

Profiling Shared Accommodation Users: A Segmentation Study of European Countries

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Abstract. *This study explores how individuals from 30 European countries use online platforms to rent shared accommodation. Within the study, we used data from Eurostat's ICT survey, which collects information about people's use of technology. While the data has some limitations, the study was able to use 14 different indicators to segment countries into clusters. Countries differed in how much people used shared accommodation and these differences were related to factors such as education and family status. The study identified four distinct groups of countries based on how much people use shared accommodation. These groups show different stages of adoption of shared accommodation and provide insights into the characteristics of people who use them. The results of this study could be useful for decision-makers and policymakers, as well as individuals.*

Keywords. *Sharing economy, cluster analysis, shared accommodation, segmentation analysis, k-means*

1 Introduction

There is a long tradition of exchanging and sharing goods or services like cars, tools, time, or knowledge. In the past, these transactions mostly took place informally within families, among friends or neighbours, and sometimes within broader social circles. However, the digital economy's emergence and growth, especially with the development of the Internet, has considerably increased the possibilities for arranging such exchanges. Today, these transactions can occur between individuals who were previously unknown to each other and can be organised more efficiently due to reduced information and logistics costs (Basselier et al., 2018).

Sharing has been a part of human behaviour since ancient times, but collaborative consumption and the concept of the "sharing economy" are products of the Internet era (Belk, 2014). The use of sharing economy services has increased significantly in recent years, and based on predictions, the total value of the global sharing economy is expected to be 335 billion US dollars by 2025, compared to 14 billion US dollars in 2014 (Yaraghi & Ravi, 2017). The sharing economy is a system of peer-to-peer exchange enabled by information technology, in which individuals or businesses share unused goods or services through an intermediary without transferring ownership for either commercial or non-commercial reasons (Schlagwein et al., 2019). The sharing economy offers individuals an additional way to earn income, for example, driving for Lyft, selling products on Etsy, lending money on LendingClub, or providing services on Upwork. As a result, sharing economy companies are reshaping a large number of markets (Eckhardt et al., 2019).

One part of this phenomenon are online marketplaces that enable peer-to-peer accommodation rental services (Guttentag, 2015). Examples of such online markets are Airbnb, Vrbo and HomeAway. In the sharing economy, demographic characteristics like the level of education and age are important because higher levels of education are often connected to increased participation, and younger generations are usually actively engaged in these innovative platforms (Puschmann, 2016). The primary purpose of this research is to determine how European countries can be segmented according to the characteristics of those who use shared accommodation.



The next section explains the data collection procedure and the Eurostat indicators used in the study. Section three provides an overview of the results. The final section contains a discussion and concluding remarks.

2 Research methodology

Since online platforms that offer shared accommodation services are not obligated to share data and studies on this topic are often limited by the number of people participating, finding adequate data is no easy task. For this study, we used data available from Eurostat from the annual ICT (Information and Communications Technology) survey on the use of information technology by households and individuals in the European Union (EU). In addition to European Union members, data is also available on countries that are candidates for membership, such as Serbia, Bosnia and Herzegovina and Turkey. Since data is available for Switzerland and Norway, they are also included in the study. Despite being a member of the EU, Ireland is excluded from the research due to the severe lack of data. As a result, the research covers the 26 EU members (without Ireland), as well as Norway, Switzerland, Serbia, Turkey, and Bosnia and Herzegovina.

Eurostat has data on the sharing economy, and the values are calculated in percentages, which means the percentage of individuals in each of the listed countries who made an online purchase to rent shared accommodation from another individual. Furthermore, percentages are also provided based on unique demographic attributes like age and gender, level of education, presence or absence of children in the home, and manual labour involvement. To segment European countries based on the characteristics of users who use shared accommodations services via online platforms, the study included data on every relevant demographic factor that was accessible. The research was conducted with the latest available data, which is from 2023.

