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## The impact of the COVID-19 pandemic on peer-to-peer accommodation businesses: The case of Airbnb

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### Abstract

**Aim/purpose** – This study aims to examine the impact of the COVID-19 pandemic on peer-to-peer accommodation (P2PA), investigate the potential factors related to organizational resilience based on resilience resources and consumer threat response frameworks, and revisit the tourism disaster management framework.

**Design/methodology/approach** – The operational Key Performance Indicators (KPIs) were analyzed in relation to host professionalism (organizational resilience) and property exposure to social contact (consumer threat response) for 23,334 properties available via the Airbnb platform. A regression model was proposed to estimate the impact of government policies on P2PA business performance.

**Findings** – The revenue, the occupancy rate, and the number of active properties decreased by –59.1%, –41.3%, and –20.4%, respectively. Professional hosts and properties offering less social contact showed lower declines in revenue and occupancy rate and their proportion in properties that survived 12 months after the pandemic breakout was higher. The consecutive waves of COVID-19 infections created a need to include a repetitive exchange of emergency and intermediate stages before the recovery stage could be started.

**Research implications/limitations** – For P2PA hosts, this study could serve as a useful contribution to shaping their tactics given the COVID-19 pandemic continuation or similar disaster to happen in the future. For governments or local authorities, this study should contribute to a better understanding of the impacts of various types of restrictions on accommodation segment performance. The limitation of this research is that it refers to big cities, extending it to rural destinations might reveal valuable insights. Additional-

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ly, it would be interesting to compare P2PA performance with other segments of the hospitality sector (e.g., hotels).

**Originality/value/contribution** – This study contributes to the knowledge of tourism disaster management, organizational resilience, and consumer threat response frameworks. It reveals potential factors related to property resilience in the face of disease-related disasters and proposes a revised framework for tourism disaster management.

**Keywords:** peer-to-peer accommodation, Airbnb, revenue, tourism disaster management, COVID-19 pandemic.

**JEL Classification:** M10, M39, L11, L25, D22.

## 1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic has impacted the world in multiple ways. One of the most affected industries is tourism, whereby operations have been limited or suspended for considerable periods due to lockdowns and various restrictions. According to the World Travel & Tourism Council (World Travel & Tourism Council [WTTC], 2021), as a result of COVID-19, the travel and tourism sector's contribution to gross domestic product (GDP) declined in 2020 by –49.1% compared to 2019, relative to a –3.7% GDP decline of the total economy.

In the last two decades, there has been an increase in disease outbreaks, but they had a regional impact (Nhamo et al., 2020) and were relatively short (Lai & Wong, 2020). COVID-19 appears to be different, with its impact being considerably stronger (Gössling, Scott, & Hall, 2020) and felt across the globe (WTTC, 2021). Dolnicar and Zare (2020) stressed that the COVID-19-induced shock is different in three critical ways: (1) it caused global travel decline, which is (2) more dramatic and (3) it has the potential to trigger structural changes in certain sectors of the industry, and thus it requires a separate assessment approach.

The COVID-19 outbreak has stopped the exponential growth of peer-to-peer accommodations (P2PA) in recent years (Hidalgo et al., 2021). The leader of the sector, Airbnb, generated \$3.4 billion in revenue in 2020, a 30% loss Year-on-Year (YoY) (BusinessofApps, 2022).

From the consumer perspective, COVID-19 constituted an unprecedented threat to people's health. According to the consumer threat response (CTR) framework, when a consumer senses the presence of contaminants in the environment and feels the emotion of disgust, the dominant behavioral tendency is to reject the contaminant and to isolate the self from potential infection (Han et al.,

2012; Lerner & Keltner, 2000; Lerner et al., 2004). During the COVID-19 pandemic, these effects were magnified by multiple governmental restrictions to limit the virus's spread.

Faced with lockdowns, the entrepreneurs fought hard to maintain their businesses, therefore exploring business features that enabled them to survive became crucial. The capacity of the organization to survive, recover, and grow is defined as organizational resilience (OR) (Huang & Farboudi Jahromi, 2021; Torres et al., 2019). The OR framework offers tools to outline the determinants, effects, and ways to measure the phenomenon. Its application to the growing sectors of the homestays and Airbnb has been recommended (Brown et al., 2018) and the COVID-19 pandemic offered the chance to do so.

Past research has considered crisis or disaster (cause of internal or external origin, respectively) management frameworks in the context of previous disease-related events and the initial phase of the COVID-19 pandemic. Based on the application of Ritchie's (2004) crisis management framework to tourism or Faulkner's (2001) tourism disaster management (TDM) framework, the studies pictured them as short-term events, with a clear roadmap of phases, heading from pre-event to recovery and resolution (for the latest literature reviews, e.g., Berbekova et al., 2021; Hao et al., 2020; Leta & Chan, 2021; Ritchie & Jiang, 2019; Wut et al., 2021). However, subsequent waves of infections followed by the re-imposition of travel restrictions proved that the COVID-19 pandemic had a different scheme. This made it necessary to revisit the earlier proposed frameworks.

In recent years, P2PA has become an increasingly important segment of the hospitality sector, which has been particularly strongly affected by the COVID-19 pandemic. In view of the extending duration of this pandemic and the threat of consecutive disease-related disasters appearing in the future, the need to thoroughly assess its impact and to improve organizational resilience of P2PA in the future becomes critical.

The literature on the impact of the pandemic on P2PA has been limited so far and concerns the early stage of the pandemic. Researchers used a restricted number of indicators with very few studies covering revenue. Moreover, the research on organizational resilience and social distancing in P2PA is particularly scarce. To gain a more comprehensive assessment of the COVID-19 pandemic impact on P2PA, an analysis of the broad array of business indicators, including revenue, in the extended time period is needed. Focusing on CTR and OR frameworks can shed light on the determinants of organizational resilience and survival in P2PA in the face of disease-related disasters.

This project aims to better understand the impact of the COVID-19 pandemic on P2PA in an extended time period. Quantitative methods were used to obtain in-depth insight into the effects of the pandemic on P2PA business performance as well as the factors related to their organizational resilience and survival. The TDM framework was revisited to discuss its accuracy for the COVID-19 pandemic and similar disease-related disasters in the future.

