SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2024
ORGANIZATION AND MANAGEMENT SERIES NO. 197

IMPACT OF SARS-COV-2 ON INPOST'S SERVICE PERCEPTION IN SOSNOWIEC

Damian JEZIORSKI[1], Maria CIEŚLA[2], Katarzyna MARKOWSKA[3], Paweł SOCIK[4*], Norbert SIGIEL[5]

[1] Silesian University of Technology, Faculty of Transport and Aviation Engineering; damijez507@student.polsl.pl, ORCID: 0009 -0002 -0442 - 572X
[2] Silesian University of Technology, Faculty of Transport and Aviation Engineering; maria.ciesla@polsl.pl, ORCID: 0000-0003-4566-6554
[3] Silesian University of Technology, Faculty of Transport and Aviation Engineering; katarzyna.markowska@polsl.pl, ORCID: 0000-0003-2184-1995
[4] Polish Naval Academy, Faculty of Mechanical and Electrical Engineering; p.socik@amw.gdynia.pl, ORCID: 0000-0002-6354-5484
[5] Polish Naval Academy, Faculty of Navigation and Naval Weapons; n.sigiel@amw.gdynia.pl, ORCID: 0000-0001-6184-1063
* Correspondence author

Purpose: The SARS–CoV–2 pandemic, which spread worldwide in early 2020, has had a significant impact on the global economy and on the operation of many sectors, including the logistics industry. In Poland, as in other countries, the sector has had to adapt quickly to changing conditions and newly introduced sanitary restrictions. InPost, a key player in the courier services market in Poland, faced the challenge of ensuring business continuity while maintaining a high level of customer satisfaction. This article focuses on an analysis of the impact of the SARS–CoV–2 pandemic on the perception of the quality of services provided by InPost in the city of Sosnowiec. The study was conducted the basis of data collected by questionnaires and analysis of InPost's operational data. The results are aimed not only at assessing the direct effects of the pandemic on the company's operations, but also at understanding long–term changes in consumer attitudes and business strategy.
Design/methodology/approach: For the article, a survey was conducted using statistical analysis. The survey research was conducted on a population of 6424 respondents.
Findings: The empirical research conducted made it possible to determine the impact of pandemics on the quality of service provision. The main issues identified were: the availability of service infrastructure to respondents, the density of its deployment, the impact of computerization on the quality of service delivery, and overall customer satisfaction with the services provided.
Research limitations/implications: Despite efforts to collect as large a group of respondents as possible, the sample represented represents only about 3.3% of Sosnowiec's population. Additionally, the survey faces limitations due to the data voluntarily reported by respondents, which may lead to potential bias in their responses. Focusing on a specific percentage of Sosnowiec's population, may not reflect overall satisfaction with the services provided.

Practical implications: The research will provide useful insights for courier companies developing their operations in urban areas. They offer guidance on concepts for expanding service infrastructure as well as mobile applications.
Originality/value: Based on the research conducted, this study can make a distinctive contribution to the current literature. At the same time, it provides a valuable insight into the adaptation of InPost's logistics organizations in terms of the dynamic changes taking place in society, in the context of the COVID–19 pandemic.
Keywords: COVID–19, service quality, courier services, business adaptation, customer perception.
Category of the paper: Research paper.

1. Introduction

The coronavirus (COVID–19) took the world by surprise as the number of infected and thus deaths skyrocketed. The challenge for everyone was to adapt their lives to the new standards. Not only did the individual have to change his or her approach but also governments, public organizations, companies and businesses, and thus all logistics, including supply chains. The pandemic forced, or perhaps greatly accelerated, the use of e–commerce and indirectly resulted in increased revenues for logistics companies. The crisis caused by the pandemic reduced human interaction and thus paved the way for e–commerce and "contactless" delivery, which caused courier services to flourish (Yiang, 2023).

Courier service is a distinctive type of service that is included in the area of postal service provision. The most complete definition including legal and technological treatment was provided by Jacek Buko: "(...) postal service can be defined as the provision by a postal organization of the transmission, constituting the object of the postal service: correspondence, tangible goods, as well as nominal values, from one or more senders to one or more recipients, by means of activities and operations related to the collection, segregation, movement and delivery of the specified objects of the service" (Buko, 2009).

Courier services are a critical link in the global logistics services market. Economic and organizational arguments have prevailed in singling them out as a unique part of the market. They are characterized by a global reach that covers individual groups of cargoes, while matching customer needs.

The current delivery system aims to minimize the delivery time of cargo, regardless of the route it has to take. The basic aspect of courier services is the relationship, "door–to–door". Additional elements may include: collection from the sender, placing an order online or over the phone, tracking the status of the shipment through a website and an app, payment of dues, preparation of packages, processing of returns. Courier companies are oriented towards the delivery of shipments with standardized dimensions, so their organizational structure and infrastructure are adapted to the express service of a huge number of small orders.

Parcel transportation in Poland is developing rapidly and is currently provided by such companies as DHL, DPD, FedEx, Geis, GLS, InPost, MEEST, Raben, UPS, Ruch, Poczta Polska and others. The market of companies providing parcel transportation services in Poland is dominated by companies that have well–developed infrastructural facilities and have transport capabilities within our country and abroad. These companies adapt their service offerings to the ever–changing needs of their customers and invest in new technologies to optimize and streamline transportation processes.

The dynamics of the development of courier services lead to a constant study of their quality provided by various companies. The SARS–CoV–2 pandemic has had a particular impact on the volume of courier services. It has contributed significantly to the increase in the number of online orders through periodic lockdowns and sanitary restrictions in stores (Acts and Documents on Prevention and Control of COVID–19, 2022). The increased volume of online orders, has also raised demand for transportation services related to their delivery. This is perfectly illustrated by the chart in Figure 1, showing the volume of goods delivered using courier services (State of the Postal Market Report, 2017, 2019, 2021).

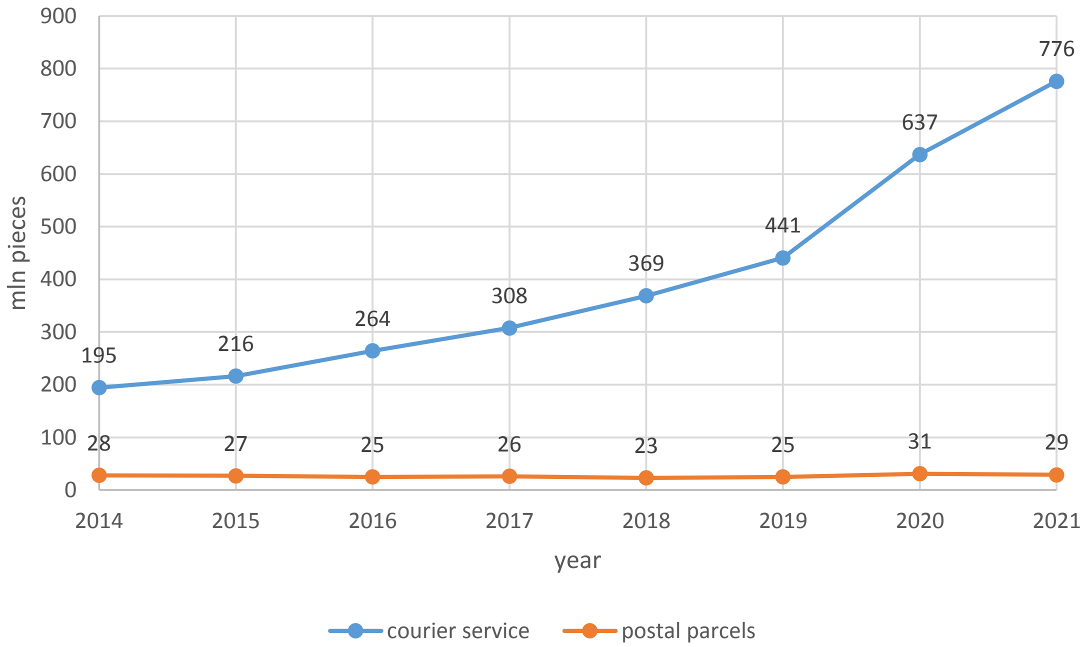

Figure 1. Changes in the volume of courier and total postal parcels from 2014 to 2021.

Source: own study.

There has been a noticeable increase in courier volumes since 2014, as shown in the chart. The biggest jump is shown between 2019 and 2020 (the impact of the pandemic). The difference between the years is shown in Table 1.

