

THE IMPACT OF THE COVID-19 PANDEMIC ON THE RAIL TRANSPORT NETWORK IN POLAND

WPŁYW PANDEMII COVID-19 NA TRANSPORT KOLEJOWY W POLSCE

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Abstract: In this article the situation of Polish rail transport during the first and second waves of the COVID-19 pandemic is presented. Noticeable trends of rail transport usage are outlined. Basic parameters such as the number of passengers, the amount of goods transported indicators depicting the state of rail transport in 2020 and 2021 are shown. To learn about the issues, a review of the literature was used, i.e. compact items, scientific articles, and an analysis of statistical data from the Reports of the Railway Transport Office.

Keywords: rail transport, passenger rail transport, freight rail transport, COVID-19

Streszczenie: W artykule przedstawiono sytuację polskiego transportu kolejowego podczas pierwszej i drugiej fali pandemii COVID-19. Nakreślono zauważalne trendy wykorzystania transportu kolejowego. Przedstawiono podstawowe parametry, jak: liczba pasażerów, ilość przewiezionych towarów, wskaźniki obrazujące stan przewozów kolejowych w 2020 i 2021 roku. Do poznania zagadnień wykorzystano przegląd literatury, tj. pozycje zwarte, artykuły naukowe oraz analizę danych statystycznych z Raportów Urzędu Transportu Kolejowego.

Słowa kluczowe: transport kolejowy, pasażerski transport kolejowy, towarowy transport kolejowy, COVID-19

Introduction and theoretical background

Since time immemorial, transport has been regarded as one of the most important and complex pillars of the national economy from a technological, organisational and economic standpoint.

The source literature defines the concept of transport in a variety of ways. I. Tarski emphasizes the classical role fulfilled by transport and characterises it as a technological process of any form of transfer over a distance, that is the relocation of people, objects or energy (Tarski, 1993, p. 11). Transport is associated with the use of specific means of transport and specialised infrastructure, as well as the existence of distinct economic entities, which provide transport services and achieve financial results as an effect of conducting transportation operations (Kozłak, 2008, p. 11). According to J. Neider, transport means providing services that consist of the

transfer of cargo or other services directly related to the process. Transport is a broad concept comprising a variety of activities, thanks to which the shipment is allowed to reach its destination from the place of dispatch. It is also a combination of actions which rely on transferring, among others, material goods in time and space by using proper technological means (Neider, 2008). Transport is similarly defined by S.E. Dworecki and J. Berny, according to whom transport should be understood as an independent set of actions linked with the physical relocation of people and goods in time and space by using proper technological means (Dworecki et al., 2005, p. 223) as well as M. Madeyski, E. Lissowska and J. Marzec, who describe transport as a “technologically, organisationally and economically deliberate relocation of any cargo and people, separated from other activities (Madeyski et al., 1971, p. 10).

In the national economy, transport performs specific functions, which are presented as follows (Grzywacz et al., 1989):

- transport is a tool used for the exchange of goods and services, but it also regulates the transfer of products which are the objects of trade;
- transport is a factor contributing to the GDP growth, and it influences the development of other sectors of the national economy;
- transport establishes the conditions for the development of sites dedicated to the production of goods
- existing and prospective transport networks and their level determine investment placement,
- transport is a city- and region-forming factor;
- transport accomplishes social purposes, such as satisfying the transportation needs of the populace or expanding the accessibility of various spheres of life, e.g. culture, education or sport.

Undoubtedly a crucial role in transport is played by logistics. From the scientific standpoint, the literature defines logistics as a field of knowledge derived from the subject of international transport (Harrison et al., 2010, p. 147). As defined by the Council of Logistics Management, logistics is the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information from point of origin to point of consumption for the purpose of conforming to customer requirements (Coyle et al., 2002, p. 51-52). In terms of functionality, logistics involves the planning and shaping of all the processes within and between the social systems, which serve the purpose of crossing space and time as well as the direction, regulation and control of those processes (Woźniak, 1992)

Transport is one of the essential elements which influence economic competition, being the dominant link of logistics operations. In order to ensure the efficient functioning of a logistics system, an appropriate infrastructure is crucial.

