata the respondents were sampled. The data for quota sampling are derived from the National Population and Housing Census 2011 which was conducted by the President of the Central Statistical Office under the 2010 Act. It was conducted on the territory of the Republic of Poland from 1 April to 30 June 2011, as of the end of 31 March 2011. A total of 1,129 adult residents, including 579 women (51%) and 550 men (49%), participated in the survey. The age of the respondents is
given in Table 1. As shown in the table, both age groups, 14-24 and 25-34, included 18% of respondents, 16% were between 35 and 44, while 29% were at least 55 years old (Table 1). The median age for this variable was 35-44 years.

Table 1. Age of study participants — number and percentage of respondents with median and mode

| Age            | N   | %  |
|----------------|-----|----|
| 14-24 years    | 200 | 18%|
| 25-34 years    | 203 | 18%|
| 35-44 years    | 177 | 16%|
| 45-54 years    | 222 | 20%|
| 55 years and over | 327 | 29%|
| **Me**         |     |    |
| 35-44 years    |     |    |
| **Md**         |     |    |
| 55 years and over |     |    |

Source: Own research

The education of the study participants is summarized in Table 2.

Table 2 Education of the study participants — number and percentage of respondents with the median and mode

| Education Level          | N   | %  |
|--------------------------|-----|----|
| primary                  | 31  | 3% |
| vocational               | 107 | 9% |
| secondary                | 522 | 46%|
| bachelor’s degree        | 129 | 11%|
| master’s degree and above| 340 | 20%|
| **Me**                   |     |    |
| secondary                |     |    |
| **Md**                   |     |    |

Source: Own research

As shown in Table 2, almost half of the respondents (46%) had a secondary education. The second largest group was those with at least a master's degree (30%). 11% of respondents had a bachelor's degree, 9% had completed vocational school, and 3% had completed only elementary school.

Responses regarding the professional status of the study participants are shown in Table 3.

Table 3. Professional status of study participants — number and percentage of respondents with mode

| Professional Status                        | N   | %  |
|--------------------------------------------|-----|----|
| primary education student                  | 40  | 4% |
| higher education student                   | 62  | 5% |
| production worker                          | 137 | 12%|
| office worker                              | 295 | 26%|
| service worker                             | 157 | 14%|
| business owner                             | 50  | 4% |
| pensioner or retired person                | 229 | 20%|
| not working or unemployed                  | 93  | 8% |
| other                                      | 66  | 6% |
| **Md**                                     |     |    |
| office worker                              |     |    |

Source: Own research
As shown in Table 3, the largest group, more than one-quarter (26%) of respondents, held office jobs and one-fifth (20%) were retired. The smallest subpopulations included: primary education students (4%), higher education students (5%), and business owners (4%).

The next question concerned the population size of the survey participants’ place of residence. As can be seen in Table 4, which shows the number and percentage of respondents by the population size of their town or city, more than one-third of survey participants (37%) lived in rural areas. Nearly one in five respondents (19%) lived in a town of 20,000 to 100,000 residents. 17% of respondents lived in a city of 101,000 to 400,000 residents. Towns under 20,000 residents and cities over 400,000 residents were cited by slightly more than 13% of respondents, respectively.

Table 4 Population of survey participants’ town or city — number and percentage of respondents with median and mode

| Population Size                  | N  | %   |
|----------------------------------|----|-----|
| rural area                       | 418| 37% |
| town under 20,000 residents      | 147| 13% |
| town of 20,000 to 100,000 residents | 218| 19% |
| city of 101,000 to 400,000 residents | 197| 17% |
| city over 400,000 residents      | 149| 13% |

Me: 
- town under 20,000 residents
- rural area

Md: 
- town under 20,000 residents
- rural area

Source: Own research

Responses to all questions were described using summary statistics: mean (M), standard deviation (Sd), median (Me), and mode (Md). In addition, for variables measured on quantitative scales, a Kolmogorov-Smirnov (KS) test was performed to see whether the distribution of the results deviated from the norm. In order to increase the relevance of the quantitative data analysis, the level of statistical significance of the relationship between variables was examined. To this end, the chi-square test (chi$^2$), Kruskal-Wallis test and Spearman correlation coefficient (rho), among others, were used.

4. Research results

Survey participants were asked about their preferred modes of travel. As multiple-choice questions were used, the response percentages do not add up to 100%. The car was chosen by the largest group — two-thirds of respondents (67%). 40% of participants responded that they walked, and 25% that they used buses. A bicycle (14%) or tram (11%) was chosen by slightly over 10% of respondents, respectively. The train was the least popular mode of transportation (7%). The response frequency distribution was analysed using the chi$^2$ test. It proved to be statistically significant ($chi^2 = 1481.60; df = 5; p < 0.001$) which means that there are significant differences between the frequencies with which different means of transport were chosen (Table 5).

Table 5. Most popular means of transport — number and percentage of respondents with a mode

| Mode | N  | %   |
|------|----|-----|
| walking | 457 | 40% |
| bike  | 158 | 14% |
| car   | 755 | 67% |
| bus   | 285 | 25% |
| tram  | 123 | 11% |
| train | 77  | 7%  |

Md: 
- car

Source: Own research
Survey participants were asked to select up to 3 features of transportation services that they considered most important (Table 6).