The paper is organized as follows. Section 2 covers the literature review, Section 3 elaborates on methods applied, Section 4 concerns research results, Section 5 covers the discussion of the results, and Section 6 focuses on conclusions, limitations, and future research recommendations.

## **2. Literature review**

### **2.1. Impact of the COVID-19 pandemic on P2PA**

Hotels measure their performance based on several dimensions (Harris & Mongiello, 2001) of which operational performance indicators have been reported to be most often used in research (Sainaghi, 2010). Operational performance indicators constitute a useful collation of customer and internal business perspectives since they are mainly indexes related to occupancy, prices, and revenue-per-available-room (RevPAR); hence, they depend not only on the relationships established with customers but also on the ability to saturate production capacity (Sainaghi, 2010). Since P2PA has been developed as an alternative to hotels, a similar approach can be applied to its performance measurement.

A stream of research has already appeared on a rapid assessment of the pandemic in the P2PA sector. First, the studies considered the sustainability of the P2PA business model in view of the COVID-19 super-shock (Dolnicar & Zare, 2020; Krouk & Almeida, 2020). Second, the research focused on P2PA customers (Bigne et al., 2020; Chuah et al., 2022; Lee & Deale, 2021; Načinović Braje et al., 2022; Vinod & Sharma, 2021); and P2PA hosts (Farmaki et al., 2020; Zhang et al., 2021), their attitudes to trust, risks and discrimination (Simonovits, Zách, & Kondorosy, 2021), or their well-being (Xu et al., 2021). Further, research tackled P2PA stakeholders' crisis management strategies (Miguel et al., 2022), impact on P2PA in relation to long-term renting (Thackway & Pettit, 2021), or modeling the state of housing rental (Lu, 2021).

A separate stream of research focused on assessing the impact of the pandemic on P2PA with respect to the selected indicators: active listings (Bugalski, 2020); bookings (Boros et al., 2020; Ştiubea, 2021); active listings and reviews

(Romano, 2021) or bookings and reviews (Liang et al., 2021); occupancy (Fialova & Vasenska, 2020); and price (Boto-García, 2020). Researchers examined the determinants of property survival (Türk & Sap, 2021) and the issue of social distancing (Bresciani et al., 2021; Hidalgo et al., 2021). Very few studies so far analyzed the revenue (Jang et al., 2021; Jang & Kim, 2022). For the summary of findings see Table 1. To enhance the cross-country comparisons the Oxford COVID-19 Government Response Tracker (OxCGRT) Ranking was calculated as a 12-month (March 2020 – February 2021) average OxCGRT Stringency Index (OxCGRT SI) per country ranked from 1 (the strictest) to 186. For a detailed explanation of OxCGRT SI see Subsection 3.1.

**Table 1.** Summary of the research on the impact of the pandemic on P2PA

References	Measures	Area	OxCGRT Ranking	Data granularity	Time period	Key findings
1	2	3	4	5	6	7
Jang & Kim, 2022	revenue occupancy rate	Florida, US	58	property	April 2020	leisure clusters and social resilience negatively influenced Airbnb revenue.
Știubea, 2021	bookings	Global	NA	global	monthly till September 2020	the drop in the number of bookings is directly related to governmental decisions (blocking travel).
Romano, 2021	active listings reviews	4 cities, Italy, Europe	17	city	till August 2020	variation 2020 vs 2019: active listings: $-3.79\%$ to $-10.16\%$ ; reviews: $-63.9\%$ to $-77.7\%$ .
Liang et al., 2021	bookings reviews	12 cities, Global	NA	city	till June 2020	four categories of patterns concerning booking rates.
Türk & Sap, 2021	survival property type reviews host type	Istanbul, Turkey, Europe	74	property	till October 2020	survival rate: 54%; among properties that survived, the proportion of entire apartments was higher; avg number of listings per host has increased.
Hidalgo et al., 2021	social distancing property type price	Madrid, Spain, Europe	59	property	till August 2020	lack of significance across different room types with regard to the price differential.
Bresciani et al., 2021	social distancing	Europe	NA	NA experiment	November 2020	travelers' reluctance to book shared flats on Airbnb when the physical distance was needed.
Jang et al., 2021	revenue occupancy rate destination attributes	Florida, US	58	property	April 2020	Revenue Per Available Listing (RevPAL): decrease of $-0.254$ ( $-25.4\%$ ), different impact by county: min: $-0.79$ ; max: $4.30$ .
Bugalski, 2020	active listings	189 cities, Europe	NA	city	quarterly till Q2 2020	decline across all city groups.

**Table 1 cont.**

1	2	3	4	5	6	7
Boros et al., 2020	bookings	15 cities, Global	NA	city	daily till 01.06.2020.	no uniform model of changes.
Fialova & Vasenska, 2020	occupancy rate	Czech Republic, Europe	115	property	till July 2020	occupancy rates (Feb-July 2020): expected 56.08%; actual: 40.2%.
Boto-García, 2020	price	Barcelona, Spain, Europe	59	property	monthly till April 2020	the drop in prices has been significantly greater among professional hosts, even though their average prices were always above those of non-professionals.

This study adds to the existing research by analyzing the broad array of indicators, extending the geographic scope with the country of medium OxCGRT SI (ranking 104), and the time horizon of the analysis till February 2021.

## 2.2. Organizational resilience (OR) framework

According to the latest work of Hillmann & Guenther (2021), the consequences to OR are survival, reduced organizational failure and decline, improved efficacy, organizational performance and competitive advantage, which is then reflected in financial performance. They conceptualized OR as the ability of an organization to maintain functions and recover fast from adversity by mobilizing and accessing the resources needed. An organization's resilient behavior, resilience resources and resilience capabilities enable and determine OR. The result of an organization's response to adversity is growth and learning (Hillmann & Guenther, 2021).

As for the hotel industry, the literature review provided by Brown et al. (2017) derived the following definition of OR: "A dynamic condition describing the capacity of a hotel, together with its stakeholders (staff, guests, the local community), to assess, innovate, adapt, and overcome possible disruptions that are triggered by disaster" (Brown et al., 2017). Consideration of economic, social, human, physical, natural, and cultural aspects of a business provides a new way for hotels to consider their resilience to disaster, and how to build and expand those resources. According to Brown et al. (2018), the evaluation of capital predictors may be, among others, made through the collection of secondary data, for example, statistics of hotel occupancy rates. The application of this framework to other accommodation sub-sectors may prove valuable in develop-

ing greater disaster resilience in the wider hospitality industry, e.g., growing new sectors of P2PA (Brown et al., 2018, 2021).

