

ANALYSIS OF URBAN TRANSPORT IN THE PERIOD BEFORE AND DURING THE COVID-19 PANDEMIC – A CASE STUDY

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Purpose: The purpose of this article is to analyze and evaluate public transportation before and during the COVID-19 pandemic.

Design/methodology/approach: The research problem is to what extent the operations of a public transportation company changed during the COVID-19 pandemic. Main hypothesis: actions taken by the urban transportation company caused positive changes in transportation operations during the COVID-19 pandemic. The method used in the article is a case study, analysis of internal company data and method of a document examination.

Findings: At Miejski Zakład Transportu Sp. z o.o. (MZK) Koszalin (MTC) during the COVID-19 pandemic, current liabilities increased to 9,392.51 thousand PLN in 2019 and decreased by 26.49 percent in 2020 during the pandemic, and operating expenses decreased by 4.91 percent, including material and energy consumption by 18.49 percent. The level of inventories remained constant. Due to increased losses of 67.97 percent

Research limitations/implications: Difficult access to data/extension of the research period.

Practical implications: The company took measures for passenger's safety like purchasing ticket machines. It is necessary to continuously modify existing lines and launch four new lines to three neighboring municipalities.

Social implications: Increasing safety and accessibility for passengers, improving the quality of life of residents.

Originality/value: The article shows the phenomenon and scale of public transport in the era of a pandemic. Similar situations may occur with other social, economic or geopolitical threats (crises).

Keywords: urban transport; pandemic COVID-19; protection of passengers.

Category of the paper: Case study.

1. Introduction

The proper functioning and development of public transport enterprises depends, among others, on economic stability, market opportunities and business potential. The changing expectations of society, often e.g. resulting from the improvement of the quality of life, force carriers to constantly develop (improve), by modifying the rolling stock, changing and creating new lines, attractive ticket prices, service delivery time, etc. Not all enterprises are prepared for such external factors, especially for sudden crisis situations, i.e. a pandemic or an economic (energy) crisis. The risk and effects of crisis situations are increasing, forcing managers of companies to act more quickly and flexibly. It is also an important research area for science, because certainty such phenomena can be analyzed in many ways.

During the COVID-19 pandemic, many enterprises changed their activities, commercial companies entered the e-commerce market, and most manufacturing enterprises increased their stocks on the supply side. There is no information on what actions have been taken in the field of a public transport. The Polish and foreign subject on the effects of the COVID-19 pandemic is illustrated by many publications on aspects of transport, in particular a public transport. The authors of these publications analyzed, among others, the relationship between the impact of the pandemic and changes in a transport behavior and expectations, working conditions, a social activity, a transport policy or a transport system efficiency. The analysis of these phenomena was to provide guidance on how to manage the organization of public transport (e.g. Miejski Zakład Transportu Sp. z o.o. (MZK) Koszalin (MTC)) in order to maintain transport balance and provide a guarantee of epidemiological safety for customers and an economic safety in the era of the pandemic crisis. Actions aimed at a specific goal become important, which improves the socioeconomic image, despite unprofitable services provided in this period. Therefore, in the case of public transport, sources of financing activities and a development are important.

However, the study of the most important databases (Web of Science, Scopus) showed that there are few publications focusing on assessing the correlation of the impact of the pandemic on the economic and planning sphere of a transport entity. It can therefore be concluded that the issues raised in the article in general assessment are rarely studied, and the literature is limited. Therefore, with this publication, the authors want to fill the research gap.

The purpose of this publication is to analyze and evaluate the public transportation before and during the COVID-19 pandemic. The research problem is to what extent the operations of a public transportation company changed during the COVID-19 pandemic.

In addition, the main hypothesis was formulated: the actions taken by the urban transportation company caused positive changes in transportation operations during the COVID-19 pandemic.

Particular hypotheses were formulated:

- [H1] The COVID-19 pandemic positive caused an increase in costs at the MTC enterprise.
- [H2] The COVID-19 pandemic affected the development of the enterprise by raised investment.
- [H3] During the COVID-19 pandemic, the increased the safety of passengers and employees from negative effects such as illnesses and layoffs.

The considerations presented in the study, supported by the results, can be used as a way to gain an adequate knowledge about the functioning of market mechanisms in public transport in crisis situations, e.g. the COVID-19 pandemic; an energy crisis, a geopolitical situation. Increasing the amount of information supported by data in a given field (practice, experience of others) can speed up the process of making planning decisions (strategic, tactical and operational) aimed at increasing the guarantee of proper functioning and ensuring the development of the organization while reducing the level of customer satisfaction. This publication has the following structure: it begins with an analysis of the subject, followed by an original approach to research. Then, as part of the research presentation, a case study is presented. The authors have tried to present the relationship between the COVID-19 pandemic and its aspects and the direction of changes in individual factors determining the provision of services. In this part of the work, a comparative analysis was used. After presenting the research results, the authors show how the organization adapted to the pandemic situation, implemented restrictions and government support, and other restrictive changes necessary to apply during the pandemic. The publication ends with the authors' conclusions and limitations in the research process.

2. Literature review

The effects of the COVID-19 pandemic were visible throughout the global economy. All economic sectors, including transport, have passed an important test of their ability to adapt to sudden crisis situations. Epidemiological restrictions have affected the conduct of business activities, forcing actions to guarantee safety (Camargo, 2021; Anderson, 2020) or a sense of security in the functioning of the entity and the work of its employees, as well as potential customers (Khan, Upadhayaya, 2020; Olkiewicz, Wolniak, 2018).