Table 6. Features of transportation services most important to survey participants – number and percentage of respondents with a mode

| Feature                                                                 | N   | %   |
|------------------------------------------------------------------------|-----|-----|
| running frequency of means of transport                                | 349 | 31% |
| punctuality                                                            | 398 | 35% |
| accessibility (proximity to bus stops)                                 | 312 | 28% |
| travel speed                                                           | 260 | 23% |
| direct connection                                                      | 201 | 18% |
| ticket price/travel cost                                               | 420 | 37% |
| ease of ticket purchase                                                | 423 | 37% |
| standard of means of transport                                         | 110 | 10% |
| availability of parking lots                                           | 116 | 11% |
| parking fee                                                            | 245 | 22% |
| accessibility/facilities for the disabled                              | 108 | 10% |
| other                                                                  | 61  | 5%  |

Source: Own research

As can be seen in Table 6, most respondents selected the answer: ease of ticket purchase (37%). Slightly fewer (also approx. 37%) considered ticket prices and travel costs to be important. More than one-third of survey participants also indicated punctuality (35%) and 31% of them – running frequency of means of transport. Accessibility, i.e. proximity to bus stops (28%) and travel speed (23%) was chosen by about one-fourth of respondents, respectively. 22% of respondents considered the parking fee to be important. 18% of survey participants said that the direct connection was among the most important features of transportation services. The remaining answers were selected by no more than 10% of survey participants.

As can be seen in Table 7, all results were found to be statistically significant, meaning that the response distributions deviated from the norm and thus non-parametric tests had to be used. In the next question, respondents were asked to rate a series of transportation-related statements on a four-point scale ranging from 1 – "strongly agree" to 4 – "strongly disagree." Table 7 summarizes the responses given. As can be seen on the basis of the median, the mode equal to 2 and the means oscillating around this value, most of the survey participants tended to agree with all the statements. In order to test whether opinions on the statements have normal distributions, Kolmogorov-Smirnov tests were conducted.

Table 7. Means, standard deviations, medians and modes, and Kolmogorov-Smirnov test results for evaluating transportation-related statements

| statement/opinion                                                                 | M   | Sd  | Me  | Md  | K-S  | p    |
|----------------------------------------------------------------------------------|-----|-----|-----|-----|------|------|
| Efficient public transport increases the number of passengers and reduces the use | 1.73| 0.68| 2   | 2   | 0.27 | < 0.001|
| of private transport (cars)                                                       |     |     |     |     |      |      |
| Railroad transport enables faster travel than private transport across regions   | 1.95| 0.73| 2   | 2   | 0.29 | < 0.001|
| and agglomerations (urban transport)                                             |     |     |     |     |      |      |
| Frequent changes in the train timetable make travelers choose alternative         | 1.94| 0.68| 2   | 2   | 0.3  | < 0.001|
| means of transport                                                                |     |     |     |     |      |      |
The high cost of travel by private (car) transport is the reason for choosing rail transport for regional and agglomeration (urban) travel.

The COVID-19 pandemic has changed travelers’ preferences with regard to urban, regional and interregional transport. Congestion (traffic jams) and lack of parking lots or high parking fees are reasons for using regional and agglomeration (urban) transport.

Given the choice of private (e.g. car, cab) or public (train, tram, bus) transport for short and medium distances to work/university, I conduct a comparative cost analysis.

Given the choice of private (e.g. car, cab, bicycle) or public (train, tram, bus) transport for short and medium distances to work/university, I compare travel time.

Given the choice of private (e.g. car) or public (train, bus, plane) long-distance (interregional) transport in Poland, I conduct a comparative cost analysis.

Given the choice of private (e.g. car) or public (train, bus, plane) long-distance (interregional) transport in Poland, I compare travel time.

Source: Own research

As can be seen in Table 7, all results were found to be statistically significant, meaning that the response distributions deviated from the norm and thus non-parametric tests had to be used. Responses to the question about the most important factors in long-, medium-, and short-distance travel are summarized in Table 8.

Table 8: Most important factors in long-, medium-, and short-distance travel — number and percentage of respondents with results of chi2 tests

|                | Price |     | Time |     | Comfort |     | chi2   |
|----------------|-------|-----|------|-----|---------|-----|--------|
|                | N     | %   | N    | %   | N       | %   |        |
| long-distance  | 255   | 23% | 361  | 32% | 513     | 45% | 89.38***|
| medium-distance| 330   | 29% | 575  | 51% | 225     | 20% | 171.28***|
| short-distance | 365   | 32% | 632  | 56% | 132     | 12% | 332.66***|

Source: Own research

Table 8 shows that nearly half of the respondents (45%) ranked comfort as the most important factor when traveling long-distance, while price mattered to 23%. The remaining respondents cited time. The differences between the response distributions were statistically significant (chi2 = 89.38; df = 2; p < 0.001). For medium-distance travel, the differences between distributions were statistically significant as well (chi2 = 171.28; df = 2; p < 0.001), with more than half of the survey participants ranking time as most important, while travel comfort, chosen by one-fifth of respondents, proved least important. The remaining 29% of respondents ranked cost first. For short distances, time was also considered most important (56% of responses), while comfort was chosen by the smallest number of respondents (12%). The remaining third of respondents chose price. These differences were statistically significant (chi2 = 332.66; df = 2; p < 0.001).

