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**Spatiality of online interactions based
on a Hungarian ridesharing platform
case study**

PhD Theses

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1. Introduction

Information and communication technologies have fundamentally changed everyday activities. At the same time with socio-economic factors, these trends lead to the rise of the sharing economy. The essence of this process is that individuals could give access to their material or immaterial resources to each other directly without a third party. Accessibility of these idle capacities which means sharing is not a new phenomenon however with the help of online platforms these activities are not as dependent on location and geographical barriers as in the past.

The appearance of strangers and diverse social groups in these platforms could result in the more effective use of resources.

The complexity and extent of this topic suggests that focusing is an essential step in its analysis. In my dissertation, therefore, I examine it through the online interactions of carpooling platforms that connects mostly private individuals and the spatial patterns of the trips made. In short: how transactions in online space appear in offline space. Platforms that directly connect individuals emerged in the early 2010s and are now present in almost every country in the world. Their impact is significant in many sectors, but especially in transport and tourism, where they compete with traditional service providers such as hotel chains or taxi companies.

2. Objectives

This dissertation aims to explore the offline spatial patterns of online interactions at different territorial levels through a case study of a digital platform related to the sharing economy. The dissertation includes three major groups of questions that contribute to the achievement of the above goals. They focus on both sides: the online aspect as well as the spatial patterns.

2. 1. Analysis of the transaction taking place on the online platform, the social background of the platform users

A platform that connects individuals for a specific purpose is a direct link between supply and demand without owning any objects, such as an office or a fleet. In the case of the carpool platform, the study of online interaction is related to the following issues aimed at users:

- Can a common feature be identified in the social background of domestic users (age, gender, education)?
- What are the main motivations of the participants?
- What are the characteristics of the demand and supply side of the platforms?

2. 2. Spatial aspect - national level: exploring the general, national and regional patterns of the platform

- What is the specificity of the national pattern of the given activity (carpooling)?
- Does the pattern of travel reflect the spatial structure of the country?
- How does the flexibility (on-demand nature) observed on the platforms appear? Can seasonal differences be identified?

2. 3. Spatial aspect - local level: exploring the patterns of the platform that can be observed at the local level

- What local spaces are the pick-up and drop-off locations for online transactions?
- What is the territorial pattern of these points within the given settlement?

3. Research methods

I examine online interactions using a platform that operates in the model of the sharing economy. The dissertation builds on both primary and secondary sources.

Among the secondary sources, the following can be highlighted:

- Hungarian Central Statistical Office settlement databases (KSH 2019)
- Analyzes and country reports of market research companies (PWC 2016; EUROMONITOR 2016)
- Other databases (TEIR, FESZTIVÁLREGISZTRÁCIÓ.HU)
- Analysis of the examined platform, the OSZKÁR.com website and the terms of use (OSZKÁR 2016; OSZKÁR 2020A, B)
- Government Decree on the regulation of platforms (KORMÁNYRENDELET 2016)
- Számítógépes térinformatikai és statisztikai szoftverek (QGIS, SPSS)
- International literature on the sharing economy, especially publications summarizing the challenges of defining the term
- Online questionnaire (N=425, N=67)
- Targeted queries

4. Results

The literature review has pointed out that the sharing economy, also known as the community or access-based economy, is a collective term that does not have a uniform, consensually accepted definition, so a narrower definition is needed to define it as the framework for analysis.

The dissertation resulted in the selection of the following research framework during the processing of publications on the topic of the sharing economy:

- The dissertation pointed out that the difficulties of interpreting the concept are the combined consequences of several factors at the same time. These include the interdisciplinary nature of the topic, the novelty of the trend, and the diversity of platforms.
- Neither a too general, broad definition nor an overly specialized definition is suitable for delimiting the topic.
- In the dissertation, based on 24 definitions, I identified four basic pillars that define the framework of the analysis. These are the followings: peer-to-peer based activity, idle capacity, access-based activity, digital platforms.
- The digital interfaces of the sharing economy are provided by purpose-built platforms that connect supply and demand directly without the intervention of a third party.
- These organizations can be grouped along their two spatial dimensions in terms of their territorial impact, which refers to the range of users, their prevalence (local/regional, global) and the role of proximity in online interaction.