Transport organizations faced new challenges, which had to adapt their functioning during the pandemic to the restrictions implemented by governments and WHO, as the literature and practice indicated the transmission and development of the virus by air (WHO, 2020; Pawar et al., 2020; Muley et al., 2020; Germann et al., 2006). This was particularly evident in the case of public transport, both in the area of planning and meeting customer needs after the

introduction of the social distancing, the obligation to wear masks or partial lockdown in some sectors (Anderson et al., 2020; Lewnard, Lo, 2020; Musselwhite et al., 2020; Moreno et al., 2021).

The sense of security has become a determinant of customer behavior, regardless of age, gender, profession or lifestyle when choosing a means of transport, as the probability of infection may be higher in it. However, it should be remembered that public transport is the best alternative to ensure effective and safe mobility of the society (Chen et al., 2022; Gutiérrez et al., 2020). It can be said that mobility has acquired a new dimension and meaning. Fear, fear of infection, and in the worst case, death caused by the SARS-CoV- infection, or other factors may reduce the willingness to use public transport in favor of bicycles, electric scooters, own means of transport or walking. (Edwards, 2020; Circella, 2020; Mohammadian et al., 2020; Askitas et al., 2020; Yap et al., 2010; Kraemer et al., 2020; Abdullah et al., 2020; Parady et al., 2020)

Such actions indicate a high level of individual and a collective awareness and a social responsibility (Wolniak et. al., 2021; Wyszomirski, Olkiewicz, 2020).

Although many serious measures have been implemented by the public transport authorities and operators since the outbreak of the pandemic (Naletina, 2021):

- Adapting the transport supply;
- Improving cleaning and disinfection procedures;
- Supplying protective equipment to their staff and passengers;
- Ensuring staff and passengers comply with health regulations;
- Increasing the level of natural ventilation and air renewal;
- Accelerating the digitalization and the deployment of IT tools to better monitor their operations;
- Anticipating the number of travelers and occupancy in vehicles to provide re-al-time information to avoid crowds;
- Arranging contactless payment facilities; and
- Providing their staff and customers with regular transparent communications, the demand was decreasing.

Research shows that in public transport during the COVID-19 pandemic, there was a decrease in the number of passengers over 80% in large cities in Iran, China or the USA, as much as 70% for some operators in the UK. Passenger reductions range from 60% and 67% in Philadelphia and Detroit, respectively, 80% for Singapore's mass transit, and 85% to 95% for Toronto, New York subway Budapest, Netherlands, Lyon and Nice, San Francisco and Washington (Gkiotsalitis, Cats, 2021; Carrington, 2020; Atchison et al., 2020; Bucsky, 2020; Teixeira, Lopes, 2020). Figure 1 shows the decrease in daily mobility (time from 5.00 to 23.00) visible in the study area of this study in the period from September 3 – October 15, 2020 (Google LLC, 2020), which had a direct impact on increasing security.

West Pomeranian Voivodeship

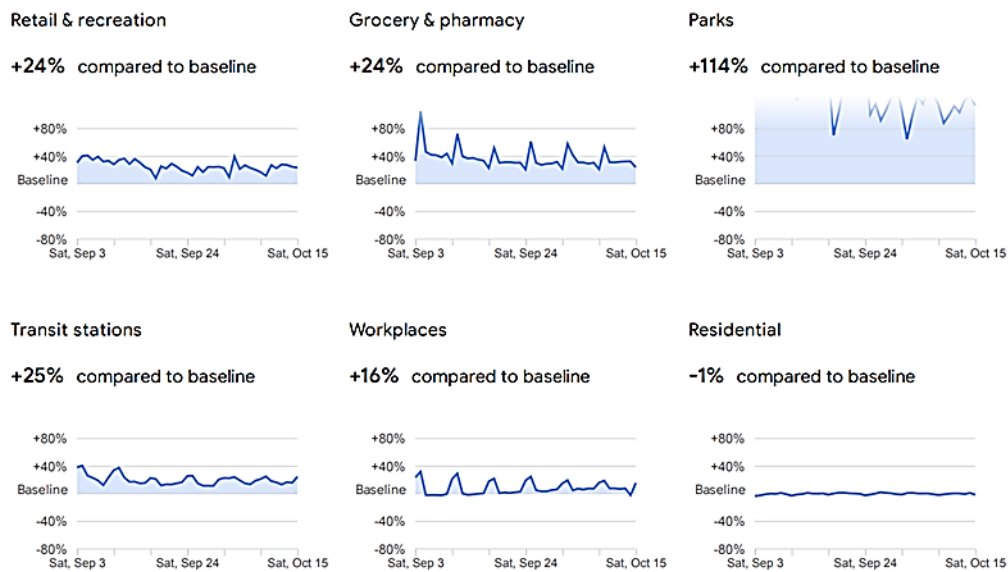


Figure 1. Daily mobility trend (September 3 – October 15, 2020).

Source: Google LLC, 2020.