Table 1.
Summary table of growth in courier volumes from 2014 to 2021

Year	Number of courier shipments [mln pcs.]	Number of courier shipments in the previous year [mln pcs.]	Growth [mln pcs.]	Growth [%]
2021	776.0	636.9	139.1	21.8
2020	636.9	440.9	196.0	44.5
2019	440.9	368.8	72.1	19.6
2018	368.8	307.8	61.0	19.8
2017	307.8	264.3	43.5	16.5
2016	264.3	216.4	47.9	22.1
2015	216.4	194.5	21.9	11.3
2014	194.5	–	–	–

Source: own study.

This fact forced the adaptation of transport offers to changing epidemiological conditions and customer expectations. Courier companies had to demonstrate efficiency, flexibility and the quality of their services at a much higher level than before.

The pandemic situation has resulted in increased competition among courier operators for customers, volumes, revenues and price pressure. Critical to the competitiveness of these companies is logistics, which guarantees adequate delivery and friendly handling of returns. Increasing competition makes it imperative for courier operators to ensure development and innovation. During the pandemic, companies did not stop deliveries. Numerous safeguards were put in place to prevent the spread of SARS–CoV–2, consequently, this forced employees to observe proper hygiene, implement internal hygiene procedures, equip branches with appropriate disinfectants. The temperature of employees was measured daily in the branches and sorting rooms, and the cleaning standard used in health care facilities was introduced. Courier companies began to introduce new services tailored to serve customers, responding to their current needs in times of pandemonium. For example, InPost introduced a service – Parcel on the Weekend (InPost Regulations, 2023). This was a direct response to the increase in people's interest in online shopping due to the COVID–19 outbreak. It was made possible to deliver parcels to Parcel Machines on Saturdays and Sundays – just as on weekdays. InPost has recommended that its customers use Parcel Post delivery, especially if a retailer on its shopping platform allows it. The company also made it possible to pick up parcels from Parcel Machines without using the device's panel, through the use of a smartphone app, using the "open the box remotely" service. The company's couriers, meanwhile, received instructions describing how to safely hand over parcels at the door or in front of the house, which minimized direct contact time with the recipient.

This paper analyzes the public's approach to the quality of InPost courier services provided in Sosnowiec. The following analysis was conducted on the basis of a survey of residents of the city of Sosnowiec.

2. Literature review of pandemic impact on delivery service

Globalization and technological advances are phenomena that affect all industries. They have also led to the development of e–commerce. In addition, the popularization of the Internet and easy access to e–banking popularized the transfer of part of commerce to the global network and thus courier services. The pandemic further accelerated their development. The main directions of influence: are infrastructure (expansion of parcel stations) and the transfer of shopping to the virtual world (expansion of online stores and dedicated applications).

2.1. Courier service before COVID–19

The increased number of smartphone users, according to Mehtab Alam et al. (Mehtab, 2021) even before the COVID–19 pandemic, fostered an increase in demand for e–commerce (see Figure 2). Since 2013, a significant increase in shipments has been observed. Courier services, offering delivery of documents, small and large shipments, as well as cargo parcels, were already heavily used before the pandemic. The commitment of courier companies to accuracy, timeliness and fast delivery has contributed to increased customer confidence. The rapid growth in the movement of goods, manufacturers, retailers and the e–commerce sector in 2010–2019 greatly accelerated the development of the courier industry. The continued growth of this industry went hand in hand with the emergence of online e–commerce giants such as Amazon and Flipkart. Many of these market leaders were able to anticipate future demand for delivery services by introducing their automated delivery systems, reducing the costs associated with using third–party courier services. From this, it is clear that the rise in smartphone users has directly contributed to the demand for online shopping and the consequent increase in deliveries (Kidawi, 2024).

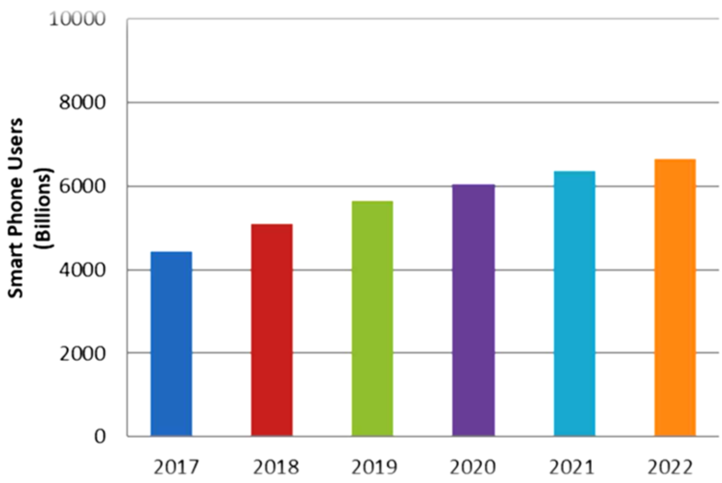

Figure 2. Changes in the volume of courier and total postal parcels from 2014 to 2021.

Source: Consequences of Covid–19 pandemic on courier delivery services (DOI: 10.5281/zenodo.7515111).

Szpilko et al. surveyed a group of Polish respondents examining the impact of the pandemic on the quality of courier services. Before the outbreak of the COVID–19 pandemic, nearly half of the survey participants (44.1%) shopped online several times a year. One in four respondents shopped online once a month (25.7%), and one in five shopped several times a month (20.6%). Regular online shopping, done on every week, was declared by only 6.4% of respondents (Szpilko,2021).

However, the situation changed in 2020, when the COVID–19 pandemic and related restrictions on traditional trade significantly accelerated the migration to e–commerce platforms. Analysis of the survey results showed that the percentage of people who shop online once a year dropped to 19.8%, while the group of those who shop several times a month increased to 39.8%. In addition, there was a noticeable increase in the group buying online several times a week, from 3.2% before the pandemic to 9.9% during it, and in the group shopping once a week, from 3.2% to 5.9% (Szpilko,2021).

Consistently throughout the survey period, InPost was the most popular courier service, chosen by 94.1% of respondents. This was followed by DPD (79.2%) and DHL (74.9%), while FedEx was the company least frequently chosen by respondents, with a score of 19.0%. These data indicate significant changes in consumer behaviour and shopping preferences, which accelerated the development of the e–commerce market during the pandemic (Szpilko,2021).

2.2. Courier service during and after COVID–19

Responding to the closures caused by the pandemic, people have begun to make greater use of online ordering of daily necessities such as food, medicine and other essential items. This, in turn, has led to a significant increase in deliveries by courier services. This change has not only affected the way consumers obtain basic products but has also accelerated the development and adaptation of courier companies to the new conditions. These companies had to quickly adapt their logistics operations to meet the growing demand for fast and safe deliveries, often introducing innovations such as non–contact delivery methods, which further protected both customers and staff from the risk of infection (Egozi, 2022).

Individuals who previously used online shopping sporadically or not at all have begun to turn to e–commerce. The pandemic has influenced a change in the demographics of e–commerce customers, noticeable especially among older age groups, the so–called Silver generation, who have shown greater interest in the Internet and online shopping (Toska et al., 2022; Watanabe, Omori, 2020). In addition, preferences for pickup methods have also changed. More and more customers are choosing non–contact package pickup options, such as parcel machines, which allow them to avoid direct contact with couriers and minimize the risk of infection (Szpilko et al., 2021; Czerwinska, 2023).

In his research, Reginald Lance E. Dones (Dones, 2020) noted that since the beginning of the COVID–19 pandemic, people have modified their purchasing criteria, preferring online platforms. The increase in interest in courier services was particularly evident among younger consumers, as opposed to the older generation. Restrictions on movement have made consumers more dependent on couriers to deliver necessary goods, which has contributed significantly to the increase in demand for these services.

According to Stephy Grace Oommen et al. the COVID–19 pandemic introduced global blockades, forcing people to stay at home, which contributed to an increase in online sales and, consequently, more deliveries. Air traffic restrictions and border closures caused delays and cancellations in air transportation, underscoring the crucial role of courier services as a link between companies and customers. During the pandemic, courier services became an essential part of the supply chain, allowing trade to continue (Oommen, 2022).