Data was gathered for the following 14 indicators: All Individuals [All], Individuals 16 to 24 years [16-24], Individuals 25 to 34 years [25-34], Individuals 35 to 44 years [35-44], Individuals 45 to 54 years [45-54], Individuals 55 to 64 years [55-64], Individuals 65 to 74 years [65-74], Individuals with no or low formal education [No/Low Edu], Individuals with medium formal education [Med Edu], Individuals with high formal education [High Edu], Non-manual including the armed forces [Non-manual], Manual [Manual], Individuals living in a household with children [With Children], Individuals living in a household without children [No Children]. Other indicators are disregarded due to the lack of data for every country included in the analysis or due to the low probability that the current values are correct. R software was used for the descriptive statistics and segmentation analysis. Descriptive statistics for these 14 indicators can be found in Table 1 presented below.

Table 1. Descriptive statistics of the observed 14 Eurostat indicators (Source: Author's work)

Indicator	Mean	Std	Min	Max
All	6.06	3.56	0.76	13.84
16-24	6.99	4.14	0.52	16.73
25-34	10.37	5.40	1.82	21.84
35-44	8.44	5.21	0.68	23.89
45 to 54	5.92	3.90	0.52	15.95
55-64	3.21	2.56	0.16	9.43
65-74	1.49	1.63	0.00	5.95
No/Low Edu	2.07	1.93	0.00	7.21
Med Edu	4.76	2.90	0.52	10.65
High Edu	11.27	6.43	1.93	30.77
Non-manual	7.44	4.45	0.62	16.37
Manual	5.41	3.31	0.87	13.44
No Children	3.49	2.89	0.17	14.26
With Children	9.55	5.00	1.66	21.27



Looking at the mean values, we can conclude that those with higher education are those who participate in the shared accommodation the most, the European average is as much as 11.27%. The results also point out that the older individuals are not participating in the concept. Standard deviations indicate that the greatest variability on the European level is seen within the group of the highly educated and those in the age range 25-34.

In order to use the k-means algorithm for segmentation, it was important to check if there were any outliers. Outliers can have an influence on the results of the k-means algorithm and the overall quality of the clustering structures. The p-value for each Mahalanobis distance was calculated using the Chi-Square statistic with 13 degrees of freedom. There were no outliers because the p-values were all above 0.001. However, Croatia was the closest to being an outlier, and since it influenced the algorithm's quality, it was not included in further analysis.

3 Research results

The k-means algorithm was used to segment 30 European countries based on the indicators mentioned earlier. Based on the silhouette score and taking into account cluster's size and structure, it was determined that European countries should be segmented into four groups. The first cluster has seven countries, the second has ten countries, the third has nine countries, and the fourth one contains four countries. Table 2 shows the mean values of each indicator per cluster and the cluster size.

Table 2. The mean values of chosen indicators per retained cluster (Source: Author's work)

Indicator/Cluster	Newcomers	Developing adopters	Progressive adopters	Advanced users
Cluster size	7	10	9	4
All	1.77	4.59	7.82	12.42
16-24	2.11	5.64	10.03	11.81
25-34	3.43	8.61	12.97	19.15
35-44	2.35	6.84	9.95	15.82
45 to 54	1.62	4.34	7.66	13.12
55-64	0.77	2.25	4.04	8.10
65-74	0.24	0.78	2.14	4.26
No/Low Edu	0.34	1.30	3.33	4.70
Med Edu	1.12	3.70	6.56	8.81
High Edu	3.72	9.39	13.18	19.98
Non-manual	2.03	5.93	9.05	15.08
Manual	1.65	3.90	7.30	11.24
No Children	0.93	2.56	3.81	6.88
With Children	3.06	8.24	11.35	18.70

Cluster number one depicts countries where shared accommodation is being introduced. Comparing all indicator values to values in other clusters, these countries show the lowest mean values. For example, the mean value for the indicator 'All Individuals', representing the percentage of people who used shared accommodation services, is barely 1.77%. This indicates that shared accommodation services are still in their infancy stage in these countries. Moreover, the mean values for other indicators such as 'Individuals with high formal education', 'Individuals 25 to 34 years' and 'Individuals living in a household with children' are rather low compared to other clusters. These nations could be seen as emerging markets for the shared economy, and in them, there is room for the shared accommodation market to grow.