5. Discussion

Many authors recognize changes in consumer attitudes and preferences, including in the passenger transportation market in the context of the COVID-19 pandemic, pointing to the growing popularity of alternative
The impact of COVID-19 pandemic on the passenger transport market is still a new, dynamically changing issue and not sufficiently discussed in the literature [1, 20, 32-37].

The presented and discussed results of the primary research are supported by the research of the Office of Rail Transport, 2021, which also concerns passenger transport in Poland, and in which travelers clearly recognize comfort (on long routes) or the price and cost of travel (on shorter routes) as the most important factors in their decision-making process. Although the above research concerns mainly rail transport, the results can be applied to all passenger modes of transport. According to the "Rail Passenger Satisfaction Survey" [8] conducted by the Office of Rail Transport in 2019, 67.3% of respondents like travelling by rail. In a survey conducted in 2021 [39] such a positive response was given by 83.4% of passengers questioned. Travel comfort is important to 62.6% of 2019 survey participants. In 2021, 54.42% of survey respondents considered travel comfort as a factor encouraging them to travel by rail. While comfort can be perceived very subjectively, what matters to a passenger is no longer just the journey from point A to point B, but also the travel conditions. The availability of in-vehicle WiFi is an important element for travelers. They are eager to use their travel time for work, study or entertainment, and internet access on the train or bus is becoming one of their primary expectations. The total number of trains providing this service increased significantly in 2020, as compared to 2019 – by almost 8%. In order to improve travel comfort, the rolling stock used on regional and long-distance routes is being replaced and upgraded. New vehicles of a very high standard with many modern facilities for passengers that significantly improve travel comfort are also coming into service. Thanks to the increasing popularity of environmentally friendly means of transport, more and more people are choosing bicycles for traveling or spending time actively. Therefore, travelers expect more from a train trip than just reaching a tourist destination. They also want to bring their bikes. In agglomerations, it is also important to be able to transport a bike on a commuter train, as a bike-rail-bike combination is becoming increasingly popular. The equipment of rolling stock used for long-distance routes, as well as rolling stock for regional and agglomeration routes have undergone some changes. One of the noteworthy improvements is equipping the cars with the GPS tracker. GPS facilitates train traffic management, and allow passengers to locate the train online. GPS functionality in as many traction vehicles as possible will allow passengers to obtain information about a route, train, delay or holdbacks. The standard of equipment due to GPS tracking systems has increased for all vehicle types. [39] In the case of long-distance connections prestigious (semi) high speed trains have turned out to be more “vulnerable” to cancellations. This is probably connected with the fact that their main target are business trips which have come to an almost complete stop in the time of pandemic [37].

6. Conclusion

The events of last three years have shown the tremendous impact the changes in the environment can have on the transport operators, carriers and the decisions of travelers. The research results presented here are a starting point for planning strategic actions of transport operators and carriers in crisis conditions. To the best of my knowledge, these have not been discussed or addressed in the available literature.

Considering the experience of the past three years, it is necessary to prepare for the future crisis situations (to develop action plans, variants of behavior, specific procedures and methods of their implementation). In the current situation, it is important to consider how to win back passengers, address their concerns, new habits, and encourage them to use public transport. However, there are different objectives to be achieved by transport operators and by carriers.

The obtained research results and formulated recommendations can be helpful for transport operators to use and apply in their daily work. The rail and road operators should reassess the volume of passenger traffic on each line and adjust the timetable accordingly. Taking into account sustainable development of transport, railroad transport should become a viable alternative to other means of transport. It is therefore necessary to adapt the rolling stock to the changing expectations of travelers. One of the priorities of the carriers is to increase passenger travel comfort and – despite the difficulty to predict financial situation – investments in rolling stock should be treated as investments in business development. As part of the improved travel experience, regional trains could depart at a fixed time. Tickets could also include public transport or alternative means of transport, scooters and bicycles, to get to train or bus stops. Carriers should ensure the safety of travelers, many of whom are still wary of using public transport. They should launch a marketing campaign and inform that they are providing additional equipment, excluding certain seats in accordance with rules and procedures for safe travel, and providing separate areas for carrying bicycles and scooters. A well-thought-out marketing campaign will encourage travelers to revert to habits formed over the years. The campaign could remind and emphasize the purposes of travel which are connected with work and study, but also...
tourism, sanatoriums, or visiting distant family. It is also important to refer to the changes taking place – rising fuel prices, parking availability and fees, as well as the problem of congestion in cities due to even more rapid development of private transport. During the pandemic, many people purchased cars for safety reasons, as they preferred to travel individually or with their families. Further research should include an in-depth analysis of the needs and preferences of travelers during the downward phase of the pandemic and in the context of ongoing military operations across Poland’s eastern border.

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