Conversely, Hui Shen and colleagues (Shen, 2022) conducted a study to examine individual preferences for online grocery shopping (OGS) versus traditional in–store shopping (PGS) during the COVID–19 pandemic. The results showed an increase in the popularity of online grocery shopping both during and after the pandemic. Key factors that influenced consumers' decision to choose online were health and safety concerns, the convenience of straight–to–home delivery, and time savings.

Damianos P. Sakas noted that the pandemic has caused a change in the shopping habits of both companies and individuals, who have shifted from traditional shopping to online shopping. The increase in e–commerce demand has challenged courier services, which have had to adapt to customer expectations for contactless delivery and digital signatures as proof of delivery. Customers' priorities in choosing courier companies have also changed, with them now looking for secure pickup and delivery methods. It has been established that customers prefer to use well–known and established courier brands, remaining loyal to them for security reasons. It is important for customers to feel safe, which increases their loyalty to a brand and makes them less likely to switch to a competitor (Sakas, 2022).

The COVID–19 pandemic has introduced significant changes in all spheres of our lives, both private and professional, forcing us to learn to cope with extreme emergencies. It has disrupted the established rhythms of daily life, prompting us to adapt to new lifestyles. In the delivery services sector, certain practices that developed during the pandemic have survived and continue even in the post–pandemic period, such as simplifying the delivery of products and services to customers. People who started using online shopping now routinely expect home delivery. For this reason, online delivery targets for 2026 are expected to be reached as early as 2023, a trend that points to continued growth in the coming years. The widespread adoption of smartphones and the Internet by different generations, in both urban and rural areas, has contributed to the increase in deliveries. The COVID–19 pandemic has provided an unexpected boost to the delivery industry and online companies, which have gained ground during the crisis and expect further growth. People, now accustomed to shopping with "on–click" delivery, are less likely to visit traditional stores, preferring the convenience of online shopping (Kidwai, 2024).

From March to June 2020, an unusually high level of online shopping activity was observed. In the same year, e–commerce's share of global commerce exceeded 16.5%, reaching a historic value of $4.2 trillion, according to Ciesielski (2020). In addition, time spent using mobile e–commerce apps increased by 40% in 2020 from a year earlier, according to data from App Annie (2021). The global e–commerce market was valued at $13 trillion in 2021, and Astute Analytica (2021) forecasts that the market will grow to $55.6 trillion by 2027.

The Central and Eastern European region, with a particular focus on Poland, is one of the fastest growing areas in the world. Over the past ten years, Poland's e–commerce sector has recorded annual growth rates of 20–25%. According to the Chamber of Electronic Economy (2023), by the end of 2022, online sales to both consumers (B2C) and businesses (B2B) were expected to maintain a growth rate of around 20–25% per year, reaching a value of PLN 850 billion. During the decade from 2013 to 2023, the value of the B2C e–commerce market increased fivefold, while the value of the B2B market increased 3.5 times. The share of online sales in total retail turnover tripled, and the number of registered online stores increased 2.5 times (Czerwinska, 2023).

Market analysis and observation of current trends indicate that the key factors that will influence the development of the Polish e–commerce market in the coming years are: rising inflation, the development of global marketplace shopping platforms, the implementation of new technologies, and the demographic shift associated with the greater participation of the "digital native" generation (Millenials and Generation Z) (Chen, 2020), for whom online shopping is a natural and often preferred method of shopping (PwC, 2022). The report "Poland's CEP 2022" (Last Mile Experts, 2022) forecasts that despite economic and international challenges, the e–commerce and courier (CEP) sector will continue to grow strongly, maintaining high levels of growth in both value and volume. This growth will require increased logistics and warehousing support from operators and e–tailers. Currently, dedicated e–commerce facilities occupy about 7.5 million sqm of warehouse space in Poland, accounting for more than 30% of the total supply. Compared to 2019, this is an increase of 84%, indicating a significant upward trend in the sector (Czerwinska, 2023).

2.3. Pandemic vs InPost company

The COVID–19 pandemic has brought massive changes to many economic sectors around the world, significantly affecting business operations and consumer behaviour. As one of the leaders in the courier services market, InPost faced challenges that required rapid adaptation to the new reality and customer expectations. Changing shopping habits, with the intensification of online shopping, created new opportunities, but also posed challenges for the company to ensure efficient and secure handling of shipments. For example, InPost introduced a service – Parcel on the Weekend. This was a direct response to the increase in people's interest in online shopping caused by the COVID–19 outbreak. It was made possible to deliver parcels to Parcel Machines on Saturdays and Sundays – just as on weekdays. InPost has recommended that its customers use Parcel Post delivery, especially if a retailer on its shopping platform allows it. The company has also made it possible to pick up parcels from Parcel Machines without using the device's panel, through the use of a smartphone app, using the "open the box remotely" service.

The increase in interest in InPost's services, as seen in Figure 3 both nationally and in Sosnowiec, has forced the company to introduce new ventures to improve parcel delivery. First and foremost, the company increased its investment in parcel machine infrastructure. The rapidly increased number of devices enabled a 40% increase in parcel delivery in 2020 compared to the previous year (Ziółko, 2021). During the pandemic, the company also introduced, several innovative services, among others:

- **InPost Office 24 –** enabling efficient exchange of correspondence between residents of a city and local government institutions.
- **Weekend Parcel** – allowing delivery of packages on Saturday and Sunday as on weekdays.
- **GOMOBILE** Strategy – enabling the use of the company's services through a specially designed application.
- **Multiscreen** – allowing multiple shipments to be picked up from a single box using a single code. Shipments are identified by the recipient's phone number.
- **Refrigerators** – a fresh grocery pick–up concept. It is based on an agreement with Auchan and allows orders to be picked up from the Auchan Direct service.
- **InPost Fulfillment** – a service designed for business customers related to the e–commerce market. It enables the use of InPost's storage infrastructure and experience.
- **InDoor parcel machines** – placing Parcel Machines inside enclosed spaces, i.e. shopping malls, apartment blocks, universities, etc. The first one was set up in 2020 at the University of Warsaw Library building.

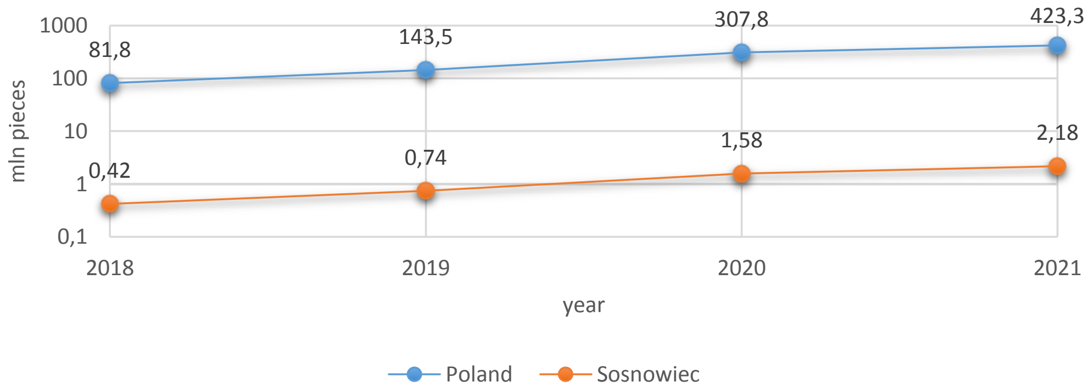

Figure 3. Changes in the volume of courier and total postal parcels from 2018 to 2021 in Poland.
Source: own study.

InPost has also made changes to the company's operations due to the COVID–19 pandemic. An example is the change in the rules regarding the redirection of parcels. If they are unclaimed, the parcel is returned to the sender, instead of being sent to an InPost branch as before. InPost has 54 Parcel Machines and 10 Parcel Points in the city of Sosnowiec (area 91.1 square kilometres, population 195,978 (Poland in numbers, 2022)). Analyzing these data, it can be concluded that there are approximately 2084 people per Parcel locker, and approximately 19,580 residents per ParcelPoint.

