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An Empirical Analysis on the Sharing Economy: The Case of Airbnb in Warsaw

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**An Empirical Analysis on the Sharing Economy: The Case of
Airbnb in Warsaw**

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Abstract

Research background: Consumption habits and the provision of services have undergone significant changes in the recent years. Platforms made way for new business models, which are often referred to as sharing economy or collaborative economy. Among the most valuable firms of the sharing economy is Airbnb, a platform for short-term accommodation rentals.

Purpose of the article: The aim of the article is to analyse the characteristics of the Airbnb network in Warsaw, Poland. The paper investigates to what extent Airbnb may generate value from underused assets and whether it brings tourism to districts previously less popular among visitors.

Methodology/methods: The analysis is based on a unique dataset, which contains all Airbnb listings of Warsaw. The dataset has been constructed by the author using web-scraping technology. Descriptive statistics and kernel density estimation are implemented for the empirical analysis.

Findings & Value added: The vast majority of the Airbnb network is focused on the short-term rental of entire homes and apartments in the city centre. Furthermore, the majority of listings belong to hosts, who offer more than one accommodation. The characteristics of the network suggest that the potential of Airbnb to generate value from underused assets is restricted: the primary activity of Airbnb decreases the number of properties on the long-term housing market. Comparing to traditional hotels, Airbnb is not significantly facilitating tourism in the outer districts of the city. The main contribution of the paper to the literature is the analysis of the entire population of Airbnb in a major city and its comparison to the traditional services sector. This is also the empirical analysis on the sharing economy and Airbnb in Poland.

Introduction

Sharing economy firms are primarily present in tourism, transportation sector, personal finance and education. The subject of this analysis is Airbnb, a 'trusted community marketplace', offering accommodation in 65000 cities and 191 countries (Airbnb, 2017). Airbnb became a major player in the tourist industry and a strong competitor for traditional hotels and accommodation providers. The total number of Airbnb listings is more than 3 million, which is all the more spectacular considering that Airbnb was founded in 2008, and that since 2015 the number of listings tripled.

Let us briefly describe the business model of Airbnb. Airbnb connects the owners of various types of accommodations with individuals looking for a place for overnight stay. Airbnb is a mere provider of the ICT infrastructure for the transaction, it does not own any of the listed properties. Hosts can easily offer their service on the website, as Airbnb provides them the entire ecosystem. Airbnb charges a 5-15% service fee from the guest (depending on the value of the transaction- the higher the lower the share of the fee), and 3-5% from the host (Airbnb, 2017). Guests may be further charged with a cleaning fee or a security deposit by the host.

The supporters of Airbnb argue that the platform generates value from underused assets, that is free space in one's home. As Airbnb enables practically any individual to provide services, it may help unemployed people to earn income. Additionally, Airbnb may bring tourists to new, previously less visited parts of cities.

The aim of this article is to analyse Airbnb offers in Warsaw in the context of the traditional hotel sector. Such comparative analysis highlights the similarities and differences between the characteristics of traditional and collaborative services in the tourism sector. Furthermore, the potential of Airbnb to generate value from underused assets is examined, along with its role in facilitating tourism in new, previously less visited districts of the city.

The rather narrow empirical literature on Airbnb is briefly summarised below. Quattrone et al. (2016) analyse the Airbnb network in London in the time period 2012-2015 and confirm that the number of Airbnb listings is decreasing from the various city centres of London. While in the entry phase (2012) the most important determinant of the location of Airbnb accommodation has been the distance from the city centre, over time the financially struggling and more bohemian districts gained importance. Gutierrez et al. (2017) provide a spatial analysis on the Airbnb network in Barcelona and conclude that Airbnb is strongly concentrated in the historic city centre, expanding on a wider area in the city centre than traditional hotels. Zervas et al. (2016) analyse the impact of Airbnb on the hotel

industry in Texas. The authors use a difference-in-difference approach and find that a 10% increase in the number of Airbnb offers results in a 0.37% decrease in hotel revenues. In comparison, a same increase in the supply of hotel rooms causes a 1.5% decrease in revenue, which suggests that Airbnb is a weak substitute for hotels in Texas. Neeser (2015) comes to a similar conclusion repeating the analysis for the Nordic countries. Coyle and Yeung (2016) examine the activity of Airbnb in 14 European cities and follow the same model as Zervas et al. (2016) to explain the hotel occupancy rate with the number of Airbnb listings. The authors find a negative effect on hotel occupancy rates, however, the effect on total hotel revenues and average hotel prices is positive. Wang and Nicolau (2017), provide an analysis on the determinants of Airbnb prices in a wide sample of scraped data on Airbnb offers in 33 cities in Europe and in North-America.