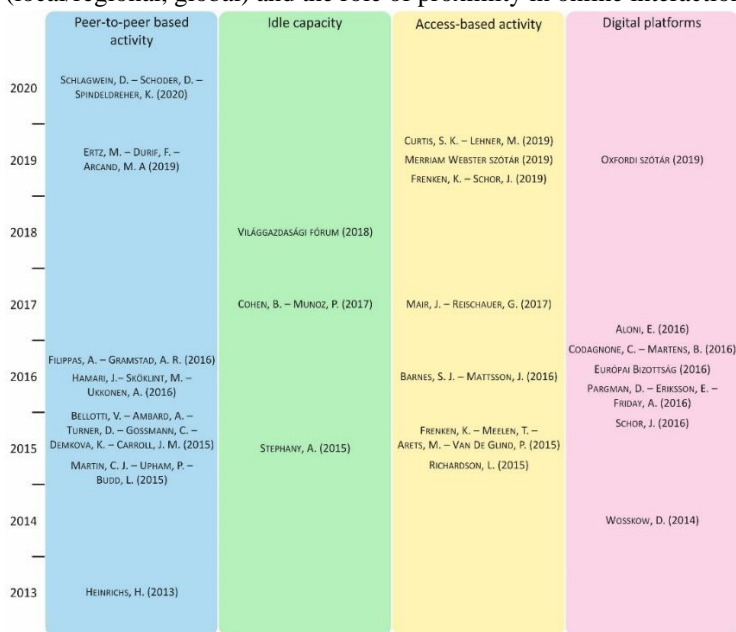


Figure 1: Distribution of definitions of the sharing economy
 Edited: Bálint D.

4. 1. During the analysis of the transaction on the online platform, the study pointed out:

- The examined OSZKÁR platform includes the specific features of intermediary organizations connected to the sharing economy, in connection with which the following can be declared:
 - The role of the participants in the transaction may change compared to traditional modes of transport, they may be present on the same platform as consumers and service providers.
 - The phenomenon of re-labelling can be observed on the platform, ie the presence of service providers (passenger transport companies) that previously operated outside the model of the sharing economy.
 - However, the entry conditions for flexibly evolving demand and supply are different. In the latter case, the possession of unused capacity and the existence of knowledge and ability certified by an official document (license).
 - The self-regulatory nature of the platforms, the control of the types of interactions, business-like enterprises: separation of business and non-business drivers, different regulation.
 - Diversity compared to traditional services in a given sector: different vehicle types and service quality
 - Facilitating interactions with assessment systems: review system. In the case of negative ratings, there is a possibility of sanctioning (even exclusion) by the platform itself.

Examination of the background of the users showed that:

- On the demand and supply side, significant gender differences can be identified among users, the proportion of women in the case of passengers and men in the case of drivers stands out.
- OSZKÁR is actively used by the age group in the late 20s and early 30s, both on the part of passengers and drivers.
- Price sensitivity plays an important role among the motivations, users switch mainly from public transport, including rail transport, to platform-based carpooling.
- In terms of full-price tickets, OSZKÁR is the cheapest mode of transport by train and bus in the period under review. While the average of the advertised routes on the platform is HUF 3,000, on the same routes the bus was HUF 4,500 and the train HUF 4,700.
- Ridesharing typically does not generate new roads, OSZKÁR distracts passengers from public transport.

- Among the users participating in the survey, those with higher education are over-represented, which is 58% for the respondents to the questionnaire, compared to 14% at the last census (2011).