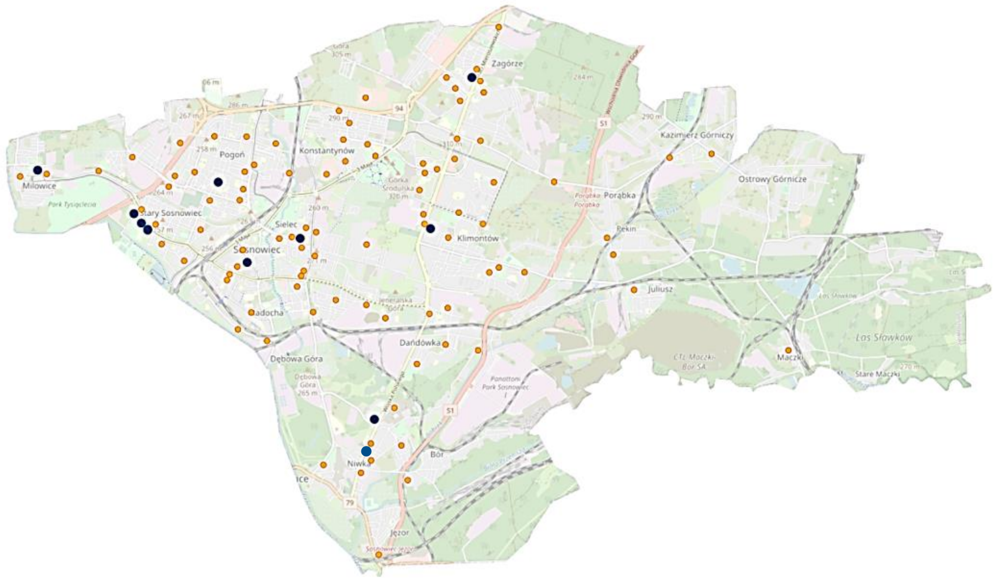

Figure 4. Map of Sosnowiec with marked Parcel Machines (•) and Parcel Points (•).

Source: https://gdzie–paczka.pl/m/sosnowiec.

The analysis of the distribution of InPost's Parcel Lockers and ParcelPoints in Sosnowiec (Fig. 4) indicates significant differences in the availability of this infrastructure in different parts of the city. The western part of Sosnowiec, with a higher degree of urbanization, is much better equipped with automatic devices and parcel service points. In contrast, the eastern part of the city, in districts such as Ostrowy Górnicze, is characterized by less or no such infrastructure.

Statistically, there is at least one parcel locker for every square kilometer in the western part of the city, which gives a density of approximately 0.97 km^2 per unit. In turn, ParcelPoints are much rarer, with one point for every 9.11 km^2 of the city's area. Throughout Sosnowiec, the number of parcel locker machines is approximately ten times greater than the number of staffed points, which highlights the trend towards automation of deliveries and minimization of direct contact in the courier industry.

This geographical disproportion in access to courier services indicates extensive infrastructure in more urbanized areas, as opposed to less developed areas, which may affect the equality of residents' access to courier services.

3. Methodology and results of own research

3.1. Methodology

The study aimed to analyze the impact of the SARS–CoV–2 pandemic on the perception of the quality of courier services offered by InPost. The aim of the analysis was to identify and assess changes in the perception of service quality before and during the pandemic. An online survey was used as a research tool, which enabled quick and wide–ranging data collection.

Google Forms was used to distribute the survey, and its dissemination took place via social media platforms and courier–related websites. The survey process lasted from July 1, 2022 to October 16, 2022 and was addressed to the residents of Sosnowiec, which allowed for examining the specific local market of courier services.

The structure of the questionnaire was designed to enable the collection of detailed information regarding opinions about InPost services. The survey included single– and multiple–choice questions, as well as open questions that allowed respondents to express their own opinions. A total of 6,424 responses were collected, representing 3.28% of the research population, with all responses completed completely, demonstrating the high quality of the collected data. All research procedures were consistent with the principles of research ethics, ensuring the anonymity and confidentiality of the information provided by respondents.

The main limitation is the non–representativeness of the sample, focusing only on residents of one city. Future research should expand the study sample to allow generalization of the results to a broader population.

Data from the survey were collected and analyzed using an Excel spreadsheet, which allowed for advanced statistical analysis. The obtained results allowed for a detailed assessment of the impact of the pandemic on the perception of InPost courier services and the identification of key factors that influenced changes in consumers' assessment of these services.

The results made it possible not only to understand the dynamics of changes in the perception of courier services in the face of the health crisis but also to provide valuable tips for InPost in terms of further development and adapting the offer to changing customer expectations. This study is an important contribution to the literature on the impact of the pandemic on the courier services sector and can serve as a basis for further research in this area.

3.2. Characteristics of InPost's surveyed customers

Half of the responses obtained were for men between the ages of 18 and 40. The overwhelming majority described their education as high school. The detailed data is shown in table 2.

Table 2.
Description of respondent group

Information		Number of responses obtained	Percentage [%]
sex	women	2838	44.2
	man	3586	55.8
age	under 18	484	7.5
	18-30	1705	26.5
	31-40	1991	31.0
	41-50	1155	18.0
	51-60	792	12.3
	over 60	297	4.6
education	primary	803	12.5
	secondary	3179	49.5
	vocational	1232	19.2
	higher	1210	18.8
socio–professional status	active	3267	50.9
	student	1474	22.9
	pensioner	1045	16.3
	unemployed	638	9.9

Source: own study.

The survey further focused on the characteristics of respondents in the context of the services offered by InPost. The survey covered aspects such as preferred delivery methods, distance to the nearest Parcel Machine, frequency of use of courier services and how to use the company's mobile app. The data shows that the most frequently chosen method of parcel pick–up by respondents is the use of Parcel Post, while Parcel Post (Fig. 5) is the option chosen least frequently. About 75% of respondents said that the distance to the nearest Parcel Machine is less than 500 meters (Fig. 6).

The majority of respondents described themselves as recipients of shipments, with 30% of survey participants never acting as a sender. For more information on specific results related to the role of shipper and receiver, as well as details on the frequency of use of the InPost mobile app, see Table 3, available in the survey results section.

Table 3.
Tabulation of respondents' data in terms of use of InPost courier services

Information	Number of responses			Percentage [%]		
The most frequently selected form of delivery:	**women**	**man**	**total**	**women**	**man**	**total**
home delivery	440	407	847	15.5	11.3	13.2
delivery to work	341	363	704	12.0	10.1	11.0
Parcel machine	1969	2651	4620	69.4	73.9	71.9
point of sales pickup	88	165	253	3.1	4.6	3.9
The most common distance to the nearest Parcel Machine:	–	–	–	–	–	–
up to 100 meters	385	308	693	13.6	8.6	10.8
from 101 to 300 meters	737	1067	1804	26.0	29.8	28.1
301 to 500 metres	1012	1232	2244	35.7	34.4	34.9
501 to 1000 meters	539	660	1199	19.0	18.4	18.7
above 1000 metres	165	319	484	5.8	8.9	7.5
The most common position in the delivery process:	–	–	–	–	–	–
sender	495	594	1089	17.4	16.6	17.0
recipient	2343	2992	5335	36.5	46.6	83.0

Cont. table 3.

Frequency of use as a sender:				–	–	–
daily	143	154	297	5.0	4.3	4.6
once a week	242	187	429	8.5	5.2	6.7
several times a week	330	506	836	11.6	14.1	13.0
once a month	583	550	1133	20.5	15.3	17.6
several times a month	396	484	880	14.0	13.5	13.7
once a year	396	583	979	14.0	16.3	15.2
never	748	1122	1870	26.4	31.3	29.1
Frequency of use as a recipient:	–	–	–	–	–	–
daily	121	88	209	4.3	2.5	3.3
once a week	319	297	616	11.2	8.3	9.6
several times a week	682	1012	1694	24.0	28.2	26.4
once a month	649	803	1452	22.9	22.4	22.6
several times a month	847	1100	1947	29.8	30.7	30.3
once a year	99	264	363	3.5	7.4	5.7
never	121	22	143	4.3	0.6	2.2
Using the mobile application of the courier company:	–	–	–	–	–	–
yes	2024	2640	4664	71.3	73.6	72.6
no	814	946	1760	28.7	14.7	27.4

Source: own study.