The development of the pandemic and its long duration result in a change in the habits of using public transport. Such a phenomenon may adversely affect the financial condition of enterprises, resulting in low or no profitability and solvency. Especially that public transport is a type of a public service that is directly supervised by a local government unit, where the price of services correlates with financing (Cascajo et al., 2018; De Oña et al., 2021; Basagaña et al., 2018; Delgado et al., 2019; Romero, Monzon, 2018). This means that despite the unprofitability of the provision by the operator, they must provide the service, and the costs are covered from public funds (Holmgren, 2013). It should be noted, however, that entities providing public transport services strive to maximize profits as part of their strategic plans, including investment plans. Naletina (2021) points out that the main issue with organizing public transport in pandemic times is the reduction of the capacity. Practices that have been proven successful for overcoming this challenge are:

1. Increase transportation capacity.
2. Limit occupancy to enable physical distancing.
3. Shift travel demand away from peak hours.
4. Help passengers make choices that alleviate crowding.
5. Enact safety measures for public transport users.
6. Restore confidence through communication and public relations (Naletina, 2021).

All activities undertaken by the entities indicated an increased need for financing (Beck et al., 2021), as a decrease in demand may lead to the canceling of connections (lines) (UITP, 2020).

In the characteristics of the journey, all three aspects of implementation (i.e. economic, social and environmental) should be involved in the planning of the system in order to mitigate the effects on the transport system (Shokouhyar et al., 2021). Evidence has been obtained that some travellers have moved to private cars in addition to public transport, which will change their habits in the future (de Haas et al., 2021). Changes in traveler behavior over time further support the opportunity to promote sustainable modes of transport and social responsibility (Dyczkowska, 2015; Reshetnikova et al., 2021). However, other means of transport in cities should be analysed (Mouratidis, Papagiannakis, 2021). Even though scientific studies that have analysed changes in the transport system during different phases of operation (Sträuli et al., 2021; Mouratidis, 2021; Freudendal-Pedersen, Kesselring, 2021), it is very difficult to fully analyse the impact of COVID-19 on the further development of public transport. In this situation, decision-makers are thinking about adapting earlier transport planning strategies and their type in the context of exhaust emissions (De Borge, Proost, 2022; Jin et al., 2023). Due to the uncertainty of the situation, some studies have recommended a new procedure in public transport that takes into account COVID-19 (Zhang, 2020; Simic et al., 2022). In cooperation between services and interested parties (e.g. city authorities, public transport companies), I am asking you to translate knowledge into practice in the strategy of action and start transport tasks. Public transportation carries out tasks in coordination with local governments, and often the authorities of the cities concerned are on the board of city enterprises. Decisions made must be in accordance with the needs of residents and agreed with the authorities of the city in the question. As well as means of transport that require assistance in making multi-criteria decisions. Changes in behavioral behavior have already been recognized by urban researchers as an inherent influence on the urban transport experience (Wilson, 2011; Koefoed et al., 2017) and incorporated into planning and design strategies for public spaces. For example, a person whom someone meets and observes in different places and times but never interacts with (Zhou et al., 2020) is considered the basis of another in the neighbourhood or commute. Many people from smaller towns and cities commute to larger cities for work, school or to run errands in offices or to see a doctor.

The sustainability of the transport system should be supported through the prism of social, economic and economic development. It is important in the assessment to help transport planners select the most effective measures and to verify the priority that would be recommended to study for new, special, auxiliary, which can serve to support financial programs. For joint travel and urban transport, Combs and Pardo (Combs, Pardo, 2021; Kamargianni et al., 2022) analysed data on participation activities during COVID-19, proposing an in-depth case study to identify activities that could remain implemented even without COVID-19, they also argue for a commitment actions because of the adherents' goals of equality and security.

3. Materials and methods

A case study method was used to conduct this analysis. The research was conducted for a public transport company in northwestern Poland - Miejski Zakład Transportu Sp. z o.o. (MZK) Koszalin (MTC). The research used financial statements and internal documents of the company regarding changes from 2016 to 2020, with a special description of 2020, as the year of the COVID-19 pandemic. The collected reports and internal documents were analyzed in terms of the years studied and the implemented changes regarding passenger safety. Analyzing the activities of MTC, it can be determined that the company made decisions in accordance with the literature review. Despite the drop in demand, it operated all the time during the COVID-19 pandemic. Earlier studies in the literature have looked at purchasing behavior or declining emissions, public transportation companies in these cities were not included in the analyses. This section presents an analysis of financial data in the period before the pandemic (2014-2019) and during the COVID-19 pandemic (2020), the data collection process and the characteristics of the company participating in the study.

Koszalin is a city with county rights in north-western Poland, in Zachodniopomorskie Voivodeship (Western Pomerania). According to data from the Central Statistical Office (CSO) as of 30 June 2021, Koszalin had a population of 150,801 and was the second most populous city (after Szczecin) in the West Pomeranian Voivodeship and the 37th most populous city in Poland. The Koszalin's area is 98.3 km² with an average population density of 1067.7 persons/km². Koszalin's public transport in today's dimension was created when the city was being organized anew after the Second World War. It should be mentioned that trams ran in the city for 25 years from the beginning of the 20th century, and in 1935 the first bus line was opened. Further significant changes took place after the political transformation. WPKM was transformed at the beginning of the 1990s into Municipal Transport Company (MTC in Poland -MZK), which was initially a budgetary unit and since 1997 a municipal company, which allowed it to operate in a different financial reality. Danish DABs assembled at the Koszalin depot appeared on the streets of Koszalin and were later joined by the then state-of-the-art MANs, Neoplanes and Mercedes. The MTC headquarters were extensively renovated. The bus routes were reorganized and, although this improved logistics, unfortunately some suburban lines were closed. In the following years, MTC slowly and methodically transformed itself into a modern company, successively increasing its fleet and investing in new solutions. MTC has spent more than PLN 32 million on investment over the past three years (PLN 21 million comes from the Regional Operational Program). The most important of these are the purchase of 21 modern buses (including five Volvo hybrids) and the construction of a transfer center on North of Koszalin. From 2015 to 2019, as planned, the number of vehicle kilometers performed increased from 2,800 to almost 3,200, the number of buses in service increased from 48 to 57, the number of courses increased from 305,305 to 370,302, as did the number of passengers carried.