Currently, the literature lacks comparative analyses on the services provided by sharing economy platforms and traditional firms. The major contribution of this analysis is the presentation of the entire population of Airbnb offers in a major city, and compare it to the traditional sector. Furthermore, this is also the first empirical analysis on the sharing economy in Poland.

The empirical analyses consist of the following sections:

Firstly, the research methodology and the data set are introduced. Secondly, the accommodation offers provided by Airbnb are examined by several attributes, including price, location or number of user reviews. Thirdly, the activity of Airbnb is analysed in the districts of Warsaw and compared to traditional hotels. The paper ends with conclusions.

Research Methodology and Data Set

The main goal of this work is to analyse the services provided by Airbnb in Warsaw. Therefore, the key issue of the analysis is the preparation of an adequate dataset. The data on Airbnb listings in Warsaw has been collected using web-scraping technology during two business days in February 2017. Web-scraping is an innovative method of collecting unstructured data from websites with the usage of a web-crawler. The dataset contains the following variables:

- Geographical location (longitude and latitude of the listing)
- Accommodation type (Single Room, Shared Room, Entire Home)
- Number of guests (maximum number)
- Price per night (shown by the website as the price of the listing for a night)

- Cleaning fee
- Number of pictures for the offer
- Host ID (an identification number of the host offering the listing)
- Superhost status of the host
- Review Count (number of reviews by guests)
- Satisfaction (overall user rating of the experience)
- Internet (dummy variable if the listing provides Internet)
- Kitchen (dummy variable)
- Real Bed (dummy variable for double bed)

Based on the geographical data, the distance from the city centre has been calculated for every listing in kilometres (using Vincenty's solution to the inverse geodetic problem). Additionally, the number of listings provided by a host has been additionally calculated (based on the Host ID).

Our dataset is combined with official district-level statistics from 2015 on the number of beds in traditional hotel sector (hotels, hostels and other facilities), the number of overnight tourists, the space in residential buildings (m^2), and on the number of the unemployed in every districts of Warsaw. The source of the data is the Statistical Office in Warszawa (2016).

Descriptive statistics and KDE (kernel density estimation) analysis on prices will be used to examine the population of Airbnb listings. The data has been cleaned from outliers for the KDE: the first 2 percentiles and the last 2 percentiles of price distribution have been removed.

Airbnb in Warsaw: an empirical analysis

Firstly, let us review descriptive statistics on Airbnb in Warsaw. Altogether, 3457 unique listings were collected: 2699 entire homes, 680 private rooms and 78 shared rooms. Therefore, the data shows that the overwhelming majority of Airbnb listings (78%) present entire homes. This may suggest that the Airbnb platform is used as an alternative for long-term flat renting. The situation when the host is potentially offering free space in the permanent place of living (single rooms and shared rooms) is only around 22%. However, more advanced analysis methods (text-mining) would be necessary to determine if the host is living in the offered home, as many of the shared rooms stand for regular hostels.

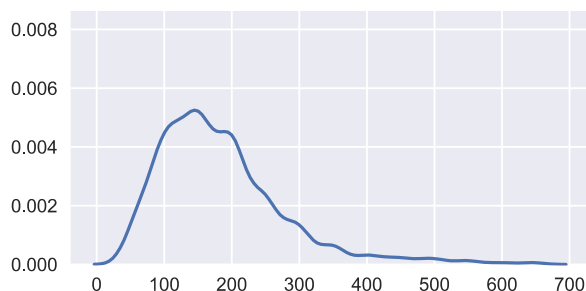
Table 1. Airbnb Listings in Warsaw (Prices in PLN)