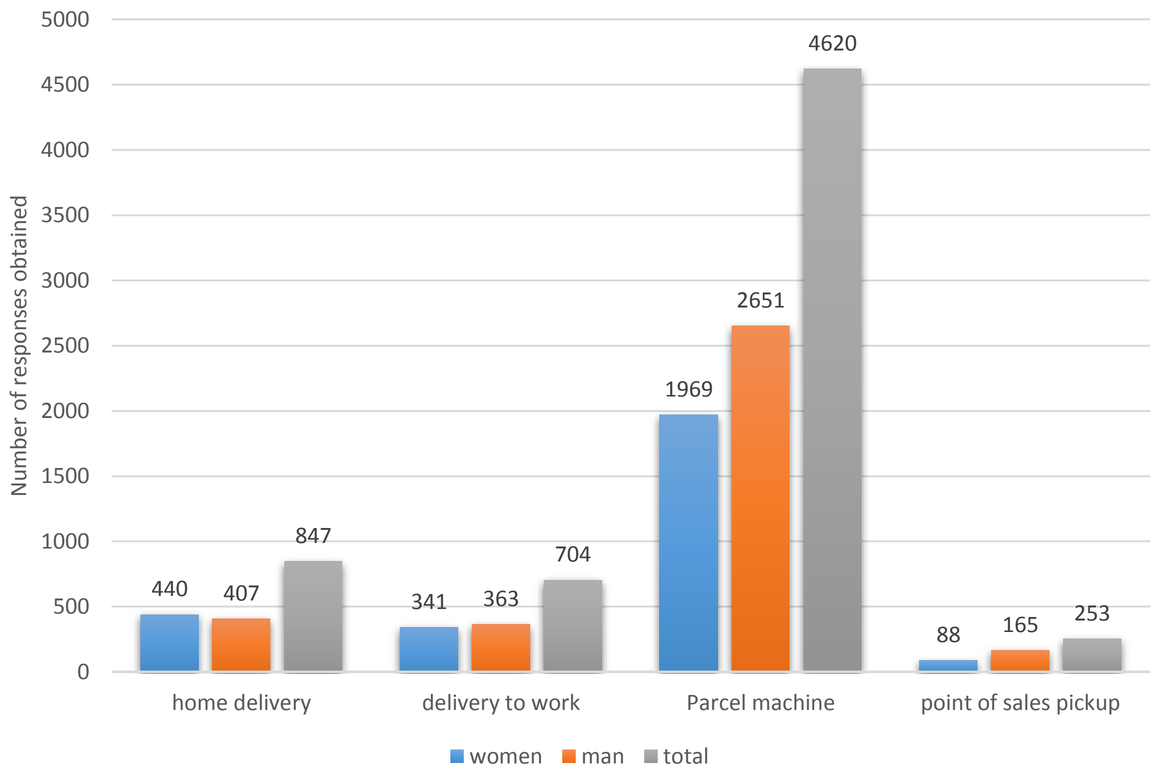

Figure 5. The most common form of delivery chosen by responders.

Source: own study.

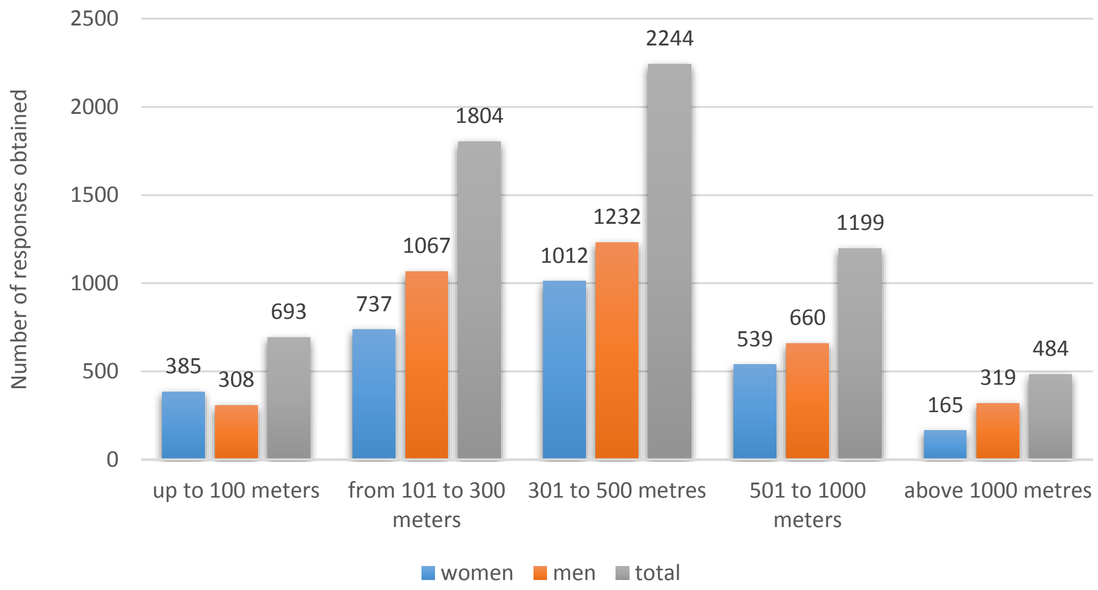

Figure 6. Typical distance to nearest Parcel Machine traveled by respondents.

Source: own study.

3.3. Evaluation of the InPost mobile application

To implement the research part, related to the determination of the level of quality of the application, offered by the courier company in question, were qualified persons who answered affirmatively in the question about the use of the software. The number of respondents amounted to 4664, which accounted for 72.6% of the surveyed group. They were asked to express their attitude toward the application and to determine their position in the aspect of using the parcel pick–up time extension and remote box opening. The details are shown in Figure 7.

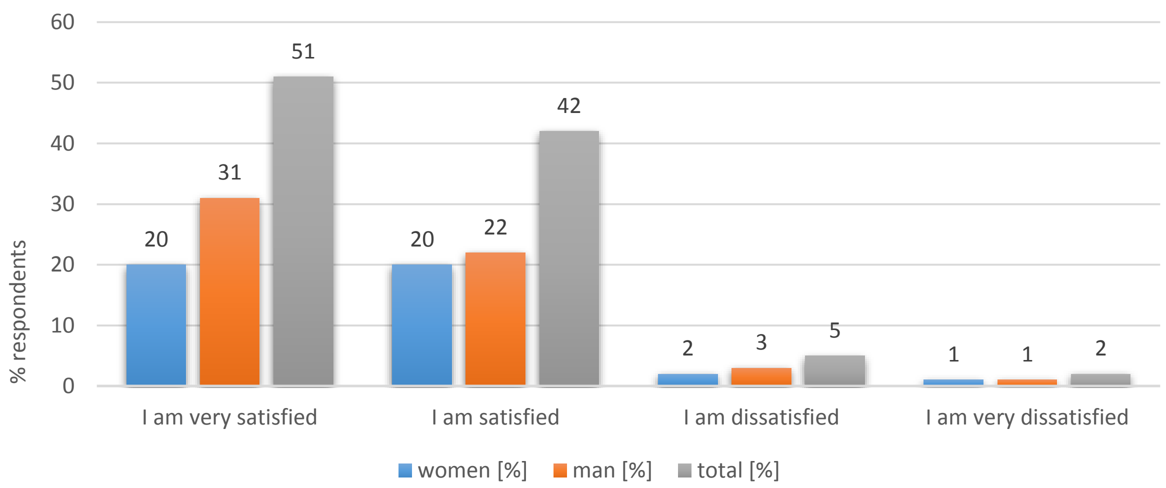

Figure 7. Respondents' relationship to InPost's mobile app.

Source: own study.

The survey further focused on evaluating the software's various features and its overall usability. Respondents were asked to rate such aspects as the intuitiveness of the interface, usability, parcel tracking functions, the process of sending parcels, the contactless box opening system, navigation to InPost points, the ability to extend pick–up times, rerouting options and the return of parcels. Ratings were given on a five–point scale, where 1 meant the lowest and 5 meant the highest rating for each category tested.