The concept of transport infrastructure is defined in a variety of ways, much like the concept of transport itself. One definition has been suggested by A. Piskozub, according to whom infrastructure refers to: man-made, permanently situated, linear and on-site public use facilities, which constitute the foundation of the socioeconomic life due to their function of relocating people, cargo (transport), information (communications), electrical energy (energetics)

and water (water resource management (Piskozub, 1982, p. 41). When applying this interpretation, transport infrastructure could be considered a group of facilities connected with space, which allow the transfer of people and goods; as well as performing actions necessary for the efficient implementation of the transport process (Urbanyi-Popiołek, 2013).

Due to the task execution of environment types, modes of transport are categorised as follows:

- land transport,
- water transport,
- air transport.

All of the branches of transport and other economic links constitute the national transport system. It includes both the freight transport system and passenger transportation services. Taking into account the specific roles of different means of transport as well as the transport route, six basic branches of transport can be distinguished (Dworecki, et al. 2005):

- road transport,
- aircraft transport,
- maritime transport,
- rail transport,
- inland transport,
- pipeline transport.

Rail transport, which this article concerns, is one of the branches of land transport. Its function involves the transportation of people and cargo by means of rail transport. Rail transport is characterised by the following properties (Beier et al., 1997):

- mass transport capability,
- relatively low transport fees over medium and long distances,
- comparatively wide connection network, well adapted to the locations of the main supply and trade markets,
- high space availability resulting from the significant density of transport routes and points,
- favourable offer in terms of the transport time as well as dependability, regularity and frequency of the connections,
- specialised rolling stock suitable for the transport of diverse cargo,
- possibility of easy transfer of the passengers and cargo from the railway to other modes of transport (e.g. the road transport),
- relatively lower security (of shock-sensitive cargo and also due to potential theft).

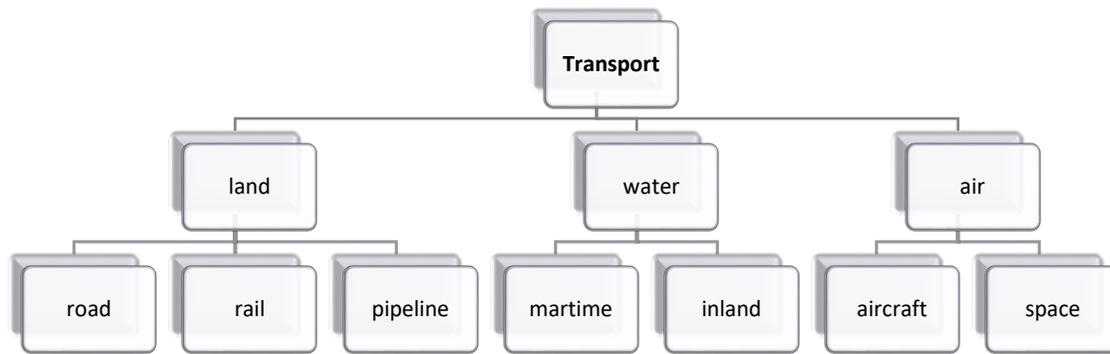


Figure 1: Modes and branches of transport

Source: Own elaboration based on: A. Piskozub, *Gospodarowanie w transporcie. Podstawy teoretyczne*. Warszawa 1982.

The rail transport market can be identified in terms of trade and economic relations, which occur in the process of exchanging both passenger and shipping services. On the one hand, there are entities on the rail transport market which offer transportation services, on the other hand – there is a demand for this type of service from passengers, cargo owners and intermediaries. Such transport takes place on a transport road specifically dedicated to this purpose, that is a railway line which, according to the Railway Transport Act, is defined as: “a railway track with a beginning and an end along with the adjacent strip of land, which consists of the railway line section as well as buildings, structures, machines and devices intended for rail traffic management together with the land they occupy” (Railway Transport Act, Dz.U. 2003 r. nr 86, poz. 789). Besides the railway lines, an important part is played by rail infrastructure, that is: “railway lines, buildings, structures, machines and devices along with the land they occupy, placed on the railway area, intended for rail traffic management, people and goods transport service as well as maintaining the necessary funds of the infrastructure manager” (Railway Transport Act, Dz.U. 2003 r. nr 86, poz. 789).

Rail infrastructure is divided into linear infrastructure and on-site infrastructure. Linear infrastructure of the railway transport system consists of railway lines along with railway sections, which allows for the transporting of cargo or people from the place of dispatch to the intended destination. On-site infrastructure includes, among others (Urbanyi-Popiołek, 2013):

- freight stations and passenger stations,
- intermodal shipping terminals,
- squares and ramps,
- warehouses,
- hump yards.