4. Results

In The analyzed period from before the COVID-19 pandemic is 2014-2019 compared to 2020 as a time of the urban transport exclusion and a high number of infections. Table 1 presents an analysis of the values of non-current assets and equity in the period 2014-2020 in PLN thousand on a selected public transport company within the city of Koszalin.

Table 1.

Analysis of the values of non-current assets and equity in the period 2014-2020 in thousand PLN

Period of analysis	Non-current assets	Equity capital
2014	35.686	30.814
2015	34.857	30.784
2016	34.359	31.024
2017	38.998	29.486
2018	43.001	28.786
2019	53.445	28.696
2020	52.274	27.369

Equity is the difference between the assets and liabilities of a company. The book value of the company is determined on the basis of equity. Bearing in mind that the value of assets may not reflect their market value, Equity should not be equated with the market value of the company. The ratio measures the share of equity in the total sources of financing operations, thus it allows to assess the degree of financial independence of the enterprise.

The analysis of fixed assets and equity over the period 2014-2019 presents a steady increase. Specifically, 2019 is the year of the best economic situation, which the company has not taken advantage of, as reflected in the analysis of long-term and short-term commitments. 2020 will see a slight decrease in fixed assets and equity.

Table 2 shows an analysis of the values of long-term liabilities and short-term commitments for the period 2014-2020.

Table 2.

Analysis the values of non-current of long-term commitments and short-term commitments in the period 2014-2020 in thousands of PLN

Period of analysis	Long-term commitments	Short-term commitments
2014	96,74	3.993,82
2015	47,56	4.509,88
2016	64,52	4.788,36
2017	101,72	5.534,87
2018	50,04	7.642,64
2019	2.975,02	9.392,51
2020	1.744,55	6.904,32

Long-term commitments have risen steadily in the period 2014-2018. In 2019, the company has invested in an interchange center and a ship to transport passengers between the city of Koszalin and the city of Mielno by the Sea due to the economic climate. Short-term commitments increased steadily up to 2017, purchases resulted in an increase in the following years. In 2020, long-term commitments fell by 41.36% and short-term commitments by 26.49% due to COVID-19. MTC in Koszalin has purchased seven second-hand 12-metre buses in a tender for leasing. The leasing period is set at 36 months with the possibility of buying the vehicles back. The offer amounted to PLN 5.035 million gross. The lease period was set at 36 months 2019-2022, with an option to buy back the vehicles. MTC managed to acquire seven 12-metre, low-floor Scania buses with Euro 6 standard in 2018, bought with support from EU funds under the West Pomeranian Voivodeship ROP. Koszalin received a support of over PLN 4 million. MTC paid PLN 1.14 million for one bus. Table 3 presents the value of stocks and expenditures for the company in the period before and during the COVID-19 pandemic.

Table 3.

Value analysis of the public transport company's expenditure and stocks in the period 2014-2020 in thousands of PLN

Period of analysis	Company expenditure	Company stocks
2014	1.721,36	1.263,27
2015	1.505,04	1.077,40
2016	2.210,46	1.204,21
2017	1.396,56	1.176,30
2018	1.330,49	1.087,02
2019	2.871,14	1.173,99
2020	4.582,86	1.108,30

The company's business inventories were unchanged in the period before and during the COVID-19 pandemic. For expenditure despite the pandemic, there was an increase of 37.35 per cent in 2020 compared to 2019 despite a reduction in public transport between March and May 2020 of 67 per cent. The company was incurring fixed costs, not eliminating expenses. The company was incurring costs for employees, insurance, and loan and lease repayments. The company committed to a short repayment period of 36 months, which, with a decrease in revenue, resulted in an increase in the company's expenses and commitments. Table 4 presents the surveyed company's operating costs for the period 2014-2020, including a material and energy consumption.

Table 3.

Value analysis of the public transport company's expenditure and stocks in the period 2014-2020 in thousands of PLN

Period of analysis	Operating costs	Consumption of materials and energy
2014	36.390,76	5.849,48
2015	38.317,35	5.313,47
2016	39.846,00	5.258,24
2017	42.356,80	5.639,31
2018	43.867,97	5.989,51
2019	47.615,75	6.331,85
2020	45.275,18	5.163,89

The activity of every company is inherently related to incurring costs. Consumption of materials and energy are the costs of consumption of basic materials, auxiliary materials, office materials, packaging, energy, fuels in connection with the basic operating activity of the economic entity. Valuation of consumption of materials purchased externally is made at purchase prices or purchase prices. And materials produced in-house, at the cost of their production. In this case, operating costs remained constant except for 2020. The analysis shows that operating costs rose steadily and 2020 saw a decline of 4.91 percent. For material and energy costs, there was a decrease of 18.45 percent. Figure 2 shows the size of materials and energy in operating costs over the 2014-2020 period.