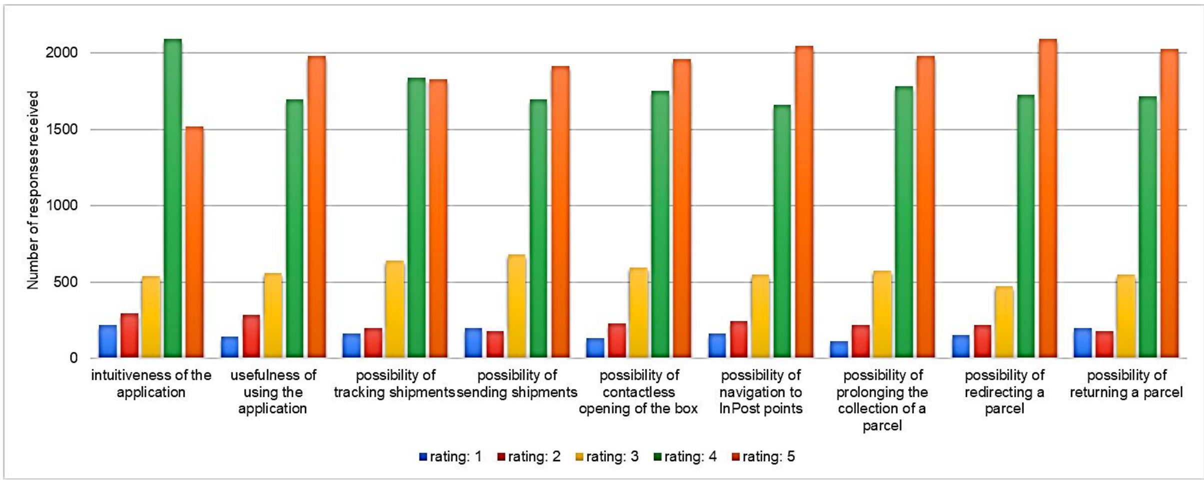

Figure 8. Evaluating aspects of the mobile application.

Source: own study.

Descriptive statistical elements were used to further analyze the responses obtained, which allowed to further analyze the values obtained. The data are presented in Table 4:

Table 4.
Summary of the results of the statistical analysis of the evaluation of aspects of the mobile application

Aspects	Mean	Median	Dominant	Variance	Standard deviation	Coefficient of variation [%]	Typical area of variation (classical): upper limit	Typical area of variation (classical): lower limit
intuitiveness of the application	3.94	4	4	1.12	1.06	27	5.00	2.88
usefulness of using the application	4.09	4	5	1.06	1.03	25	5.12	3.06
tracking of shipments	4.06	4	4	1.01	1.01	25	5.07	3.05
posting of shipments	4.06	4	5	1.09	1.04	26	5.10	3.02
contactless box opening	4.11	4	5	0.99	0.99	24	5.10	3.12
navigation to InPost points	4.11	4	5	1.07	1.03	25	5.14	3.08
extension of parcel collection	4.14	4	5	0.93	0.96	23	5.10	3.18
parcel redirection	4.15	4	5	1.01	1.01	24	5.16	3.14
possibility of returning a parcel	4.11	4	5	1.07	1.04	25	5.15	3.07

Source: own study.

In the survey, the average obtained from the evaluations of the various aspects of the application was classified as good, meaning that the typical rating was 4 on a five–point scale. The value oscillated around a mean standard deviation of 1, indicating some variation in respondents' answers. The analysis also used an index of variability, which reached 25%, indicating moderate variability in the data. The range of the spread of responses given was defined as a typical interval of $X_{typ} < 3; 5 >$, where the dominant value was 5, and the median for all categories analyzed was set at 4.

3.4. Evaluation of the services provided by the courier company

The final stage of the survey conducted involved a detailed analysis of respondents' answers, focused on various aspects of courier services. The categories studied included: time efficiency of deliveries, the level of security of shipments, the efficiency of complaint processes, the quality of information flow between the customer and the company, the standards of customer service both online and over the phone, and the professionalism of couriers. The purpose of this analysis was to understand how users rated each of these aspects in the context of their experience of using the services offered. Ratings were given on a five–point scale, with 1 being the lowest and 5 being the highest.

Table 5.
Evaluation of InPost courier services

Aspects	Mean	Median	Dominant	Variance	Standard deviation	Coefficient of variation [%]	Typical area of variation (classical): upper limit	Typical area of variation (classical): lower limit
delivery time	3.97	4	4	0.93	0.96	24	4.93	3.01
security	4.03	4	4	0.92	0.96	24	4.99	3.07
execution of complaints	3.96	4	4	1.04	1.02	26	4.98	2.94
information flow	4.01	4	4.00; 5.00	1.06	1.03	26	5.04	2.98
Internet customer service	4.02	4	5	1.05	1.03	26	5.05	2.99
telephone customer service	4.01	4	4	0.99	1	25	5.01	3.01
courier competence	4.12	4	5	0.94	0.97	24	5.09	3.15

Source: own study.

An analysis of the collected data showed that the average score in each of the surveyed aspects oscillated around the value of 4, indicating high overall satisfaction among respondents. The standard deviation, staying close to the value of 1, suggests a moderate variation in responses, with a predominant range of responses from 3 to 5. This value is confirmed by the calculated typical area of variation, defined as $X_{typ} < 3; 5 >$. A particularly outstanding aspect that received the highest average rating was the competence of the courier, highlighting their key role in the delivery process. In contrast, the lowest ratings were for the complaint handling process, which may signal areas for further improvement in procedures and customer communication. The coefficient of variation for each of the surveyed issues set at 25% further confirms the relative homogeneity in service perception. The noticeable consistency in ratings may indicate a stable level of service quality offered by the company, however, it also indicates the need to pay special attention to those areas that do not achieve maximum results in customer ratings.

During the survey, residents of the analyzed region were also invited to share their experiences regarding the difficulties they encountered while using courier services offered by InPost. Survey participants allowed to select several answers from predefined options, as well as the opportunity to enter their comments in the open "other" section. However, it is noticeable that none of the respondents chose to use this option, which may suggest that the provided response options adequately reflected their experiences or they did not feel the need to add additional comments.

The purpose of this part of the survey was to identify and understand specific problems that may affect perceptions of the quality and effectiveness of the company's services. The lack of use of the "other" section by respondents may indicate that the most common problems had already been identified by the company and included in the questionnaire. This may also indicate a certain degree of customer satisfaction with the service offered by InPost, although it cannot be ruled out that some respondents may not have been comfortable with describing their negative experiences in more detail.

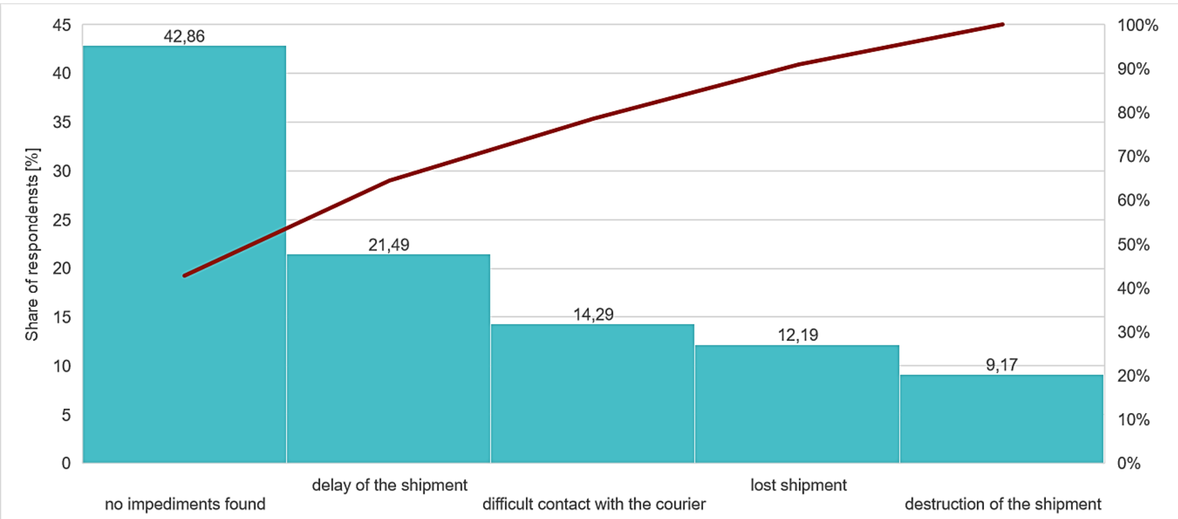

Figure 9. Pareto chart of obstacles encountered.

Source: own study.

The chart above (Figure 9) presents the results of a survey of users of InPost's courier services to identify the most common problems encountered by customers. The summary illustrates the percentage response of respondents to various categories of difficulties. The largest percentage, at 42.86%, of respondents indicated that they had not encountered any obstacles while using InPost's services. The first most common difficulty, reported by 21.49%

of respondents, is delayed delivery. The second most frequently reported difficulty, indicated by 14.29% of users, is difficulty in contacting the courier.

A considerably smaller percentage, 12.19% of respondents, reported that their parcel was lost, and 9.17% experienced damage to their parcel. The chart also shows a trend line that shows a general downward trend in reported problems, suggesting an improvement in service quality or better user adaptation to InPost's service delivery system.