As far as OR of hotels is concerned, the COVID-19 pandemic has been studied in the context of predictors of resilience (strategy and change) (Melían-Alzola et al., 2020); employment trends (Khan et al., 2021); regional developments (Boto-Garcia & Mayor, 2022) or social networks (Pham, Coles, Ritchie, & Wang, 2021).

The decision to continue or discontinue operations may be driven by the host's features (Leoni, 2020), or, as in any business, its ability to generate profit. In high-fixed-cost businesses, such as airlines, restaurants, or hotels, profit is maximized through the optimization of revenue (Talluri & van Ryzin, 2005).

Previous studies on P2PA have proven discrepancies in the motives and behaviors of professional vs. non-professional hosts (Li et al., 2015; Koh et al., 2020; Wu, 2016). The researchers advocated that the hosts managing one property valued mostly social interactions and the experience of meeting the guests, while the motivations of the hosts managing multiple properties were more economically driven. Linking these findings to earlier mentioned frameworks of Brown et al. (2017) and Hillmann and Guenther (2021), the host professionalism is proposed as the potential factor to be linked to property resilience and survival of P2PA in the face of disease-related disaster.

Li et al. (2015) compared the financial performance of hosts with one property and hosts with two or more properties. They found that hosts with multiple accommodations had 15.5% higher occupancy and 16.9% higher daily revenue than the single-unit hosts. Research on Airbnb listings' survival in Ibiza (Balearic Islands, Spain) between July 2015 and September 2016, performed by Leoni (2020), confirmed that more expert hosts, both in terms of the number of listings managed and longevity on the platform, were less likely to leave. Assuming this would also apply to a disaster situation, the following hypotheses are proposed:

**H1:** In the event of a disease-related disaster, P2PA properties run by more professional hosts would experience smaller declines in (a) revenue and (b) occupancy, and (c) would be more likely to survive.

### 2.3. Consumer threat response (CTR) framework

External threats are explained as both the actual or potential occurrence of events with negative repercussions for consumer well-being (Campbell et al., 2020). The typology of threats covers economic, health, social, informational,

and environmental threats. Health threats negatively impact a consumer's own, or close others', physical health, such as the potential threat of getting sick from a contagious disease, or the actual threat of a loved one's cancer diagnosis (Campbell et al., 2020). In the context of a health threat, responses included the fear of contamination and disgust with seeing symptomatic others (Galoni et al., 2020; Tybur et al., 2013). Research showed that the behavioral immune system (Neuberg et al., 2011) motivates people to avoid contamination. According to the evolutionary perspective, self-protection and disease avoidance are two fundamental motives for reproductive fitness (Griskevicius & Kenrick, 2013). Taking an evolutionary approach, Huang and Sengupta (2020) provided evidence that the salience of disease contagion increases motivation to avoid others (Campbell et al., 2020).

Furthermore, as one of the most important precautions to limit the spread of the virus during the COVID-19 pandemic is social distancing (World Health Organization, 2021), the property types exposed to different levels of social contact could cope differently with the pandemic. Based on that social distancing is proposed as the potential factor to be linked to property resilience and survival in the face of disease-related disaster.

Bresciani et al. (2021) carried out the experiment with the participation of customers and proved the travelers' reluctance to book shared flats on Airbnb when the physical distance was needed. Türk and Sap (2021), focusing on property location and characteristics accompanied by guests' reviews component, analyzed their relation to property survival in the initial phase of the COVID-19 pandemic (until October 2020). They reported the overall survival ratio for the properties located in Istanbul of 54%. Moreover, they indicated that among properties that survived, the proportion of entire apartments was higher than before the pandemic outbreak and that the average number of listings per host has increased in the post-COVID period.

Linking the CTR framework to OR, WHO recommendations on social distancing and recent findings related to the early stage of the COVID-19 pandemic for P2PA the following hypotheses are proposed:

**H2:** In the event of a disease-related disaster, P2PA properties offering less social contact would experience smaller declines in (a) revenue and (b) occupancy, and (c) would be more likely to survive.



## **2.4. Tourism disaster management (TDM) framework**

Scholars distinguish between crises and disasters based on the cause or source of negative events. A crisis is defined as a result of inefficient actions of an organization (or several organizations), and disasters are developed from external roots whether they are natural or human-induced (Berbekova et al., 2021; Faulkner, 2001). Both concepts have been researched in the tourism industry, and corresponding management frameworks have been developed (Faulkner, 2001; Ritchie, 2004, 2008; Ritchie & Jiang, 2019; Wut et al., 2021). In this research, we focus on the seminal TDM framework by Faulkner (2001), who proposed a five-stage framework consisting of (1) pre-event (when action can be taken to prevent or mitigate the effects of potential disasters), (2) prodromal (when it is apparent that a disaster is imminent), (3) emergency (when the effect of the disaster is felt and action necessary to protect people and property), (4) intermediate (when the main focus is to restore services and the community to normal), and (5) long-term (recovery) (the continuation of the previous phase, but includes post-mortem, self-analysis, and healing).

Most of the research that appeared after the COVID-19 outbreak focused on the emergency and intermediate phases. Hao et al. (2020) applied Faulkner's (2001) framework to the early stages of the COVID-19 pandemic in China and proposed a management framework to address the anti-pandemic phases, principles, and strategies. However, as the pandemic continues and we witness consecutive waves of infections and restrictions, the disaster management framework requires further discussion to reflect this unique feature of the COVID-19 pandemic. Using the Oxford COVID-19 Government Response Tracker (OxCGRT) (Hale et al., 2021) monitoring of the containment and closure policies introduced by governments across countries, this study attempts to advance the disaster management framework in tourism.

## **3. Research methodology**

### **3.1. Data**

This study analyzed property-level monthly records and chosen characteristics of properties offered for short-term rent through the Airbnb website in the two biggest cities in Poland: Warsaw and Krakow. These two locations had the highest number of properties offered via Airbnb in Poland, which accounted for

approximately 38% of all historical Airbnb offers in the country; they were also the first two cities in Poland that exceeded 1000 active listings in the 3rd quarter of 2015 (Bugalski, 2020). The research was based on property-level data for the three KPIs: revenue, occupancy rate, and Average Rental Revenue per occupied (ADR), as well as the information regarding property host type: the number of properties offered per host, the property type, and the information on the property being active or not.