The nature of the rail transport is based on several principal aspects (Urbanyi-Popiołek, 2013):

- the ability to transport a considerable number of passengers,
- the ability to transport a substantial cargo weight,
- the ability to transport both passengers and cargo over long distances,
- limited negative influence on the natural environment.

In the case of freight transport, standardised railway cars can be used to transport the majority of available cargo. The freight transport universality also involves a competitive shipping tariff, especially in the case of full-train freight transport. One of the most essential aspects of passenger transport is the availability of on-site infrastructure, commonly located in city centres and smaller towns.

Research methodology

The research objective of the article was to identify, analyse and evaluate the impact of the COVID-19 pandemic on the situation of passenger and freight rail transport. To learn about the issues, a review of the literature was used, i.e. compact items, scientific articles, and the analysis of statistical data from the Reports of the Railway Transport Office.

Passenger rail transport in the time of the pandemic

The events of 2020 undoubtedly impacted railway transport. The rapid spread of the pandemic shook the world economy, including the railway sector. Although the primary measures taken in the effort of preventing the spread of SARS-CoV-2 impacted the passenger sector of railway

transport, the freight sector suffered as well. After years of seeing a gradual increase, the passenger transport sector observed the highest decrease of travellers in recorded history. Compared with the year 2019, the number of passengers in 2020 was

lower by 126.7 million, which represents a decrease of nearly 38%. The year 2020 was characterised by a high variety of results and transport offers in individual months.

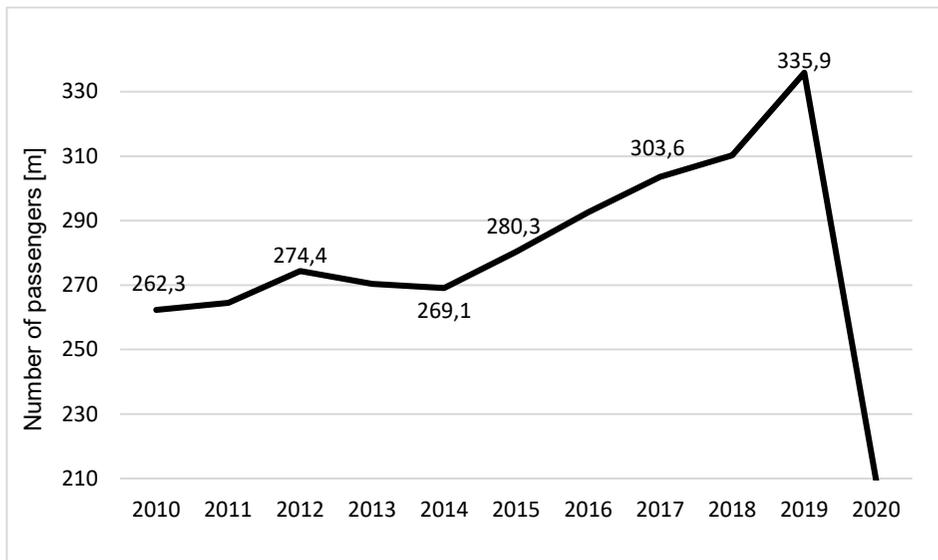


Figure 2: Number of passengers using the passenger rail transport in the years 2010–2020

Source: Own elaboration based on data acquired by UTK (Railway Transport Office).

The first two months of 2020 indicated a continued increase in the number of railway passengers. That number was at the time influenced by the holiday season, the winter break, but also the lower number of days in February. In January and February (UTK report, 2021) the rise in the number of passengers as compared with the year 2019 amounted to, respectively, over 2 million (7.6%) and 2.3 million (9.3%) (Fig. 2). However, this upward trend was stunted as a result of the first wave of the pandemic. At the beginning of March, 2020, the Main Sanitation Inspector (*GIS, 2020*) recommended cancelling all mass gatherings and events with 1000 or more people organised in closed spaces. Some of the university rectors cancelled all lectures and classes for students and postgraduates (monitor.uw.edu.pl, 2020-03-10, bip.uj.edu.pl, 2020-03-10). These restrictions and the simultaneous introduction of restrictions concerning travel between the member states of the European Union had a major impact on the rail transport sector: most of the international passenger trains were cancelled while the national passenger transport declined as compared with 2019. In mid-March the effects of actions taken in

order to prevent the spread of were already noticeable and the decrease in rail transport in March, when compared with the same period in 2019, reached 36.9%.