4. 2. Spatial aspect 1 - national level: exploring the general, national and regional patterns of the platform

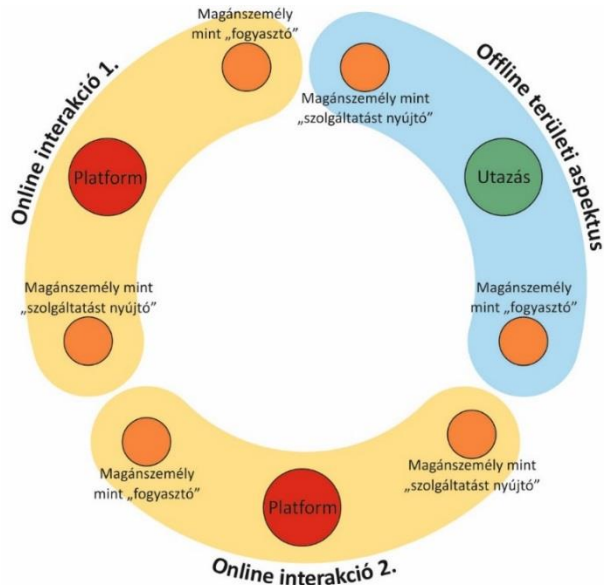


Figure 2: Online and offline aspect of the platform transaction Edited: Bálint D.

A general, territorial analysis of the rides of the carpool platform revealed that:

- The online interaction of the ridesharing platform shows a pattern in the geographical space that can be related to the spatial features of the given area (Hungary) (central road network, dominance of Budapest).
- The proportion of people with higher education has a strong, positive effect between the characteristics of the settlements participating in carpooling (as departure or arrival stations) (settlement indicators) and the use of the platform.
- Income, car supply and road length to the motorway junction show an inverse, negative correlation.
- The absolute numbers and the relative numbers and patterns of carpool trips about the population differ. In the former case, Budapest and the regional centres stand out, which spectacularly presents the critical mass spread of the platforms. In terms of population, Northeast Hungary and the settlements on the

shores of Lake Balaton, as well as two university towns, Szeged and Pécs, have the highest values.

- Based on the pattern relative to the population, the disadvantageous transportation situation (Northeast Hungary) and tourist destinations (Lake Balaton) resulted in higher values in carpool relations.
- The Hungarian characteristics of the settlement structure (different settlement densities of Transdanubia and the Great Plain) are also reflected in the carpool patterns.
- The absolute number of departures and arrivals differs for several settlements. In the cities of Győr, Nyíregyháza and Debrecen, a significant surplus can be observed in arrivals, which can be traced back to one of the peculiarities of the journey on the platform, ie the fact that passengers can make round trips on various means of transport. It proves that flexible young people use it the most.

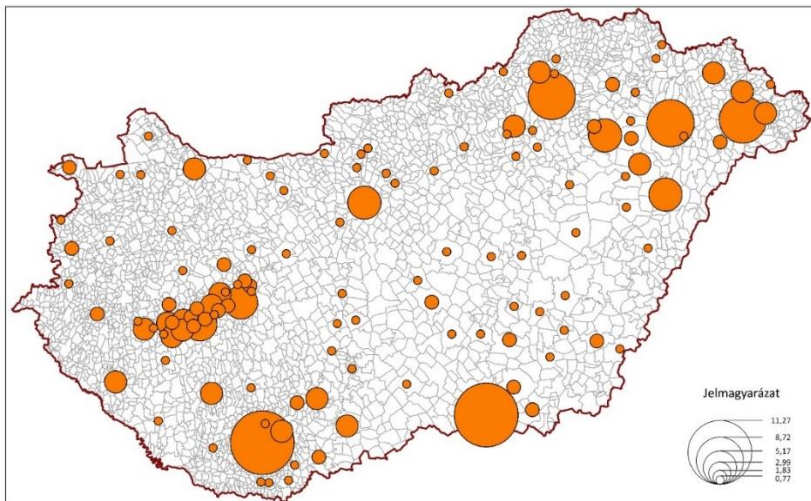


Figure 3: Ridesharing routes (September 2017) Edited: Bálint D. Cartography: Szabó T.