The initial dataset comprised 497,083 property-level monthly records for 40 268 properties in 67 months, from the beginning of data availability for Poland until the present (August 2015 to February 2021). To reflect the impact of the pandemic, the analysis was limited to a 24-month period – pre-COVID-19 (March 2019 – February 2020) and in-COVID-19 (March 2020 – February 2021).

The source of the data was AirDNA, the world's leading provider of short-term vacation rental data and analytics, which tracks the daily performance of over 10 million listings in 120,000 markets globally on Airbnb, Vrbo, and more (AirDNA, 2021). AirDNA data have been used in previous studies regarding P2PA (Chen & Xie, 2017; Gibbs et al., 2018; Jang et al., 2021; Koh et al., 2020; Kwok & Xie, 2019).

In addition, OxCGRT (Hale et al., 2021) was used to analyze the containment and closure policies introduced by governments to limit the spread of the virus. OxCGRT collects systematic information on policy measures taken by governments to tackle COVID-19. The different policy responses are tracked since January 1, 2020, cover more than 180 countries, and are coded into 23 indicators, such as school closures, travel restrictions, and vaccination policy. These policies are recorded daily on a scale to reflect the extent of government action (Hale et al., 2021). The Stringency Index takes a value from 0 to 100 (100 = strictest).

### **3.2. Variables**

In this research, the following operational KPIs of properties offered through the Airbnb service in Poland were analyzed: revenue and occupancy rate. The general findings were drawn upon 23,334 properties that showed revenue in any of the months in the 24-month period. These findings covered the properties that were active before March 2020, as well as the properties that were listed in March 2020 and later, during the COVID-19 pandemic. Further analysis focused on 20,236 properties that showed revenue in any of the months in the pre-COVID-19 period to

investigate the percentage change in their performance on a single property level. Finally, the number of properties for statistical tests was limited to 13,549 properties that showed any occupancy in the in-COVID-19 period.

The revenue reported monthly by AirDNA is the total revenue (in the native currency chosen by the host) earned during the reporting period and includes the advertised price from the time of booking, as well as cleaning fees. The variable was calculated as per formula [1]:

$$\text{Revenue percent change} = \left[ \frac{\text{Sum of revenue in-COVID19}}{\text{Sum of revenue pre-COVID19}} - 1 \right] \times 100 \quad [1]$$

The variable was defined as a ratio variable, ranging from  $-1$  (for properties with no revenue in the in-COVID-19 period) to  $150.85$  (16 outliers of more than  $50.0$  increase) and proven not to have a normal distribution.

The occupancy rate reported by AirDNA is calculated according to the formula:  $\text{Occupancy Rate} = \text{Total Booked Days} / (\text{Total Booked Days} + \text{Total Available Days})$ . The variable calculation followed the formula [2]:

$$\text{Occupancy rate percent change} = \left[ \frac{\text{Avg occup. rate in-COVID19}}{\text{Avg occup. rate pre-COVID19}} - 1 \right] \times 100 \quad [2]$$

The variable was defined as a ratio variable, ranging from  $-1$  (properties active, but with no bookings in the in-COVID-19 period) to  $145.56$  (1 property showed results of more than  $30.0$ ) and proven not to have a normal distribution.

The variables described above were tested against host professionalism (host type) and property exposure to social contact (property type).

Similar to previous studies (Koh et al., 2020; Kwok & Xie, 2019), host professionalism was operationalized by the number of properties a given host was managing. Hosts with more than one property ID matched to them were classified as multi-unit hosts (assigned as 1), and hosts with one property ID matched to them were classified as single-unit hosts (assigned as 0). As a result, a binary variable of the host type was created.

Regarding property exposure to social contact, Airbnb defines four property types: entire home/apt, hotel room, private room, and shared room. As hotel room, private room, and shared room property types assume repeated interpersonal contact with either the host or the other guests, they were grouped together. Consequently, a binary variable of property type was created with the entire home/apt group assigned as 1 and the other group assigned as 0.

Property survival was operationalized as properties that operated in any month of the 12-month pre-COVID-19 period (showed any revenue) and were active in February 2021. The properties active in February 2021 were assigned a value of 1 and the properties that were not active in February 2021 were assigned a value of 0. As a result, a binary variable was created.

### **3.3. Method**

To analyze the impact of COVID-19 restrictions on P2PA, the monthly average of the OxCGRT SI and YoY monthly Revenue Per Available Listing (RevPAL) percentage change was used. Linear and non-linear regression models were estimated for the relation.

Percentage changes in revenue and occupancy rate were tested against host and property types in pairs. As the dependent variables were ratio variables that proved not to be normally distributed, Mann–Whitney U tests were performed.

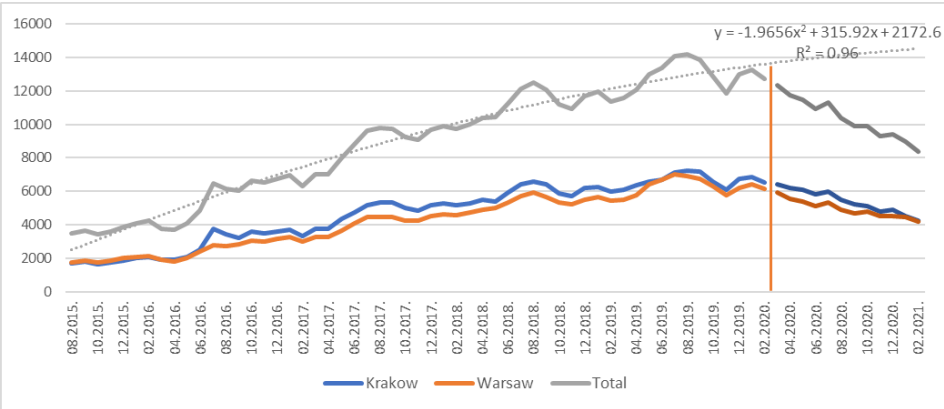
To analyze the survival of the properties, three binary variables were used: property survival, host type, and property type. To estimate the relationship between property survival vs. host type and property survival vs. property type,  $2 \times 2$  contingency tables were used, followed by the chi-square test for independence, Phi, Cramer's V, and contingency coefficient analysis. IBM SPSS Statistics was used for all the test calculations.