In the first quarter of 2020 it became a commonplace occurrence for passengers to resign from the services of collective transport, which resulted in a decrease in rail transport. Despite the state of epidemic – which was officially announced on March 20, 2020 – all of the rail carriers dealing with passenger transport maintained national rail transport. Due to the considerable restrictions placed on long-distance coach services, a portion of people started turning to rail transport instead. In spite of that, the number of people using the services of rail transport per day was at a record low. According to the Railway Transport Office (UTK), during that period some regions noted that the number of passengers had decreased by 95% when compared with the previous year. During the peak transport time the number reached about 16%, while during the off-peak time the figure was only 9%. At weekends the level was about 7–8%. All this resulted in the carriers limiting the number of active trains (<https://utk.gov.pl/pl/aktualnosci>).

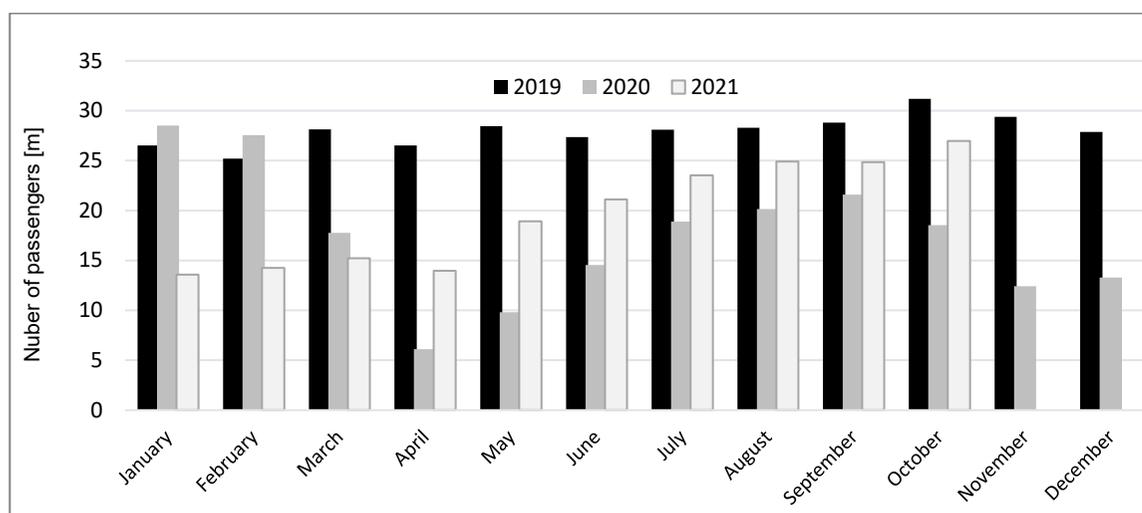


Figure 3: Number of passengers using the passenger rail transport in years 2019–2021

Source: Own elaboration based on data acquired by UTK (Railway Transport Office)

In the second quarter of 2020 the majority of countries e.g. Croatia, Italy, France, Portugal, Spain (Independent Regulators' Group – Rail, 2021, p. 6.), introduced strict domestic transport restrictions, which caused a significant reduction in mobility. This state of affairs continued until the summer months when the restrictions were loosened in Poland and other countries. Over the summer months a gradual return of passengers who were using rail transport became noticeable. During that period, summer season services were available and international transport was restored. As in previous years, travellers trusted the rail while planning their summer vacation trips. The commute between homes and places of work was systematically increasing and carriers reopened a portion of temporarily shut down services in order to provide attractive offers.

Whereas in the last quarter of 2020 many countries once again implemented restrictions in connection with higher COVID numbers, which became known as the second wave. This factor led once again to a decline in the amount of people using the railways and a lower interest in the passenger rail transport services, causing the passenger transport market to be negatively affected by the restrictions.