		Entire home/apt	Private room	Shared room
	Number of observations	2699	680	78
<i>Price without cleaning fee</i>	mean	226.21	117.67	66.05
	median	186.00	89.00	52.00
	standard dev.	321.19	211.37	54.20
<i>Price with cleaning fee</i>	mean	260.93	130.94	71.04
	median	210.00	101.00	52.00
	standard dev.	355.01	212.37	58.16
<i>Cleaning Fee</i>	mean	34.72	13.27	4.99
	median	0.00	0.00	0.00
	standard dev.	64.21	27.83	18.63
<i>Superhost</i>	mean	0.16	0.13	0.04
	median	0.00	0.00	0.00
<i>Host ID</i>	Number of hosts	1549	526	52
<i>Distance</i>	mean	2.68	4.42	3.67
	median	1.91	3.87	2.17
	standard dev.	2.31	3.13	3.57
<i>Review Count</i>	mean	16.15	12.70	7.22
	median	4	2	1
	standard dev.	30.77	24.58	15.09
<i>Satisfaction</i>	number of obs.	2051	439.00	47.00
	mean	93.39	94.02	92.55
	median	96.00	96.00	96.00
	standard dev.	8.90	8.06	9.99

Source: Own elaboration

As expected, the prices are increasing with the space of the rented property: cheapest are shared rooms (mean price approx. 12.5 EUR with cleaning fee), more expensive are private rooms (25 EUR) and apartments (around 50 EUR). The high standard deviations suggest a skewed price distribution, with a long tail. The distribution of the prices for all types of Airbnb listings is presented in Figure 1.

Figure 1. Histogram and kernel density estimation of prices on Airbnb (without cleaning fee in PLN)

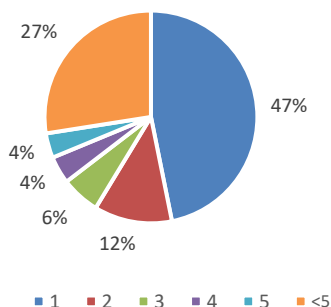


Source: Own elaboration

When it comes to location of the listings, half of all apartments is in the radius of 2 kms from the city centre. Single rooms are further from the centre, and also more varying in distance, based on the standard deviation. Table 1. also presents descriptive statistics on user reviews. The data suggests that many listings are new or have not been visited at all, as the median number of reviews is low. On the other hand, the data confirms the extremely high user ratings, typical for Airbnb and other popular sharing economy platforms, such as Uber.

Let us continue with the analysis of the ownership structure of Airbnb. The share of listings offered by hosts owning 1 listing is only 47%. Therefore, 53% of the listings are multi-listings, which may mean a strong presence of various real-estate investors and professional agencies that use the Airbnb platform to provide professional services. As Figure 2. shows, more than a quarter of all accommodations offered via Airbnb belongs to hosts with more than 5 listings.

Figure 2. The share of Airbnb listings belonging to hosts owning different number of offers (hosts with 1-5+ offers)



Source: Own elaboration

Next, the Airbnb network in Warsaw is examined in the context of district characteristics. The data is presented as the district's share of the overall statistics in Warsaw, e.g. 0,93% of Airbnb listings, 1,3% of hotel beds in Warsaw are located in Bemowo district. The data on unemployment refers to the share of unemployed people in Warsaw living in the different districts (e.g. 5.8% of unemployed in Warsaw live in Bemowo).

We can draw interesting conclusions from the data. Firstly, Airbnb is more concentrated in the city centre than traditional hotels: 44% of Airbnb listings is located in the centre (Śródmieście district), while in the case of hotel beds the share is 41,3%. Therefore, a higher share of traditional hotels is spread in the outer residential districts: notable exceptions are the Praga districts and Wola. Secondly, the spatial distribution of Airbnb accommodation seem to be weakly related to the amount of residential space, as residential districts like Ursynów are underrepresented on Airbnb. Thirdly, the data does not support a robust relationship between the provision of accommodation and unemployment, as districts with a higher share of unemployed inhabitants (Bielany, Mokotów, Praga-Pół etc) do not have a considerably higher share of Airbnb supply (with the exception of Wola).