Cluster number two comprises countries classified as developing adopters, where the use of shared accommodation services is moderate. The mean values for indicators across this cluster are higher than in Cluster 1 but lower than in Clusters 3 and 4. For instance, 'All Individuals' has the mean value of



4.59%, which indicates a moderate level of shared accommodation services uptake. Promising growth and growing acceptance of the shared economy concept can be expected in these countries.

The third cluster of countries exhibits an intermediate degree of familiarity with shared accommodation. These countries show a moderately established use of shared accommodation, with mean values higher than Clusters 1 and 2 but lower than Cluster 4. Indicator 'All Individuals' has the mean value of 7.82% and this represents a noteworthy proportion of the population engaged with a shared accommodation platform. These countries show a strong basis for future growth and development.

Cluster number four demonstrates countries with the extensive use of shared accommodation services. These countries show the highest mean values taking into account all indicators, stipulating a mature and widespread adoption of shared accommodation platforms. For example, the mean value for 'All Individuals' is 12.42%, showing a substantial percentage of the population using shared accommodation services. In addition, the mean values for 'Individuals with high formal education', 'Individuals 25 to 34 years' and 'Individuals living in a household with children' are significantly higher compared to other clusters. These countries are leaders in the shared economy space, with a strong ecosystem that supports services and platforms for shared housing. For an in-depth analysis, in Table 3, we listed out the countries based on the clusters they belong to.

Table 3. List of countries within each cluster (Source: Author's own work)

Cluster 1: Newcomers	Cluster 2: Developing adopters	Cluster 3: Progressive adopters	Cluster 4: Advanced users
Bulgaria	Germany	Czechia	Belgium
Cyprus	Lithuania	Denmark	France
Latvia	Austria	Estonia	Luxembourg
Hungary	Portugal	Greece	Switzerland
Poland	Romania	Spain	
Slovakia	Slovenia	Italy	
Turkey	Finland	Malta	
	Sweden	Netherland	
	Bosnia and Herzegovina	Norway	
	Serbia		

Most of the countries in Cluster 1, which stands for emerging markets, are located in Eastern Europe. These countries include Latvia, Bulgaria, and Hungary. Clusters 2 and 3, which are defined by a use that is steadily growing or relatively established, are a mix of countries from all parts of Europe. Cluster 4's Advanced Nations, which show extensive adoption, are mostly from Western Europe and include Belgium, France, and Switzerland.

4 Discussion and conclusion

Our study's observed clustering patterns show significant geographical differences in the uptake of shared housing platforms among European countries. A distinct division appears, showing a higher prevalence of shared accommodation use in Western Europe relative to Eastern Europe, with most Eastern European countries clustered in the first group and all Western European countries in the fourth. These findings can inform targeted strategies to reduce the disparity and promote equitable growth and development of the shared economy across Europe. The results in particular may assist sharing economy platforms in their efforts to target and segment their base of users. Furthermore, this insight is especially important for policymakers, managers, and politicians, as it can speak out initiatives aimed at increasing involvement in the sharing economy and fostering more balanced participation across regions. Moreover, these findings have implications for the future of the sharing economy, highlighting the importance of understanding and addressing the underlying factors that led to regional differences in adoption rates.



Even though this study offers insightful information about the dynamics of shared accommodation usage in Europe, it is crucial to recognise several limitations. Firstly, the study's geographical representation and conclusions might have been damaged by the removal of some nations from the analysis due to a lack of data. Additionally, the reliance on self-reported data from the Eurostat ICT survey may introduce biases or inaccuracies reflective of the respondents' perceptions rather than their actual behaviors. This limitation indicates that additional research and the inclusion of different data sources are necessary to improve the validity of our conclusions.

Our study's results are also consistent with earlier research by Maričić and associates (2023), which used data from 2019 to show a similar rise in the adoption of shared accommodations throughout Europe. Given this finding, it would be intriguing to carry out additional research using the same indicators over a longer period of time, look at how nations have moved between clusters over time, and find trends and patterns.

Better results could be obtained by collecting data for other significant indicators and including them in the analysis. To perform additional analysis, it is suggested to use bicluster or other advanced clustering algorithms (Nikolic et al., 2022). Based on that, a deeper and more comprehensive analysis would be carried out.

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