According to the data collected by the UTK (Railway Transport Office), after three quarters of 2020 the number of passengers in the sector was 33% lower than in the same period before the pandemic, during which time the total of 164.9 million passengers were transported (<https://dane.utk.gov.pl/sts/przewozy-pasazerskie/dane-eksploatacyjne/18164>). It can be concluded therefore that, despite the implementation of multiple travel

restrictions, rail transport is fairly resistant to disruptions caused by the COVID-19 pandemic.

The year 2021 began quite positively with a steady increase in the number of passengers from month to month. This undoubtedly attests to the arduous but systematic restoration of trust among the rail transport passengers. Credit must also be due to the safety measures taken by the carriers and the introduction of a vaccine against the SARS-CoV-2 virus.

The introduction of vaccinations against COVID-19 accelerated the decision of passengers to return to using rail transport and mitigated the impact of subsequent waves of the pandemic.

The most recent data collected in October 2021 shows that the number of people travelling by rail amounted to almost 27 million – 2.11 million more (+8.5%) than in September of the same year. That is the highest monthly score since February 2020 when 27.54 million passengers were transported.

According to I. Góra, the president of the Railway Transport Office (UTK):

The demand for passenger transport is gradually increasing. October is, so far, the best month of this year and the best month since March 2020. These numbers indicate that the average of over 870 thousand people travelled by rail every day. October is the beginning of the academic year. The increase of interest in the railways can be connected to, among others, the return of students to stationary classes after a year of remote education (<https://dane.utk.gov.pl/sts/przewozy-pasazerskie/dane-eksploatacyjne/18164>).

The number of rail passengers in October 2021 constitutes 86% of the number of passengers in October 2019 – the period before the COVID-19 outbreak.

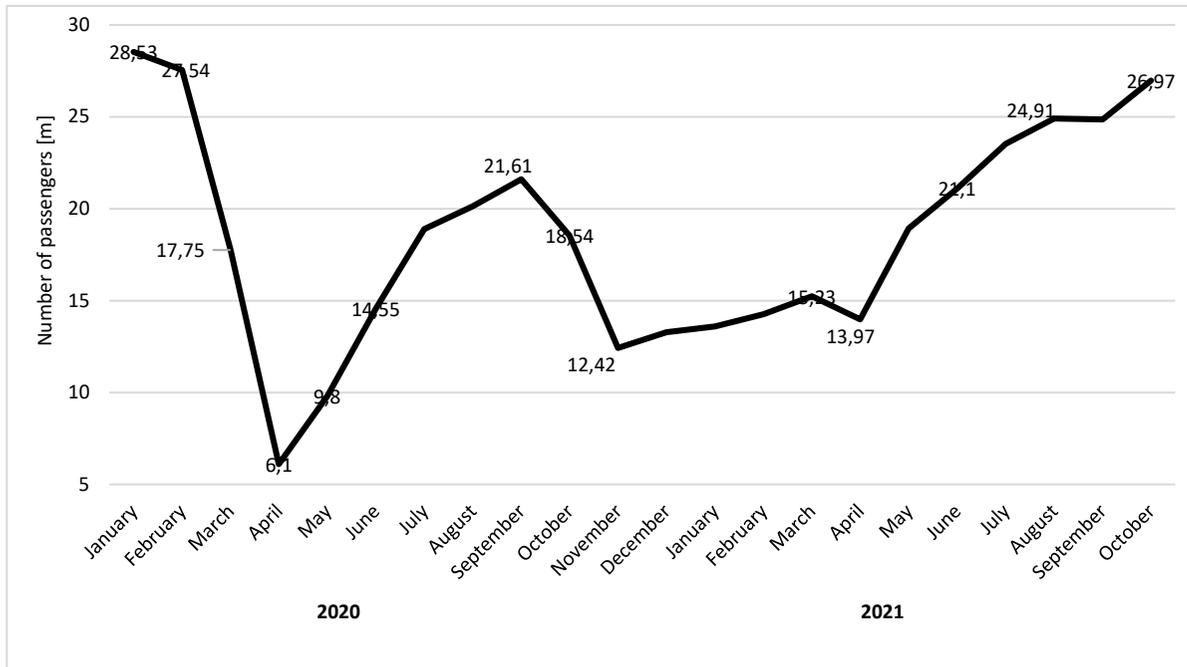


Figure 4: The dynamics of the change in the number of passengers using rail passenger transport in the years 2020-2021

Source: Own elaboration based on data acquired by UTK (Railway Transport Office).