3.5. Impact of the SARS–CoV2 pandemic on the quality of InPost's courier services and efforts to improve them

The SARS–CoV–2 pandemic has forced many industries to quickly adapt to new realities, especially those related to direct customer service. InPost, as one of the leaders in the courier services market in Poland, also faced challenges that required rethinking and modifying existing operational and service practices. Below we discuss the impact of the pandemic on the quality of InPost's courier services, and outline the changes suggested by respondents that the company should make to improve the quality and efficiency of its services.

In the survey conducted (Figure 10), respondents determined their attitude towards such aspects as timeliness, price, flexibility, speed, information, comprehensiveness of service. The scale of ratings given ranged from 1 to 5.

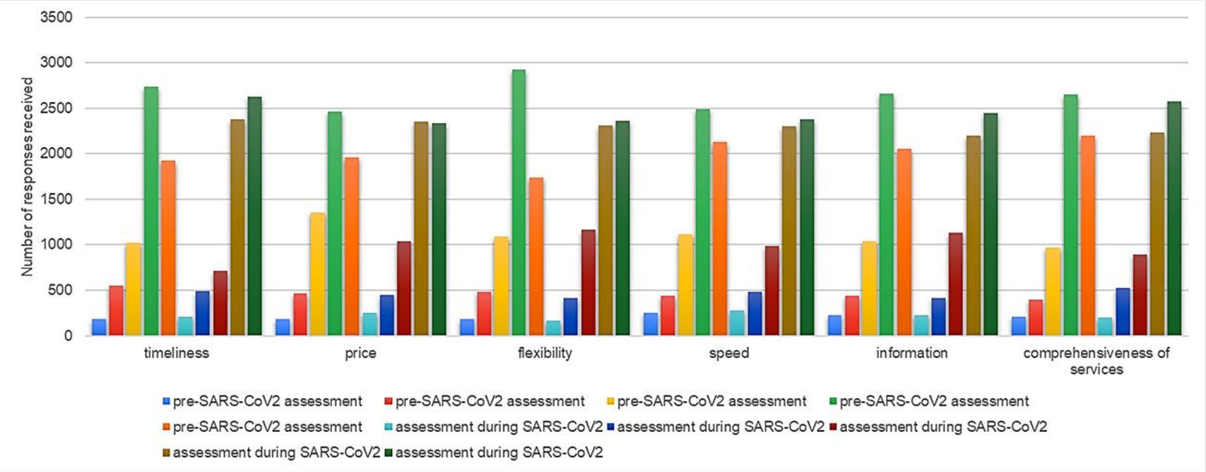

Figure 10. Pareto chart of obstacles encountered.

Source: own study.

Based on the study of the quality of service provision of the InPost courier company in Sosnowiec, it should be noted that the average values obtained for the response "during the occurrence of SARS–CoV–2" are higher in every aspect, compared to the period before the pandemic (Table 6, Figure 11). For each studied characteristic, the median was 4, while the averages obtained in each studied time interval oscillated at its value. The dominant in each case is limited in the range <4;5>. Interpreting the level of the standard deviation and the coefficient of variation, it can be concluded that the average interval spread of the answers given was $X_{typ} < 3; 5 >$.

Table 6.
Evaluation of InPost courier services before and during SARS–CoV2

Aspects	Duration of SARS–CoV2	Mean	Median	Dominant	Variance	Standard deviation	Coefficient of variation [%]	Typical area of variation (classical): upper limit	Typical area of variation (classical): lower limit
timeliness	before	3.88	4	4	1.05	1.02	0.26	4.91	2.86
	during	4.05	4	5	1.12	1.06	0.26	5.1	2.99
price	before	3.86	4	4	1.05	1.02	0.26	2.84	4.89
	during	3.94	4	4	1.16	1.08	0.27	2.87	5.02
flexibility	before	3.86	4	4	0.98	0.99	0.26	2.87	4.86
	during	3.98	4	5	1.04	1.02	0.26	2.96	5
speed	before	3.9	4	4	1.12	1.06	0.27	2.84	4.96
	during	3.94	4	5	1.21	1.1	0.28	2.84	5.04
information	before	3.91	4	4	1.07	1.04	0.26	2.88	4.95
	during	3.97	4	5	1.14	1.07	0.27	2.9	5.03
comprehensiveness of the service	before	3.97	4	4	1.03	1.02	0.26	2.96	4.99
	during	4.01	4	5	1.15	1.07	0.27	2.93	5.08

Source: own study.

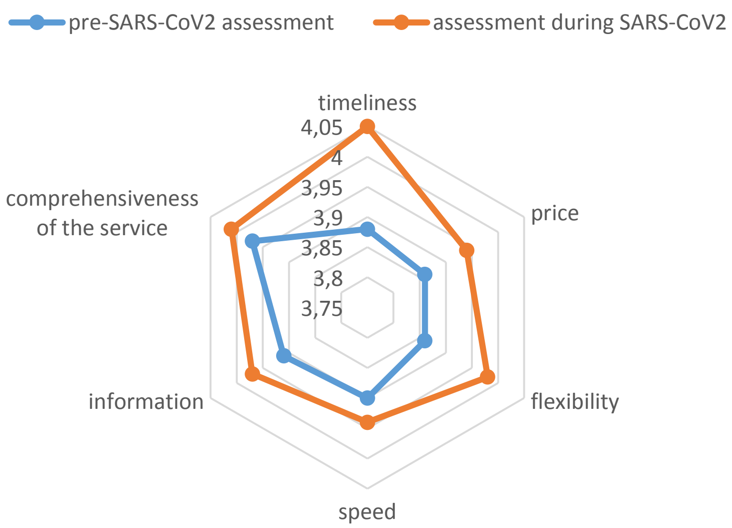

Figure 11. A radar chart of the averages of the aspects studied.

Source: own study.

The final phase of the empirical study focused on identifying respondents' suggested changes to improve the quality of courier services provided by InPost (Figure 12). Survey participants were given the opportunity to choose from a list of suggested improvements or to enter their own suggestions in the "other" category. An interesting aspect of the results was that some respondents did not suggest any changes, which was classified as "none". These submissions indicate a perception that existing services do not need further modification.

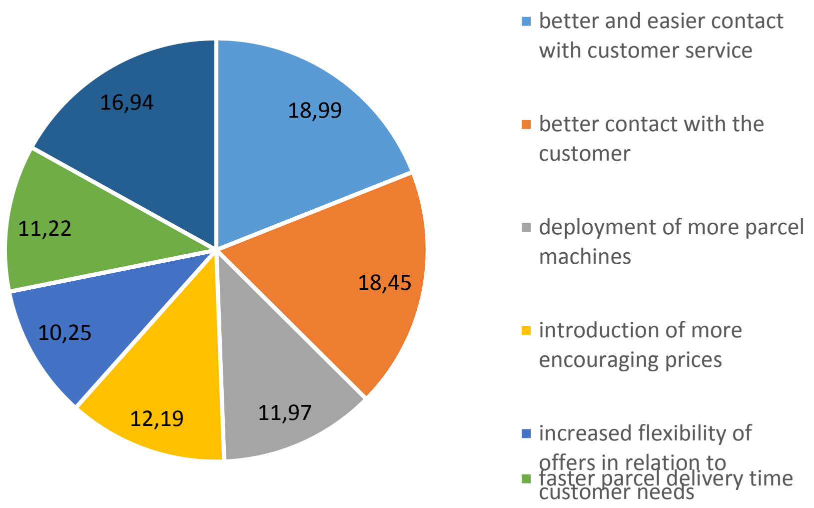

Figure 12. Summary of responses from the scope of the proposed changes.

Source: own study.

The most frequently cited need for improvement was the issue of better contact with customers, which accounted for 37.44% of all responses, highlighting the importance of effective communication in the perception of service quality. In contrast, the least frequent responses, oscillating around 10%, were for the need to increase service flexibility, suggesting that this is a lower priority area among respondents.