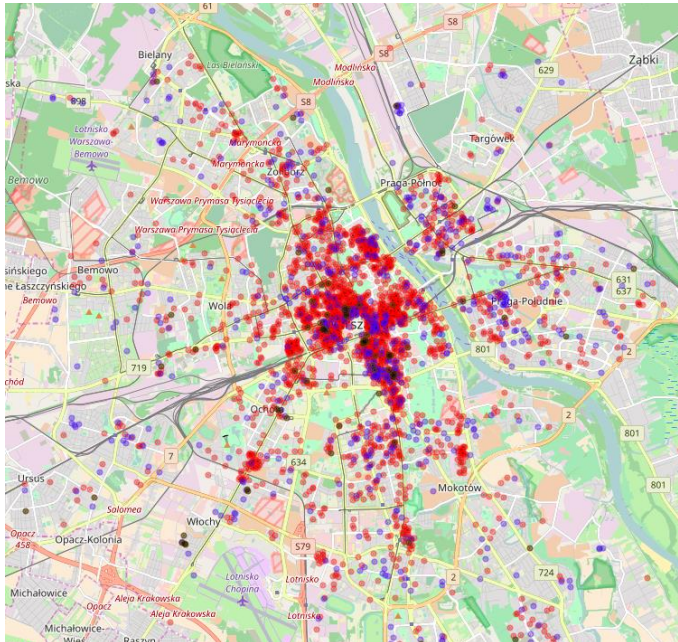
Table 2. Airbnb activity in various districts of Warsaw, along with district statistics

	Airbnb Listings	Hotels (bed places)	Hotel guests	Flats(m2)	Unemployment
<i>Bemowo</i>	0.93%	1.29%	1.14%	6.25%	5.80%
<i>Białołęka</i>	0.52%	2.26%	0.57%	6.78%	5.03%
<i>Bielany</i>	2.26%	1.09%	0.49%	6.55%	7.88%
<i>Mokotów</i>	11.25%	11.12%	8.11%	13.03%	11.19%
<i>Ochota</i>	4.83%	9.16%	13.08%	4.56%	4.62%
<i>Praga-Poł.</i>	6.28%	3.37%	2.44%	9.34%	12.09%
<i>Praga-Pół.</i>	4.28%	1.00%	1.77%	2.85%	6.28%
<i>Rembertów</i>	0.14%	0.42%	0.10%	1.39%	1.56%
<i>Śródmieście</i>	44.06%	41.26%	46.75%	7.22%	7.21%
<i>Targówek</i>	0.95%	0.37%	0.07%	5.62%	7.69%
<i>Ursus</i>	0.49%	0.13%	0.11%	2.95%	2.77%
<i>Ursynów</i>	2.83%	3.90%	2.56%	9.27%	6.24%
<i>Wawer</i>	0.87%	4.61%	2.71%	5.75%	4.22%
<i>Wesoła</i>	0.12%	0.66%	0.30%	1.86%	1.22%
<i>Wilanów</i>	1.10%	1.13%	0.64%	3.47%	0.94%
<i>Włochy</i>	2.02%	10.36%	9.88%	2.70%	2.29%
<i>Wola</i>	14.55%	7.89%	9.27%	7.22%	10.37%
<i>Żoliborz</i>	2.52%	-	-	3.19%	2.62%

Source: Own elaboration

Finally, the map of all Airbnb listings are presented on Figure 3. The map shows the strong focus in the city centre, and also along the metro lines. Red dots presents entire homes, blue ones single rooms, while black dots shared rooms.

Figure 3. Location of all Airbnb listings in Warsaw



Source: Own elaboration

To conclude, Airbnb does not seem to significantly differ from the traditional sector in facilitating the spread of tourism to the outer districts of Warsaw. The density of the Airbnb network seem to be determined by the closeness to the city centre, and not by the available residential space. Furthermore, district level statistics do not confirm a robust relationship between the share of unemployed and provision of services via Airbnb. However, Airbnb is more active in the bohemian Praga districts, which supports the experience in London (Quattrone et al., 2016).

Conclusions

Airbnb may be facilitating the utilisation of underused assets, the free space in one's home. However, the data in Warsaw suggests that this may be the case only for the minority of listings. Furthermore, the highly

concentrated ownership structure suggests that Airbnb is often used as a platform for professional agencies, providing business-to-consumer services.

The analysis does not support the common belief that Airbnb is bringing tourism to places where traditional hotels and hostels are not present. The Airbnb network is more concentrated in the city centre than traditional hotels, and the number of Airbnb listings is weakly related to the available residential space.

The major contribution of this analysis is the spatial comparison of sharing economy services with the traditional sector in Warsaw. This paper constitutes the first empirical summary on the activity of Airbnb or any other sharing economy service in Poland.

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