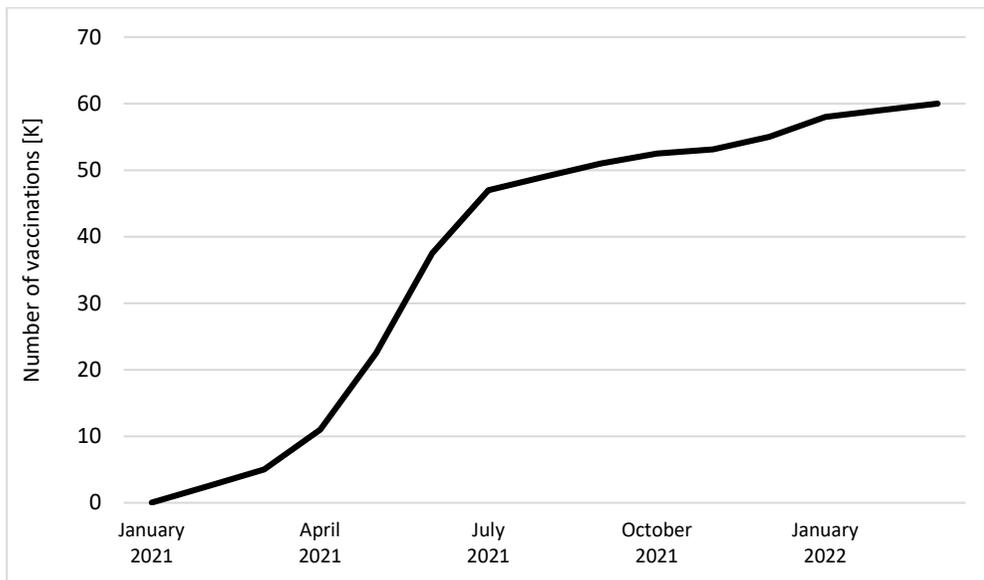


Figure 5: Number of vaccinations [K]

Source: Own elaboration based on data acquired by MZ (Ministry of Health).

Freight rail transport in the time of the pandemic

In addition to passenger transport, freight transport warrants attention. In the case of freight transport the influence of the pandemic was less palpable than in passenger transport. The 2020 scores, although lower than in 2019 or 2018, confirm that rail freight transport in Poland has great potential. Despite the epidemic, international

freight transport was maintained throughout the entirety of 2020, which allowed for the achievement of similar results to those from the years 2015-2016.

The highest drop in 2020, as compared with 2019, was noted in April (16.7%) and May (14.4%). October and November, on the other hand, were more productive with the total mass of transported cargo exceeding 20 million tonnes,

meaning that in the last months of 2020 a higher amount of cargo was transported than in the same period before the pandemic.

In spite of the restrictions seen in 2020, railway entrepreneurs managed to find new opportunities; and mainly because the biggest carriers in Poland are usually also a part of larger companies operating in many other countries.

In 2020, freight carriers completed the transportation of roughly 52.2 billion tonne-kilometres – 6.6% less than in 2019 (<https://dane.utk.gov.pl/sts/przewozy-towarowe/dane-eksploatacyjne/18165>). The highest drop in freight transport during that year took place in April, when freight transport was about 1.1 billion tonne-kilometres (22%) lower than in 2019. In September, November and December the freight transport scores were respectively 0.1 (2.4%), 0.2 (4.1%) and 0.5 billion tonne-kilometres (12.7%) higher as compared with the same months in 2019.

