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A Network Theory Approach to the Sharing Economy

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Abstract
With the rapid growth of businesses in the sharing economy, evidence is accumulating regarding their underlying business models, growth patterns and other characteristics.
This article demonstrates that a network theory approach can be useful for analysing the internal structure and other features of sharing economy platforms and the networks created by them. After introducing the most important concepts and theoretical considerations relating to the sharing economy, we analyse the data of a regional ride share company based in Hungary. Our analysis reveals an increasingly popular service, which is in a phase of rapid growth in terms of both the number of origin/destination settlements and the number of trips/passengers. Taking settlements as nodes and trips between them as edges we demonstrate that the network formed by them shows the characteristics of scale-free networks.
Our findings may help company managers and policy makers to fine tune their decisions and indicate potential areas for further research directions to better understand the societal effects of the sharing economy.
Keywords
sharing economy, peer to peer ride sharing, network theory, scale-free networks

1 Introduction

In the last few decades new business models have arisen which are increasingly influencing traditional market structures and social interactions. Patterns of collaborative consumption and especially the sharing economy are becoming especially prevalent in many sectors of the economy. As a result, researchers are increasingly focusing on the most important features of the sharing economy including the spread of their networks, the characteristics and motivation of their users and their impacts on individual lifestyles and society as a whole.

Since sharing economy businesses invariably use internet-based platforms to operate and promote their networks, an increasing amount of readily available data is generated during their operations. However, most of the research to date has not utilized the databases available to sharing economy businesses but has used other methods of data collection, such as questionnaire surveys. Researchers of the sharing economy use a wide range of theoretical considerations to anchor their research activities including the concept of disruptive innovations, the theory of self-determination, and social capital theory.

In this article we first introduce the different theoretical approaches used in the literature to explain the spread and characteristics of sharing economy platforms. Then we take the case of a regional ride share company and analyse the database generated during the use of its platform over an eight-year period.

Since network theory lends itself well to the analysis of geographical networks created by sharing economy platforms and since such an approach has rarely been taken so far in the literature, we will strive to identify the most important features of a sharing economy network and to draw some conclusions regarding its operations and spread over time. This may assist both corporate and government decision makers in their work.

A similar approach has been successfully used by a number of authors analysing the World Wide Web (Barabási et al., 2000), cellular metabolism (Ravasz et al., 2002), calls made on mobile phones (Onnela et al., 2007), the Internet (Faloutsos et al., 1999), scientific collaborations (Barabási et al., 2002) and the North American power grid (Albert et al., 2004). However, the potential of

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the network theory has not yet been fully utilized in examining the sharing economy.

Apart from its contribution to the scientific literature, our results may also benefit policy makers involved in several sectors of the economy. Regulatory efforts in transportation policy, environmental policy and several other fields of government intervention at the local, regional, national and international levels are lagging behind the rapidly changing business environment, including the spread of the sharing economy. A better understanding of the behaviour of its actors, their motivations and activities, as well as their broader impacts on society is crucial from a policy standpoint. Our results could thus be used to make informed policy decisions in these fields and beyond.

2 The concept of the sharing economy

With the rapid spread of businesses using one or another kind of resource sharing, the concept of the sharing economy has become a frequently researched topic. As a result, a number of related concepts have emerged, such as "collaborative consumption" and "access-based consumption" and these are often used interchangeably to describe initiatives aiming at a better utilization of resources (Ferrari, 2016; Mallargé et al., 2017; McArthur, 2015; Möhlmann, 2015).

Some authors emphasize the differences between these concepts. Hamari et al. (2016:p.2047) defines collaborative consumption (CC) as a "peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services". They argue that collaborative consumption can be expected to alleviate a number of societal problems including overconsumption, the pollution of natural eco-systems, and poverty. According to Botsman (2013), collaborative consumption is "an economic model based on sharing, swapping, trading, or renting products and services, enabling access over ownership. It is reinventing not just what we consume, but how we consume."