## **4. Research results**

### **4.1. Impact of the COVID-19 pandemic on P2PA**

The number of properties active on the Airbnb website in Krakow and Warsaw has been growing steadily since 2015. As evident in Figure 1, it reached its peak in August 2019 with 14,163 properties. The development showed some seasonality, with the growth driven by the summer months and a slight decline towards November, returning to growth in December. The growing trend was broken by the COVID-19 pandemic outbreak, and since March 2020, the number of properties active per month decreased, with a small uplift in July 2020, reaching the bottom of 8 387 properties active in February 2021. This was below the August 2017 results and accounted for a –40.8% decline vs. August 2019.

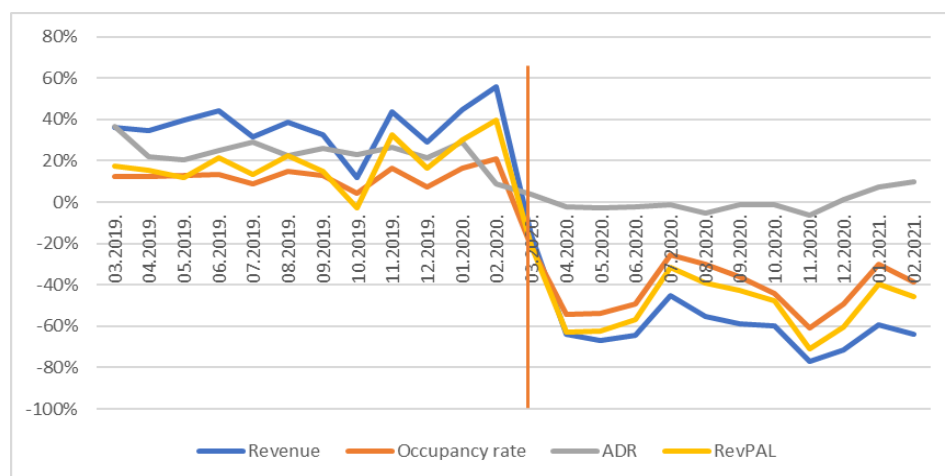
**Figure 1.** Number of active properties per month (August 2015 – February 2021).



Source: Author’s own elaboration based on AirDNA.

Regarding business performance, until February 2020 Airbnb properties in Warsaw and Krakow enjoyed growth in every KPI every month (except for a slight decline of –3% in RevPAL in October 2019) (Figure 2). The record revenue growth of 55.6% in February 2020 was not the month with the highest revenue; the highest revenue was observed in August 2019. As of March 2020, when the first COVID-19-related lockdown was imposed, all indicators declined sharply, reaching their bottoms in April, May, and June, recovering in summer and going down even deeper in the second lockdown in November 2020, reaching as much as –77.2% YoY decline in revenue. Of all indicators analyzed, ADR displayed a different pattern: from a solid growth of 20-30% in the pre-COVID-19 period, it stabilized around a 0% change in the in-COVID-19 period, with a 7.4-9.6% growth in January and February 2021. Comparing the 12-month average of the number of active properties in the in-COVID-19 period, it decreased by –20.4% relative to the pre-COVID-19 period (Table 2).

**Figure 2.** Monthly percentage changes in KPIs in the period of March 2019 to February 2021, compared to the same month last year



Source: Author's own elaboration based on AirDNA.

**Table 2.** Number of active properties

		# of active properties (average)				
		pre-COVID*		COVID**		Percent change
Total		12,992		10,339		
Location	Krakow	6,672	51.4%	5,389	52.1%	-19.2%
	Warsaw	6,319	48.6%	4,950	47.9%	-21.7%
Host	Multi-unit host	10,245	78.9%	8,375	81.0%	-18.2%
Type	Single-unit host	2,747	21.1%	1,963	19.0%	-28.5%
Property type	Entire home/apt	11,012	84.8%	8,833	85.4%	-19.8%
	Other	1,980	15.2%	1,506	14.6%	-23.9%

\* March 2019 – February 2020..

\*\* March 2020 – February 2021.

Source: Author's own elaboration based on AirDNA.

Although the declines did not differ much between the groups in the case of property location (Krakow declined by -19.2% and Warsaw by -21.7%), the host type showed a visible discrepancy between single-unit hosts, with a stronger decline of -28.5% and multi-unit hosts, with only an -18.2% decrease in the number of active properties. With respect to property type, the dominant property type, which was the entire home/apt declined by 19.8%, while the other property types declined by 23.9%.

The revenue decline among properties that showed any revenue during the 24 months (March 2019 – February 2021) was -59.1% (Table 3). Considering the listings that were operating before the COVID-19 pandemic (showed any

revenue in the pre-COVID-19 period), the decline was even bigger:  $-63.6\%$ . This meant that the result was somewhat better thanks to new listings created after the pandemic outbreak. The 12-month average occupancy rate declined by  $-41.3\%$  in the in-COVID-19 period compared to the pre-COVID-19 period. If only listings that were created before the COVID-19 outbreak were considered, the impact was slightly lower ( $-40.6\%$ ), which was a sign that they held somewhat higher occupancy rates than the new properties listed after the pandemic outbreak. The ADR 12-month average almost did not change between the pre-COVID-19 and in-COVID-19 periods, and in total, it accounted for a  $-0.2\%$  change. If the analysis was limited to properties that existed in the pre-COVID-19 period, the change became positive and accounted for  $1.4\%$

**Table 3.** Revenue, occupancy rate, and ADR YoY percent change

	Properties with any revenue in period of: 3.2019-2.2021. N = 23 334			Properties with any revenue in period of: 3.2019-2.2020. N = 20 236		
	pre- COVID*	COVID**	Percent change	pre- COVID*	COVID**	Percent change
Revenue (sum) [m. PLN]	491	201	$-59.1\%$	491	178	$-63.6\%$
Occupancy rate (avg)	56.8%	33.4%	$-41.3\%$	58.0%	34.4%	$-40.6\%$
ADRR – Average Daily Rate (avg – average) [PLN]	219.13	218.71	$-0.2\%$	219.13	222.23	$1.4\%$

\* March 2019 – February 202.