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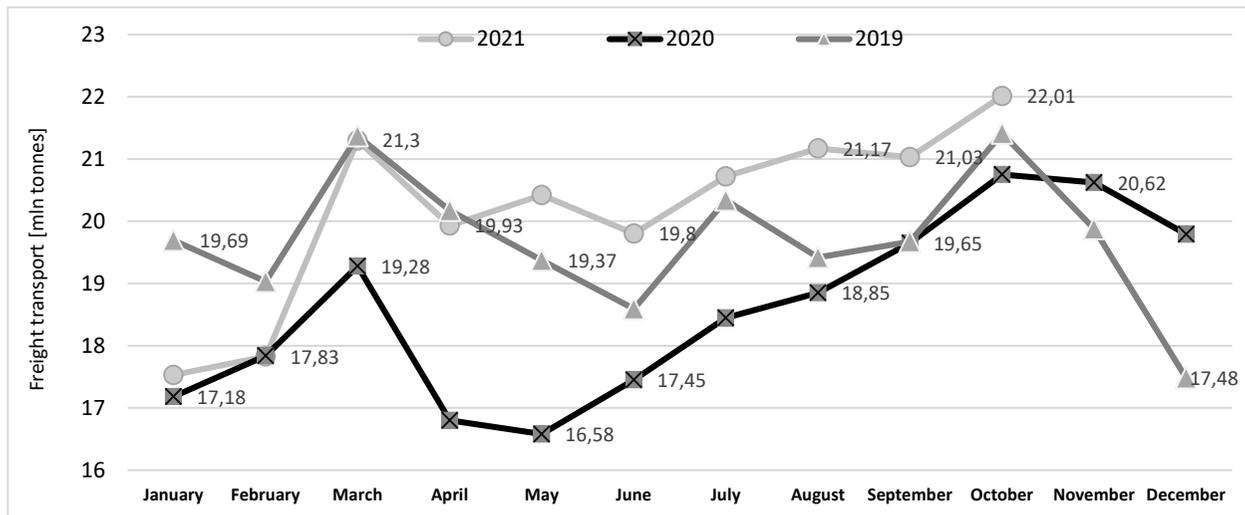


Figure 6: Freight transport

Source: Own elaboration based on data acquired by UTK (Railway Transport Office).

The situation which emerged due to the pandemic forced the freight carriers to take many actions in order to maintain their activities. Among those actions was the development of new connections within transport corridors or the New Silk Road. Moreover, after the production demand was renewed; and thanks to new rail infrastructure investments, an increase in related cargo transport was noted.

The results of all those undertakings and an increased general interest in rail transport were especially apparent in the intermodal transport data collected after 2020. Basic data shows that the growth trend continued in that transport sector (carriers mainly associated with intermodal transport obtained good scores).

It is worth noting that the pandemic had no significant impact on freight transport, which is confirmed by data collected in October 2021. The total mass of transported cargo exceeded 22 million tonnes and proved to be the best score in three years (Fig. 5). This means that the mass of cargo transported in October increased by 1,3 million tonnes (6.1%) each subsequent year.

As I. Góra, the president of the Railway Transport Office (UTK) observes:

The role of rail freight transport is growing. We note the best data since October 2018. Despite the decrease in the transport of fossil fuels, the rail transport market has skilfully adapted to the current realities by seeking freight transport opportunities in different sectors. Along with growing demand, the availability of transshipment infrastructure and higher capacity impacting the time and price of transport must also increase” (<https://utk.gov.pl/pl/aktualnosci/18172>).

Conclusions

2020 was the year in which the Polish railways were confronted by many unexpected challenges. The situation caused by the COVID-19 pandemic impacted the state of rail transport in the country in a significant way. The passenger rail transport scores were considerably lower than in the previous year. Freight transport suffered a decrease as well, however not to such a high degree. Nevertheless, despite the concerns experienced at the beginning of the year, the

pandemic failed to slow down the growth of rail transport. Rail transport in Poland possesses a large potential. It is the second largest type of transport that provides both freight and passenger services. On a national scale, the railway connections are an important element of the communication system. Railway is considered to be one of the few modes of transport that is universal, mass and environmentally friendly, which makes it a safe means of public transport.

In spite of the restrictions seen in 2020, railway entrepreneurs managed to find new opportunities. There is no doubt that the COVID-19 pandemic has had a much smaller impact on freight transport compared to passenger transport. The possibility of carrying out freight transport without additional restrictions, in international transport as well, allowed for commissions to be maintained. The biggest carriers in Poland are usually also members of large companies operating in many other countries.

Despite the continued economic impact of the pandemic, the supply chain has been preserved. From June to November, each subsequent month was characterized by increases compared to the previous month. In the case of selected groups of goods, a very large increase in transport was visible; which only confirms that the freight transport market is searching for the possibilities of functioning in the situation of the coronavirus pandemic.

Due to a lack of knowledge concerning the eventual end of the pandemic; as well as the possibility of similar events reoccurring in the future, the rolling stock constructors and rail carriers face some important tasks. These tasks should involve the construction of a rolling stock, the equipping of passenger spaces; and investment in appropriate technological solutions.

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