Examining the relationships of the platform yielded the following results:

- The number of trips on the carpool system is in line with the trends in mobility (summer and winter season differences, weekend/weekday differences).
- Not only seasonal differences can be identified in the trips, but also local, national or international events are reflected (eg Sopron numbers during the VOLT festival).
- Among the events, the multi-day music festivals resulted in a measurable increase in carpool traffic in the 17 settlements examined.
- In the case of smaller settlements, the growth is more spectacular.

- Due to the demand-driven nature and the exposure to the effects on mobility, not only increasing but also opposite changes in the values of the relations can be observed based on the data of the time of the first wave of spring 2020 epidemics.
- During the first wave of COVID-19, car traffic will decrease significantly, by more than 90% in the end-March-April period compared to the base period in early February.
- The period before and after the declaration of the emergency, the biggest difference can be experienced in the period immediately after the declaration of the emergency, the direction of the roads is undergoing a significant change. At this point, each of the popular destinations shows a strong move out of the capital.
- A slow rearrangement is observed after the exit restrictions. The number of roads to Budapest will also start to increase during the long weekend in April, and more and more settlements will appear on the map again.
- A total of four major stages can be identified in the first wave of epidemics in Hungary:
 - Seasonal baseline - the period before the announcement of the emergency, which is characterized by differences in the number of passengers between weekends and weekdays, as well as other characteristics related to the given period.
 - Mobility-intensive period - a change in destinations (appreciation of rural destinations) in the days following the declaration of an emergency.
 - Low activity after a downturn - a period of curfew: reduced numbers of passengers and routes.
 - Slow recovery - the period after curfew: slow increase in passenger numbers and destinations.

4. 3. Spatial aspect 2: exploring the patterns of the platform that can be observed at the local level

- The meeting points are easily accessible to both the passenger and the driver side due to the nature of the transactions related to the profile of the platform, which is close to the main transport axis.
- Due to the trip, the meeting points have a significant parking capacity and typically some commercial function appears in their area (eg shopping mall, restaurant, etc.), ie a type of space that is suitable for both the driver and the passenger, therefore free parking. and they are typically tied to transportation hubs and supermarkets.

- In addition to the previous two aspects (accessibility, parking), the prominent role of bus and train stations also indicates that carpool meeting places can be considered as intermodal hubs - ie they do not generate traffic per se, but are connected to the networks of other means of transport.
- In the case of meeting points, it can also be observed that they are connected to landmarks, which can be quickly recalled from the mental maps of travellers (drivers and passengers) (LYNCH, K. 1960) (eg Szeged, Megyeháza).
- It is an important element that the most popular places, in addition to accessibility, have the appropriate infrastructure for both car needs (eg petrol station) and passengers (eg indoor, indoor areas, waiting areas, convenience stores, transfer facilities), ie the demand and supply side. they are also ideal for. Due to the profile of the platform, offline transactions are located close to the junctions of highways and main roads, however, it is important to highlight that no general conclusion can be drawn from the platforms of the sharing economy as a whole. The offline, spatial mappings of the transactions always depend on the activity of the platform.
- Individual sites make up a significant proportion of advertisements, with a large number of mentions appearing everywhere in the cities surveyed. In the case of the table containing the top5 geocode locations, the “individual” mention always occupies the first three places of the list (Debrecen: 3rd place - 991 mentions; Szeged: 2nd place - 1198 mentions; Kecskemét: 2nd place - 400 pcs) Sopron: 2nd place - 193 mentions, Tatabánya: 1st place 167 mentions). This indicates the points of embarkation and disembarkation as discussed, which may include several categories. This includes door-to-door transport, on the other hand, it can also be an intermediate meeting point, which will be agreed upon later by the travelling parties after contact.
- This common pattern reveals that online interactions and the type of platform form offline densification points that can be characterized by specific traits. In the case of carpooling, development proposals can be formulated, which may require the construction of carpool car parks, stops and covered waiting areas at the given meeting points, as well as the emergence of services for the market that are related to the said interurban mode of transport. This is partly shaped organically by the users themselves, who have linked the designation of meeting places to an infrastructure that has adapted them to the existing physical environment and functions.

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