\*\* March 2020 – February 2021.

Source: Author's own elaboration based on AirDNA.

As indicated earlier, the strictness of the restrictions could be represented by the OxCGRT SI (Hale et al., 2021) and business performance could be represented by the RevPAL indicator. Regression modeling was used to estimate the relationship between the OxCGRT SI and RevPAL of Airbnb listings available in Warsaw and Krakow, Poland. The parameter estimates of the linear and logarithmic equations are listed in Table 4.

**Table 4.** Avg monthly OxCGRT SI and RevPAL YoY percent change linear and non-linear regression models

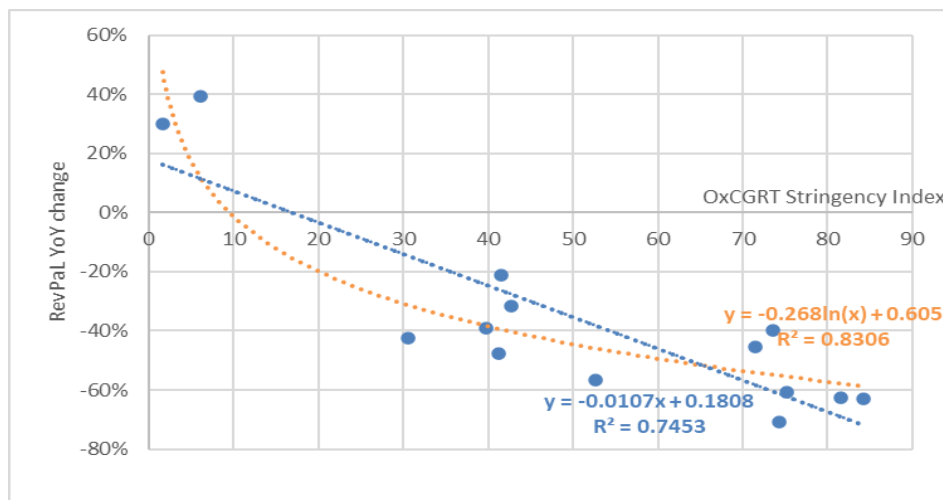
Specification	Model summary					Parameter estimates	
Equation	R Square	F	df1	df2	Sig.	Constant	b1
Linear	0.745	35.113	1	12	0.000	0.1808	$-0.0107$
Logarithmic	0.831	58.850	1	12	0.000	0.605	$-0.268$

Source: Author's own elaboration based on OxCGRT and AirDNA (IBM SPSS Statistics).

Both models appeared to be significant, with the logarithmic model achieving higher goodness-of-fit (R Square = 0.831 for logarithmic and 0.745 for the linear model). This means that the strictness of governmental restrictions

(OxCGRT SI) significantly predicts RevPAL of P2PA by explaining 83.1% and 74.5% of the variance (for logarithmic and linear models, respectively). Both models obviously indicate the negative influence of the OxCGRT SI on P2PA RevPAL. A graphical representation of the models is shown in Figure 3.

**Figure 3.** Avg monthly OxCGRT SI and RevPAL YoY percent change linear and logarithmic regressions



Source: Author's own elaboration based on OxCGRT and AirDNA.

The assumptions of a linear relationship and homoscedasticity were analyzed using scatter plots and the normality of residuals assumption was tested using the normal P-P plot of regression standardized residual. All three assumptions were met. However, the assumption of autocorrelation was not met, with the Durbin-Watson test result for this model accounting for 0.717. Furthermore, the normality of the distribution was tested, with the OxCGRT SI variable showing normal distribution and RevPAL variable appearing not to be normally distributed.

These models can be proposed to estimate the potential impact of government restrictions of various strictness levels on P2PA.

## 4.2. Organizational resilience and consumer threat response

Regarding P2PA OR, the hypotheses stated that properties run by more professional hosts and exposed to less social contact would experience smaller declines in revenue (H1a and H2a) and occupancy rate (H1b and H2b). The Mann-Whitney U Tests (Table 5) estimated significant positive relationships for both multi-unit



hosts and the entire home/apt property type. The mean ranks indicated lower revenue and occupancy rates decrease levels for multi-unit hosts and for the entire home/apt property type. These findings were supported by the calculations on the total level (Table 6), the declines in revenue and in occupancy rates for properties run by multi-unit hosts were smaller (−62.3%; −39.5%) than for those managed by single-unit hosts (−72.1%; −47.2%). Moreover, the total level of the entire home/apt property type revenue and occupancy rates declines were smaller (−63.1%; −39.7%) than for other property types (−69.2%; −47.7%). These results supported hypotheses related to the revenue and occupancy rates variables: H1a, H2a, H1b, and H2b.

**Table 5.** Mann–Whitney U and Chi-square test results

		Host Type		Property Type	
Revenue percent change	Mann–Whitney U	49,216,900	$p < 0.001$	32,565,181	$p < 0.001$
	<i>T</i>	28.850		13.623	
		SUH*	MUH*	Other*	EH/A*
	Mean ranks	8,155.82	10,785.16	8,902.42	10,362.01
	<i>N</i> = 20,236	5,188	15,048	3,376	16,860
Occupancy rate percent change	Mann–Whitney U	16,293,833	$p < 0.001$	12,795,350	$p < 0.001$
	<i>T</i>	11.543		8.536	
		SUH*	MUH*	Other*	EH/A*
	Mean ranks	5,978.82	6,963.89	6,080.56	6,893.43
	<i>N</i> = 13,549	2,598	10,951	1,974	11,575
Survival	Pearson's Chi-square	185.434	$p < 0.001$	29.371	$p < 0.001$
	Phi	0.096	$p < 0.001$	0.038	$p < 0.001$
	Cramer's V	0.096	$p < 0.001$	0.038	$p < 0.001$
		0 cells (0.0%) have an expected count of less than 5			

\* SUH = single-unit host; MUH = multi-unit host; EH/A = entire home/apt. Other = non-entire home/apt.

Source: Author's own elaboration (IBM SPSS Statistics).