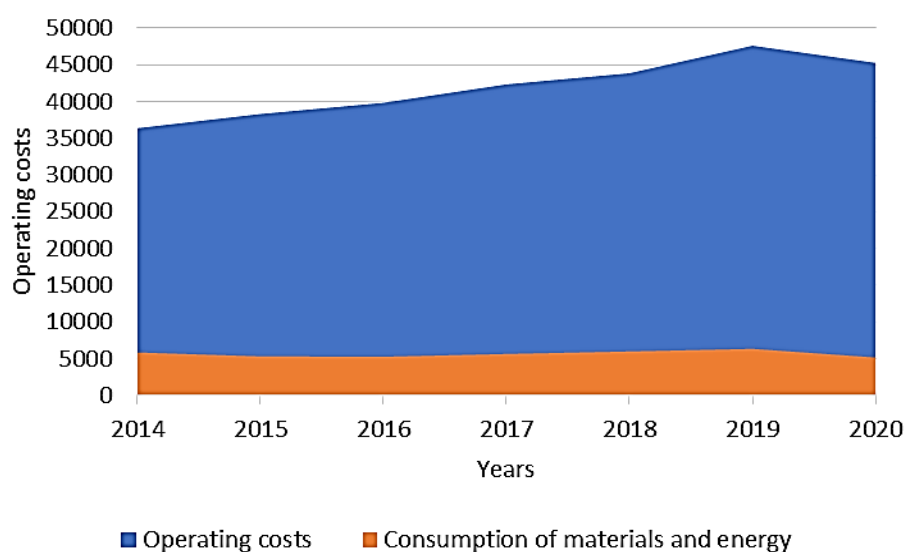


Figure 2. Analysis of materials and energy in operating expenses in the period 2014-2020.

An analysis of materials and energy in operating costs in the period 2014-2020 shows that costs are steadily increasing, and in the case of 2020, where the company practically in the period March 21-May 15 has reduced its operating activities, the value of materials and energy used fell, but not proportionally to the reduction in the number of bus routes, which fell by more than half. If one additionally compares material and energy consumption as a percentage of fuel prices, the analysis shows no correlation of this raw material in MTC despite the fact that it is the most important cost carrier. The year 2014 was taken as the basis -100 percent (Figure 3).

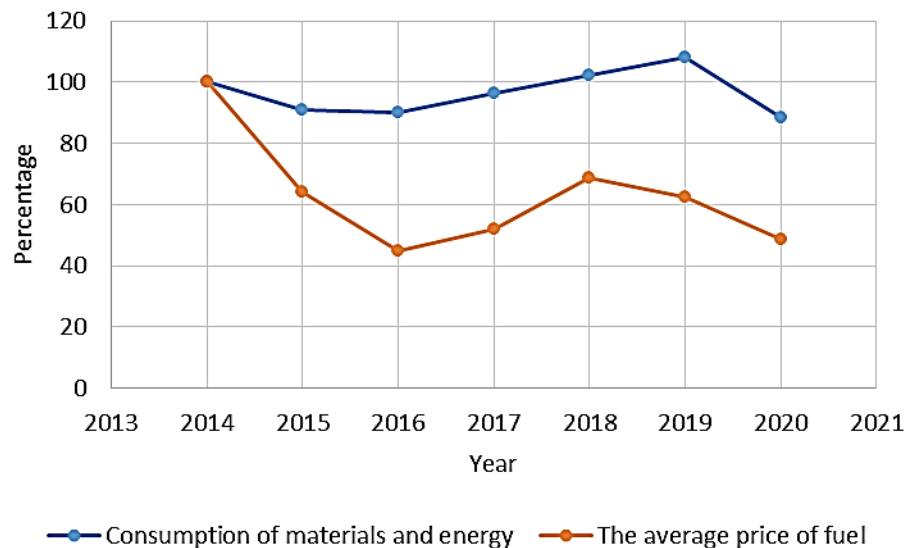


Figure 3. Percentage analysis of average fuel prices in relation to material and energy consumption for the period 2014-2020.

The analysis took 2014 as 100 percent of the average price of fuel and consumption of materials and energy, then for fuel it was the year with the highest price of diesel. The decrease in fuel as the primary cost of transportation did not translate into volumes in the company in the 2015-2019 period, only for 2020 there was a decrease in material consumption of 19.97 percent, and for fuel prices of 13.89 percent compared to the previous period.

A similar trend over time to costs in a company's operations can be seen in net income (Figure 4).