4. Conclusions

The empirical survey conducted in Sosnowiec analyzed the impact of the SARS–CoV–2 pandemic on the quality of courier services offered by InPost. Based on the survey data collected, a number of conclusions can be made about the company's performance during this particular period:

- Parcel–handling infrastructure was much better developed in the western part of the city, indicating an uneven distribution of services in the study area.
- The density of the distribution of parcel service machines (Parcel Machines) was much higher compared to staff–operated points. On average, there were 2084 users per Parcel Machine, and 19580 users per Parcel Point. The ratio of Parcel Machines to Parcel Points was nearly 10:1.
- The location of Parcel Machines was rated as good, as almost 75% of respondents declared that the distance to the nearest device did not exceed 500 meters.
- The InPost mobile app was very popular among users, with 72.6% of the surveyed population using its services. Of this group, 92.9% expressed satisfaction with the app's functionality, and 88% positively evaluated the ability to open boxes remotely.

In addition, one in four users of the app used the function of extending the parcel pick–up time.

- The overall assessment of the quality of InPost courier services was positive both before and during the pandemic. The values obtained during the pandemic were higher than before the pandemic, indicating an increase in customer satisfaction. Before the pandemic, the average score was 3.9, during the pandemic it rose to 4. The biggest improvements were seen in terms of on–time delivery.
- The introduction of new solutions by InPost, such as Office 24, Parcel on the Weekend, GOMOBILE strategy, Multiskrytka, Refrigerators, InPost Fulfillment, and InDoor Parcel Machines, contributed to an increase in the average rating of services in the surveyed categories, indicating the effectiveness of these initiatives in improving customers' perception of quality. Aspects such as timeliness of delivery and flexibility of services were particularly well rated.

Based on the analysis of the results of the empirical study, identification of the following recommendations for improvements for InPost could help increase operational efficiency and customer satisfaction:

- Infrastructural expansion: Significant investments in the expansion of courier infrastructure, especially in areas with lower levels of urbanization, will enable more even access to courier services, which can help reduce disparities in the availability of services in different areas.
- Increasing the number of delivery machines: The increase in the number of Parcel Delivery Machines responds to the growing demand of users, which may result in a reduction in the overload on individual machines and an increase in the overall efficiency of the distribution system.
- Mobile app optimization: Maintaining and developing the mobile app's functionality should be a priority, in light of its high user rating. Developing new functionalities and improving existing ones can increase user engagement and satisfaction.
- Improving complaint processes and service flexibility: Further improvements in the area of complaint processes and increased service flexibility can positively affect customer perceptions of the company, increasing customer satisfaction and loyalty.
- Sustaining on–time delivery: As on–time delivery is a key aspect of customer satisfaction, further investment in logistics optimization and delivery time management is essential.
- Innovation and implementation of new technologies: Continuing innovation initiatives, such as Refrigerators and Multiscreen, is key to maintaining a competitive edge and adapting to evolving market and technological expectations.

Summing up, the survey results show that InPost is well perceived by its customers, but there are still areas for further development and optimization. These measures are key to further increase customer satisfaction and improve operational efficiency.

References

1. *Akty–prawne–i–dokumenty–dotyczace–zapobiegania–przeciwdzialania–i–zwalczania–covid–19*. Retrieved from: https://www.katowice.uw.gov.pl/aktualnosci/akty–prawne–i–dokumenty–dotyczace–zapobiegania–przeciwdzialania–i–zwalczania–covid–19.
2. App Annie (2021). *The State of Mobile 2021 Report*. Retrieved from: https://www.data.ai/en/go/state–of–mobile–2021/.
3. Astute Analytica (2021). *Global B2B E–Commerce Market, By Type, By Payment Mode, By Enterprise Size, Estimation & Forecast, 2017-2027*.
4. Buko, J. (2009). *Powszechne usługi pocztowe w Polsce, stan obecny i koncepcja zmian*. Szczecin: Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, p. 24.
5. Chen, D. et al. (2020). Vehicle routing problem of contactless joint distribution service duringCOVID–19 pandemic. *Transportation Research Interdisciplinary Perspectives, Vol. 8(12)*. Retrieved from: https://doi.org/10.1016/j.trip.2020.100233.
6. Ciesielski, M. (2020). *E–commerce and fintech. Interconnected vessel system Report 300 Research*. Retrieved from: https://static.300gospodarka.pl/media/2020/11/Raport_–Ecommerce–i–fintechy_System–naczy%C5%84–po%C5%82%C4%85czonych_2020–r.pdf.
7. Czerwińska, M. (2023). *The impact of the COVID–19 pandemic on courier delivery innovation – InPost company case study*. European Conference on Innovation and Entrepreneurship. Retrieved from: https://doi.org/10.34190/ecie.18.1.1556.
8. Dones, R. (2020). *Demand on the of Courier Services during COVID–19 Pandemic in the Philippines*. International Conference on Frontiers of Industrial Engineering (IEEE).
9. Egozi, L. et al. (2022). Couriers' safety and health risks before and during the COVID‑19 pandemic. *International Archives of Occupational and Environmental Health, 95*. Retrieved from: https://doi.org/10.1007/s00420–021–01795–8.
10. Gruenwald, H. (2020). *Parcel Delivery Services boom during Covid–19*. Research Gate. Retrieved from: 10.13140/RG.2.2.35180.18569.
11. Jiang, Y. et al. (2023). Exploring the factors that drive consumers to use contactless delivery services in the context of the continued COVID–19 pandemic. *Journal of Retailing and Consumer Services*.
12. Kidawi, A.G. (2024). Consequences of covid –19 pandemic on courier delivery services. *Journal of New Zealand Studies*. Retrieved from: https://doi.org/ 10.5281/zenodo.7515111.
13. Last Mile Experts (2022). *Polish CEP report 2022,* Retrieved from: https://lastmileexperts.com/reports–subscriptions/.
14. Mehtab A. et al. (2021). Shipment Delivery and Covid–19: An Indian Context. *International Journal of Advanced Engineering Researchand Science*. Retrieved from: https://dx.doi.org/10.22161/ijaers.88.17.

15. Oommen S. et al. (2022). Courier Service demand during COVID–19 Pandemic in India. *Proceedings of the National Conference on Emerging Computer Applications (NCECA), Vol. 4(1).* Retrieved from: doi: 10.5281/zenodo.6364879.
16. PwC (2022). *Development prospects for the e–commerce market in Poland in 2018–2027.* Retrieved from: https://www.strategyand.pwc.com/pl/en/publications/2022/development–prospects–for–the–e–commerce–marketin– poland–in–2018–2027.html.
17. *Raport o stanie rynku pocztowego w 2021 r., Raport o stanie rynku pocztowego w 2019 r., Raport o stanie rynku pocztowego w 2017 r.* Urząd Komunikacji Elektronicznej. Retrieved from: https://bip.uke.gov.pl/raporty/2022,arch.html, 15.07.2022.
18. Regulamin świadczenia usługi „paczkomaty 24/7" przez InPost sp. z o.o. obowiązujący od 1.04.2022. Retrieved from: https://inpost.pl/sites/default/files/docs/regulaminy/regulamin–swiadczenia–uslugi–paczkomaty–247–przez–inpost–sp–z–oo–obowiazujacy–od–01042022–237471.pdf.
19. Sakas, D. (2022). *The Long Term Risk Familiarity Effect On Courier Services' Digital Branding During The Covid–19 Crisis, Vol. 17(4),* Retrieved from: https://doi.org/10.3390/jtaer17040084
20. Shen, H. et al. (2022). Investigation of online grocery shopping and delivery preference before, during, and after COVID–19. *Transportation Research Interdisciplinary Perspectives, Vol. 14.* Retrieved from: https://doi.org/10.1016/j.trip.2022.100580.
21. Statista (2023). *eCommerce report 2023, Statista Digital Market*. Retrieved from: https://www.statista.com/study/42335/ecommerce–report/.
22. Szpilko, D., Bazydło, D., Bondar, E. (2021). The impact of the COVID–19 pandemic on the scope and quality of courier services. Preliminary research results. *Marketing and Market, No. 5,* pp. 11-22.
23. *Szukam punktu odbioru Sosnowiec*. Retrieved from: https://gdzie–paczka.pl/m/sosnowiec
24. Toska, A. et al. (2022). Covid–19 and consumers' online purchase intention among an older–aged group of Kosovo. *International Journal of Emerging Markets*.
25. Watanabe, T., Omori, Y. (2020). Online consumption during and after the COVID 19 pandemic: Evidence from Japan. *The Impact of COVID–19 on E–Commerce, No. 10*.
26. Ziółko, M., Dziecic, D. (2021). *Transport i łańcuchy dostaw w czasie pandemii*. Warszawa: Wydawnictwo CeDeWu Sp. z o.o.