As for Hypotheses H1c and H2c, the analysis aimed at investigating the relationship between property survival and host professionalism or property exposure to social contact. Group comparison (Table 6) indicated that among the properties that survived, the proportion of properties managed by multi-unit hosts was higher (81.2%) than among those that did not survive (71.8%) and it indicated a higher proportion of entire home/apt among the properties that survived (85.6%) than among those that did not survive (82.4%). The Pearson's Chi-square test (Table 5) indicated significant positive relationships between property survival and host type as well as property type. The results supported both H1c and H2c.

**Table 6.** Revenue and occupancy rate percent change. Property survival per host type and property type

	Revenue (sum) [m. PLN]			Occupancy rate (avg)			Survival				
	pre- COVID <sup>*</sup>	COVID <sup>**</sup>	Percent change	pre- COVID <sup>*</sup>	COVID <sup>**</sup>	Percent change	NO		YES		Total
	Host type										
MUH <sup>***</sup>	424	160	-62.3%	59.9%	36.2%	-39.5%	10,542	71.8%	4,506	11.2%	15,048
SUH <sup>***</sup>	68	19	-72.1%	50.6%	26.7%	-47.2%	4,142	28.2%	1,046	18.8%	5,188
	Property type										
EH/A <sup>***</sup>	448	165	-63.1%	59.1%	35.6%	-39.7%	12,106	82.2%	4,754	85.6%	16,860
Other <sup>***</sup>	44	13	-69.2%	51.8%	27.1%	-47.7%	2,578	17.6%	798	14.4%	3,376

\* March 2019 – February 2020.

\*\* March 2020 – February 2021.

\*\*\* SUH = single-unit host; MUH = multi-unit host; EH/A = entire home/apt; Other = non-entire home/apt.

Properties with any revenue in the period of: 3.2019-2.2020. N = 20,236.

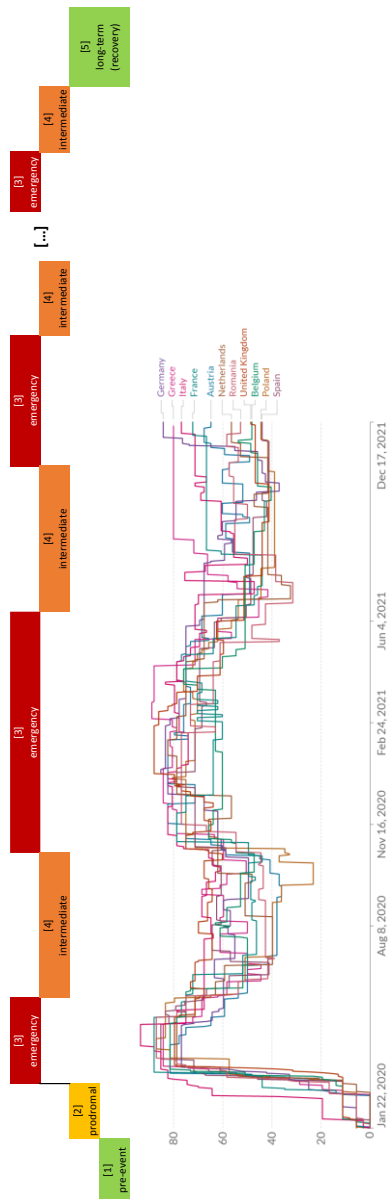
Source: Author's own elaboration based on AirDNA.

### 4.3. Tourism disaster management framework

Faulkner's (2001) TDM framework assumed five stages, namely (1) pre-event, (2) prodromal, (3) emergency, (4) intermediate, and (5) long-term (recovery). This framework was applied in cases of previous disasters, as well as the COVID-19 pandemic in its initial phase. The government's reactions to a new and unknown virus in March-April 2020 covered bans or limitations to international and domestic travel, closure of schools, leisure facilities, accommodation, restaurants, beauty and fitness services, and others. According to the OxCGRT (Hale et al., 2021) for European countries, after high scores of Stringency Indexes in spring, in the summer months the restrictions were eased (e.g., Germany, Austria, Italy, France, and Poland) (Figure 4). These two periods refer to the emergency and intermediate stages, which should be followed by the recovery phase. Unfortunately, from September to October 2020, the second wave of infections forced governments to re-impose restrictions. As an effect, the return to the emergency stage could be noticed in a number of countries (especially in Europe). The third wave of the pandemic, appearing in January-May 2021 (depending on the country), forced governments to sustain the restrictions. Towards summer, the restrictions were gradually withdrawn, allowing tourism to enter another intermediate stage, with the vaccinations building the confidence that the industry smoothly headed toward the recovery phase. However, as of September 2021, the number of cases started increasing again, and as of November 2021, some of the countries started re-imposing the restrictions entering the consecutive emergency phase. The

next intermediate stage should be expected in the spring or early summer of 2022. The proposed framework in relation to the chosen European countries is shown in Figure 4. It assumes several switches between the emergency and intermediate stages before it finally moves toward the recovery phase.

**Figure 4.** Tourism disaster management framework for COVID-19



Source: Author’s own elaboration based on Stringency Index data per country sourced from OxCGRT (2021).

## 5. Discussion

Following the theoretical foundations, KPIs and property survival were analyzed in relation to host professionalism (host type) and property exposure to social contact (property type).

This study shows the magnitude of the negative impact of government restrictions on P2PA. All analyzed business KPIs moved from healthy growth they enjoyed until February 2020, to no growth (ADR) or severe decline (revenue, occupancy rate, RevPAL) in the first 12 months of the pandemic. In addition, the number of active properties decreased sharply below the summer 2017 level. On the global level, Airbnb generated \$3.4 billion in revenue in 2020, a 30% loss YoY, also, the number of bookings in 2020 was 193 million, a 41% contraction from the 272 million in 2019. The number of listings was down from 7m in 2019 to 5.6m in 2020 (-20%) (Businessofapps, 2022).