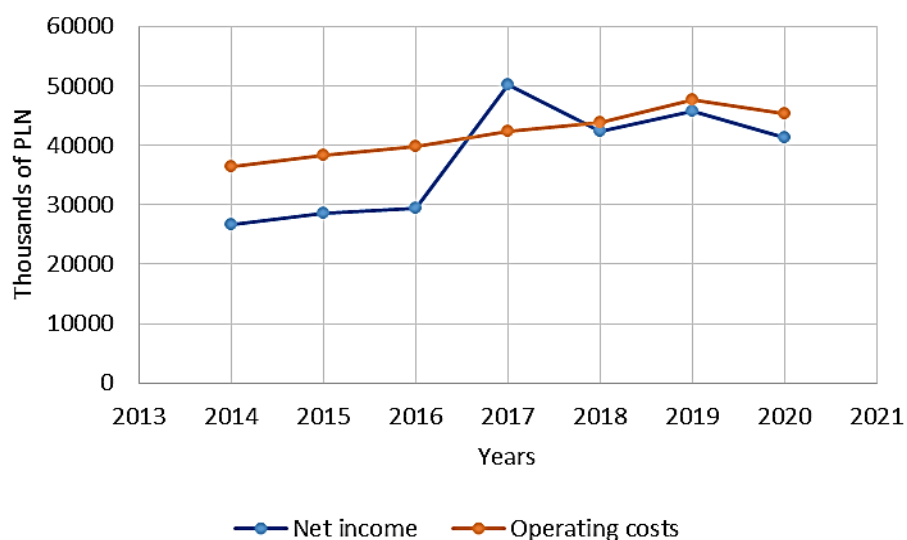


Figure 4. Net income and operating cost for the period 2014-2020 in thousands of PLN.

With the exception of 2017, operating expenses exceeded net income; in 2020, they were 9.36 percent higher. The company, due to COVID-19, had to invest in modern ticket machines. MTC has changed its way of operating, according to the analysis of the literature, despite the loss and reduced demand, MTC maintained its previous lines, invested in ecological means of transport, and decided to install ticket machines.

The best economic and social effects are provided by fees for promoting regular users of public transport - buying network seasonal tickets - the price of which should be the equivalent of 25-30 single tickets, which we will not buy in tickets, but via an application on the Internet. In Koszalin, the price of a 30-day city network ticket was calculated as 30 times the price of a single ticket. In the tariff suburban tariff, the price of a 30-day ticket is equivalent to the price of 25 single tickets. During the COVID-19 pandemic, there was a real threat that passengers would not buy seasonal tickets, and there was a problem with the purchase of single tickets.

During the 2014-2020 period, the company recorded losses. The largest in 2017 in the amount of PLN 1,864, 41 thousand, but the COVID-19 year of 2020 brought a loss of as much as PLN 1,326.6 thousand (Figure 5).

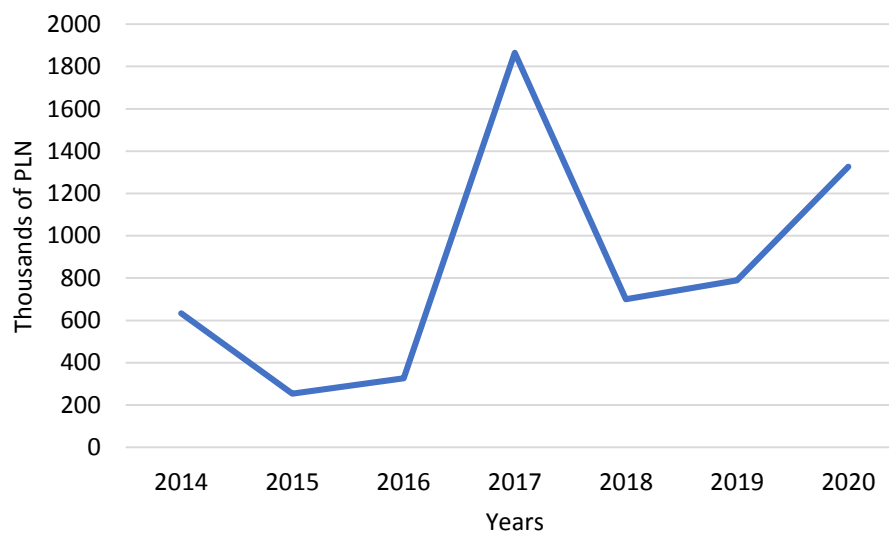


Figure 5. Losses of the company for the period 2014-2020 in thousands of PLN.

The company paid employees during COVID-19, but due to government restrictions did not fully utilize the rolling stock. The recommendations stated that every second seat on a bus must be free.

5. Discussion

The company, according to the authors, with low oil prices, should increase inventories (Fig. 3). The company made decisions regarding the launch of four new lines to three neighboring municipalities, which raised already high losses in the first analyzed period of 2020 (Fig. 5). MTC decided to introduce a line modification in Koszalin and three suburban lines to neighboring municipalities (Manowo, Sianow, Swieszyno). The analysis of the volume of demand for transportation services on non-urban sections of suburban lines Koszalin public transport begins with the determination of its level in the section of a weekday school, Saturday and Sunday. Swieszyno municipality has 7848 in-habitants, covers an area of 132.6 km²,

with an average population density of 53 persons/km². Manowo municipality has 6885 inhabitants, covers an area of 188.3 km², with an average population density of 37 persons/km². Sianow municipality has 13785 residents, occupies an area of 226.8 km², with an average population density of 61 persons/km². These municipalities are the place of residence for the workplaces of Koszalin, and to sum it up to 15 percent in relation to the number of residents of Koszalin are a commuting group.

Demand estimation and any further analysis is for the above-mentioned non-urban sections of the individual lines studied (Figure 6):

- for line 3 - the neighbouring municipality of Swieszyno (Nieklonice) – in figure 6 marked in dark green,
- for line 8 - neighbouring Manowo municipality – in the figure 6 marked in gray,
- for line 19 - neighbouring Swieszyno municipality (Kretomino, taken over to Koszalin city in 2022) – in figure 6 marked in light brown,
- for line 33 - neighbouring Sianow municipality – in figure 6 marked in light orange, but not visible to the village of Sianow itself.

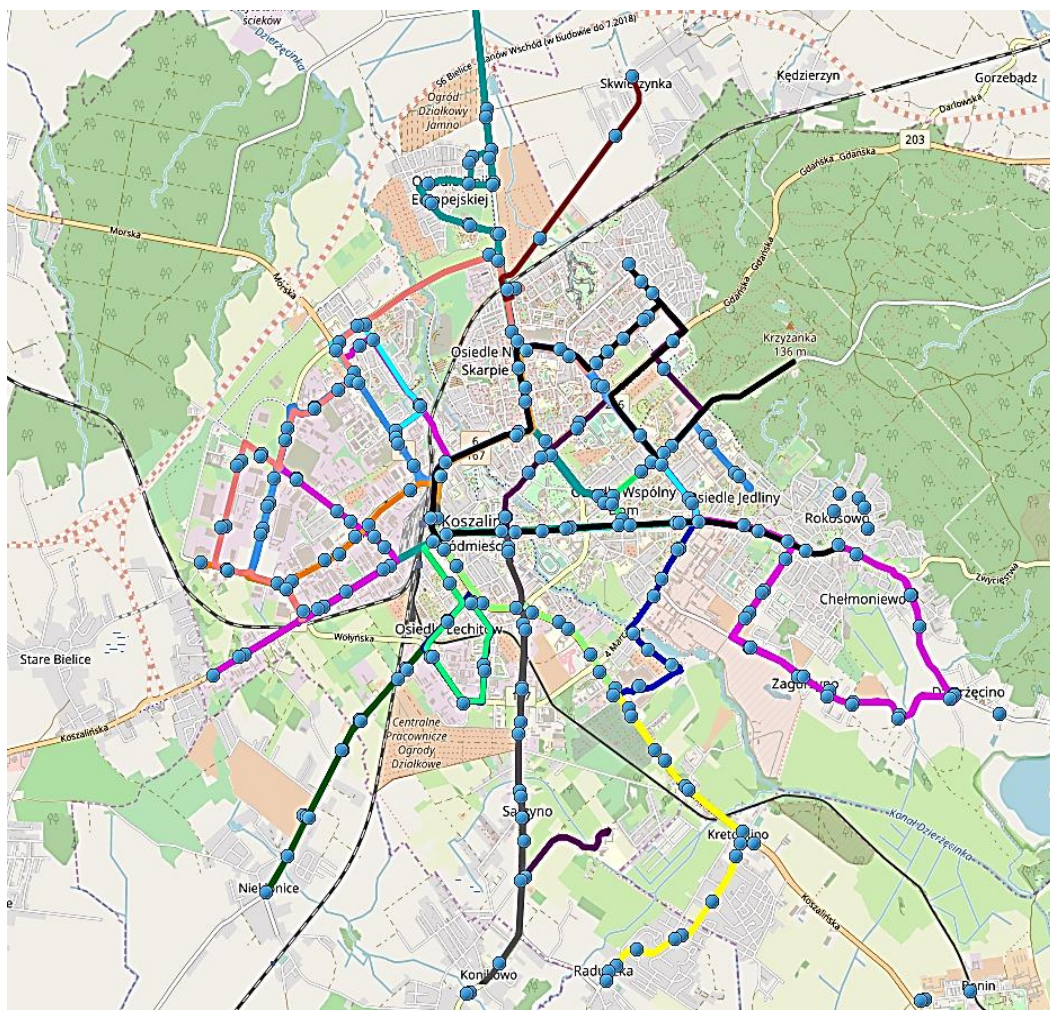


Figure 6. Bus lines in Koszalin.

Source: www.mzk.koszalin.pl, 2023.

Despite the losses and the decrease in demand, the company fulfilled the mission of transporting passengers, the development strategy by launching new lines. MTC Koszalin maintains:

- thirteen municipal lines (2, 4, 6, 8, 10, 11, 12, 14, 15, 16, 17, 18, and 20) - with routes entirely within the administrative boundaries of the city of Koszalin,
- four suburban lines (3, 8, 19 and 33) - with routes connecting the city of Koszalin with six towns in the neighboring communes: Manowo, Sianow and Swieszyno.

The volume of demand on the non-urban sections indicated above, as well as the number of passengers per vehicle kilometer, presented for individual suburban lines in relation to for a weekday, Saturday and Sunday.