Compared to Italy, where Romano (2021) reported a decline in the number of active properties by -8.13%, the decline in Poland was higher (-20.4%), moreover, if applying the same comparison periods (August 2020 to August 2019) – the decline for Poland was even stronger (-26.7%). This cannot be directly explained by the differences in strictness of governmental restrictions as Italy was one of the most affected countries by the pandemic, with the top 17 ranking of 12-month avg OxCGRT SI, while Poland holding the ranking of 104, was among medium-affected countries. Similar contradictory results are visible when we make a comparison to Turkey (the ranking number of 74), where the survival ratio for the properties located in Istanbul from January 2020 to October 2020 accounted for 54% (Türk & Sap, 2021), the survival ratio for Poland appeared to be higher: 74.3% (October 2020 to January 2020) and 63.1% (February 2021 to January 2020). In terms of RevPAL decline in Poland, it proves to be considerably higher than reported so far. For Florida, US (ranking 58), Jang et al. (2021) reported the RevPAL decline of -25.4% (April 2020 to April 2019), while for Poland this decline accounted for as much as -62.8%. Occupancy rates in Poland went down by -40.6%, from 58.0% to 34.4%, and compared to previous research, this decrease was again stronger. Data reported for the Czech Republic (ranking 115) indicated a lower decline (Fialova & Vasenska, 2020): -28.2%, from 56.08% to 40.2%, however, the period of their measurement was shorter. These inter-country comparisons indicate that it is not solely the strictness of restrictions that influence the operational KPIs of P2PA.

These severe declines might be temporary (after the restrictions are lifted, the business returns to its previous performance) or, more probably, following the logic of Dolnicar and Zare (2020) some longer-term changes might be observed (switch of properties from short-term to long-term rentals, the predominance of local vs. international travel, etc.).

The regression model proposed to estimate the revenue decline related to the strictness of government restrictions revealed that the relationship is not necessarily directly proportional. Growth in non-pandemic conditions, average –40% revenue decline with medium-level restrictions (OxCGRT SI at ca. 40) and ca. –60% revenue decline with high-level restrictions (OxCGRT SI at ca. 75-85) indicated that P2PA hosts found other than tourism sources of revenue. Indeed, out-of-office working, quarantine fulfillment, or medical staff isolation were mentioned as alternative rental purposes and allowed P2PA to retain at least some of the revenue.

This study also indicated that some properties tend to be more resilient to disasters (or disease-related disasters in particular) than others. As per OR and CTR frameworks, properties managed by multi-unit hosts and properties classified as entire home/apartment showed lower declines in revenue and occupancy rate, and their proportion in properties that survived 12 months after the pandemic breakout was higher than single-unit hosts and other property types.

This study confirmed the results of the experiment carried out by Bresciani et al. (2021) that proved the travelers' reluctance to book shared flats on Airbnb when the physical distance was needed and findings by Türk and Sap (2021) in Turkey, where the share of entire home/apartment property type increased from 69.2% (January 2020) to 72.8% (October 2020).

Advancement to the existing TDM framework by Faulkner (2001) was also proposed, which included the repetitive exchange of emergency and intermediate stages before the final move toward the recovery stage. Such a flow, characteristic of the majority of European countries during the COVID-19 pandemic, introduced additional turbulence in managing businesses in the tourism sector. The additional shock caused by an unexpected return to the emergency stage was amplified by the uncertainty of the strictness and length of re-imposed restrictions (the governments were introducing the restrictions at very short notice and prolonging them as a given wave of infections developed). Such a framework, which assumed switching on and switching off the businesses almost overnight and for undefined periods of time, appeared to be more demanding, resulting in a further decline in the number of active Airbnb listings available in Poland in the second wave of government restrictions.

It is worth mentioning that not all the regions followed the same pattern as in Europe. Countries such as Canada, Indonesia, and Venezuela, where the restrictions were held at relatively high levels throughout the last 24 months, experienced fewer fluctuations and therefore their pattern differed from the one proposed for Europe.

## **6. Conclusions**

In summary, this study added to the developing stream of research focused on assessing COVID-19 impact on hospitality sector business performance in several aspects. It offered an analysis of the main business KPIs (revenue, occupancy rate, and ADR) as well as survival for properties available through the Airbnb platform in Poland. It enhanced the OR framework by applying the concepts of resilience resources (Hillmann & Guenther, 2021) and human aspects of the business (Brown et al., 2017) to the P2PA sector. Along with it, this study confirmed the importance of property attributes and host professionalism in P2PA resilience in the face of disease-related disasters. In particular, building on the CTR framework, it confirmed that in view of contagious disease consumers tend to choose locations offering less social contact. A regression model was presented to illustrate the relationship between the strictness of governmental restrictions and business performance in P2PA. This study also attempted to advance the framework for TDM, taking into consideration the unprecedented characteristics of the COVID-19 pandemic, with consecutive waves of infections followed by governments lifting and re-applying the travel and people movement restrictions several times in the last 24 months.

For practical implications of this study, except for an exhaustive analysis of the impact of the COVID-19 pandemic on business, which could serve as a benchmark for any accommodation provider to assess their performance, there are at least two groups that could benefit from this study. For P2PA hosts, this study could serve as a useful contribution to shaping their tactics in view of the COVID-19 pandemic continuation or similar disaster to happen in the future. They should strive for high flexibility, as the restrictions might cause immediate and sharp changes in demand, leading to unprecedented occupancy rates and revenue drops. The restrictions may also be lifted and re-imposed by governments several times, with different strictness and undefined length; thus, entrepreneurs should develop the ability to switch businesses off and on almost over-

night and survive during lockdown periods. In addition, especially in the face of disease-related disasters, social distancing plays an important role, making the entire home/apt property type more resilient to disaster consequences than other property types. Further limitations of social contact should be assumed by the hosts, like contact-less key access or electronic PIN pad-allowed locks. For governments or local authorities, this study should contribute to a better understanding of the impacts of various types of restrictions on accommodation segment performance. This should allow the authorities to better formulate the measures counteracting the consecutive COVID-19 waves as well as programs supporting the businesses during lockdowns.

The limitation of this research is that it refers to two cities. Krakow and Warsaw were chosen for the analysis, as they are the biggest cities in Poland, responsible for approximately 38% of all Airbnb historical listings in the country, and the first two cities in Poland that exceeded 1000 active listings in the 3rd quarter of 2015. However, as tourists' perceived risk of the virus infection may be reduced in rural destinations because of the low density of tourism facilities and businesses and the ease of social distancing (Jang et al., 2021), extending this study to rural destinations might reveal valuable insights. Additionally, albeit this study focused on P2PA, it would be interesting to compare its performance with other segments of the hospitality sector (e.g., hotels) to reveal any discrepancies in more intense social contact conditions. As the pandemic continues to develop, it would also be recommended to further extend the research time horizon to observe long-term effects on hospitality.

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No potential conflict of interest was reported by the author(s).

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