The COVID-19 period forced MTC to change its area of operation. The total of passengers on the individual suburban sections of Line 19 does not correspond to the total of passengers on the line, as passengers traveling on the Konikowo-Swieszyno section overwhelmingly - except for a few people - travelled from Koszalin and were also included in the previous section of the Seminary-Konikowo section. An analogous situation occurred in the opposite direction. For this reason, the number of passengers per kilometer is uncountable for the constituent sections on line 19 - the value of this indicator would not reflect reality. At the scale of individual lines, on a weekday in the segment of suburban connections, in the studied non-urban area, the highest traffic was recorded on line 3, whose services outside Koszalin were used by 470 people. Slightly lower demand was recorded on line 19, on which out-of-town or out-of-town services carried 444 passengers. The smallest number of weekday passengers in the suburban line segment was recorded on lines 33 and 8, which carried 73 and 75 passengers, respectively, on the surveyed out-of-town sections. On a weekday scale, the total demand for MTC's suburban line services in Koszalin in the neighboring municipalities was at the level of 1,062 passengers. The two best-used suburban lines (3 and 19) on non-urban sections on a weekdays were used by 914 passengers, or as many as 86% of the total number of passengers traveling outside Koszalin or on Koszalin public transportation. In the segment of surveyed suburban connections, the best used on a weekday were the following Line 3 buses, carrying an average of 6.9 passengers per kilometer outside the city, which is 68.3% more than the average value for all lines. At a lower level - 4.3 passengers per kilometer outside the city - were used by vehicles serving line 8. Next in order were lines 19 and 33 - with results in the range of 3.3 and 1.9 passengers per kilometer performed outside Koszalin, respectively. As already mentioned, commuter courses were taken into account when calculating the number of passengers per vehicle kilometer.

On the scale of the entire studied network of non-urban sections of MTC commuter lines in Koszalin, the average daily number of passengers per kilometer on a weekday was 4.1. This is an attractive result, although it should be emphasized that this indicator refers only to the studied sections of the routes of individual lines, and not to their entire length.

Based on information from 2017, it can be noted that the majority of new standard transportation vehicles purchased in MTC meet the emission limits that exist in European countries (EURO5/6). However, hybrid buses meet such standards. The company will consider the purchase of more natural gas-powered buses, rather than enter electric buses as in most Polish cities. Such actions were indicated in a literature review (De Borge, Proost, 2022; Jin et al., 2023).

Given the challenges faced by public transportation companies in many cities during the 2020/2021 lockdowns, as well as the shortcomings of emergency scenario planning, it is recommended that emergency planning scenarios be incorporated into the company's business plan. The nature of the COVID-19 pandemic emergency is urgent, and acting urgently involves risks due to lack of time for proper planning. Emergencies will occur, as will threats of various kinds. Ad hoc planning ignores planning implications relevant to the long term.

And this is where emergency planning as part of strategic planning is important, and the option of hazard planning especially in public transportation should be taken up.

6. Conclusions

The outbreak of the COVID-19 pandemic significantly changed the activities of the public transportation companies analysed. The case study analysis on the example of MTC Koszalin presents the activities carried out during the COVID-19 pandemic and to what extent the pandemic changed the financial situation of MTC. Although the lasting impact of the COVID-19 pandemic on urban mobility and resilient cities is still unknown, lessons can be learned for future planning policies. MTC Koszalin correctly reacted to the problems arising from the COVID-19 pandemic, in line with the previously presented literature.

Firstly, based on the results of the MTC Koszalin company, in which the analysis of financial statements is defined as fundamental to its activity. Decisions of the company's authorities should not be based on the expectations and behavior of passengers, but on financial considerations. In recent decades, urban transport planning has focused on generating a modal shift from private motorized vehicles to active forms of mobility as well as public transport, measuring the quality of the latter by efficiency, speed and networking rather than range and performance. The financial analyses of the MTC Koszalin company present the impact of the COVID-19 pandemic on the financial situation of the company and the actions it takes before and during the pandemic.

Secondly, however, not using an additional funding and introducing changes to the lines that help passengers who rely on it to move around Koszalin. In this way, changes in the use of MTC by some benefits may be perceived as an expression of concern and solidarity with neighbouring municipalities. Thus, the approach to disclosing the conflicting effects of

an alternative to MTC when developed as an adaptation to amplify an external effect that the company had no control over. On the one hand, many passengers used MTC transport throughout the pandemic, on the other hand, forcing an alternative that provided additional space between passengers and safety for those in need of public transport.

Third, our study targeted whether changes in public transportation operations during the COVID-19 period had specific financial effects, as well as in the perspective of analyses of new lines launched and experiences. The analysis presents that the number of passengers of the three lines has been steadily increasing, and the city of Koszalin in 2021 has applied to incorporate part of the area into it, as residents of neighboring municipalities work in Koszalin. In this way, we combine a horizontal approach with an examination of various MTC practices during the COVID-19 audit. We take into account the importance of behavioral, basic and structural elements of experience in policy-making for the future of urban transportation, but with an eye on potential risks. As part of its social responsibility, MTC has not decided to lay off employees and has maintained the same level of wages. However, our research shows that the benefits of the changes introduced during COVID-19 affect the functioning and perception of MTC after the pandemic.

The main hypothesis was positively verified, as the actions taken by the urban transportation company caused positive changes in transportation operations during the COVID-19 pandemic. Hypotheses H1-H3 were also positively verified, among others, by demonstrating actions, i.e.: new suburban lines were launched, ticket vending machines were installed to ensure the safety of passengers, and the number of seats was limited (every second seat was free). In addition, the increase in investments affected passenger safety, but the company had higher short-term and long-term liabilities in the period 2019-2020. Investments during the COVID-19 pandemic function well after the lifting of restrictions. Also, retaining employees during the COVID-19 pandemic increased trust in the employer.

As a result, the solutions that the systems are supported and financed have important policy implications for the MTC enterprise. In response to emerging public transport challenges, they must be used to use devices with attached features and activities to support social distancing and test forms of service delivery or funding, such as call-on-demand transport in Koszalin.

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