While a number of definitions have been proposed over the last few years, Meelen and Frenken (2015) caution that it is hard to tell "where the sharing economy begins and where it ends". According to Böcker and Meelen (2017:p.28.) the "sharing economy is consumers (or firms) granting each other temporary access to their under-utilized physical assets ("idle capacity"), possibly for money." Wosskow (2014:p.13) defines the sharing economy as "online platforms that help people share access to assets, resources, time and skills". Meanwhile Botsman (2013) suggests that the sharing economy is "an economic model based on sharing underutilized assets from spaces to skills to stuff for monetary or non-monetary benefits. It is currently largely talked about in relation to P2P marketplaces but equal opportunity lies in the B2C models."

The definitions introduced above highlight that the sharing economy can operate in both B2C and C2C (also called P2P) contexts. Böcker and Meelen (2017) define it as a for-profit activity, while Botsman (2013) and Meelen and Frenken (2015) suggest its application for non-profit operations.

The notion of peer to peer markets is defined by Botsman (2013) as "person-to-person marketplaces that facilitate the sharing and direct trade of assets built on peer trust." Hamari et al. (2016) describe the peer to peer market as part of collaborative consumption. Schor categorized the sharing economy into four categories: "recirculation of goods, increased utilization of durable assets, exchange of services, and sharing of productive assets" (Schor, 2014:p.1). She also divides the sharing economy into P2P and B2P platforms based on their participants (Schor, 2014). Table 1 introduces examples of the different types of sharing economy businesses.

For the purposes of our research a further breakdown of the types of sharing economy businesses in the transportation industry is warranted. Business models in the car industry have been called car sharing (e.g. Car2Go), ride

Table 1 Examples of sharing economy businesses (based on the categories identified by Schor (2014))

	For-profit		Non-profit	
	P2P	B2P	P2P	B2P
Recirculation of goods		eBay, Craigslist, Aliexpress, thredUP, Yerdle, redinner.com	Freecycle, Gardróbcsere, jofogas.hu	
Increased utilization of durable assets	Uber, Lyft, Airbnb, Turo,	Zipcar, Car2Go, Mol Limo, GreenGo, Mol Bubi, Loffice	Zimride, Tapazz, BeeRides, Oszkár, Blablacar, miutcank.hu, Couchsurfing	
Exchange of services	TaskRabbit		Timerepublik, TimeBank, miutcank.hu	
Sharing of productive assets	Skillshare.com			Makerspaces

sharing (e.g. Blablacar) and ride services (e.g. Uber and Lyft) (Codagnone and Martens, 2016; Schor, 2014).

An analysis by Deloitte (2017) identified three types of car sharing: free-floating, stationary, and peer to peer. The first type is a short distance service in which vehicles can be reached anywhere within a designated geographical area and the service is priced per minute or by mileage. The second is conceived as a substitute for car rental and is characteristic of smaller cities, while the third is based on individuals sharing their cars at times when they do not need them.

Participants in peer-to-peer ride sharing "use their personal vehicles to transport passengers, and do not work as agency employees" (Masoud and Jayakrishnan, 2017:p.219). This definition is also shared by Martens (2016), who defines P2P sharing as follows: "the platform owner or organizer is often a formal company though individuals supply the service content". The definitions of P2P ride sharing include the following criteria:

- an internet-based platform connects peers and their under-utilized cars
- drivers offer rides for a fee
- rides are predominantly long-distance trips (usually between cities, not inside them).

In the following sections we will use the term "sharing economy" as defined by Botsman (2013), while using the concept of Schor (2014) for peer-to-peer ride sharing.

3 Theoretical considerations relating to the sharing economy

Being a rather new phenomenon, the sharing economy has been examined from a number of vantage points using different theoretical considerations as a backdrop. In Section 3 the terms "collaborative consumption" and "sharing economy" are used interchangeably according to how the original author(s) used them during their research.

Christensen and Raynor (2003) and Guttentag (2013) look at the sharing economy as a disruptive innovation and come to the conclusion that the sharing economy – in their case the sharing of accommodation – is a part of the grey economy and has segments of illegality (e.g. tax avoidance). They conclude that the sharing economy will not be able to displace well-known products and services but may be a way of providing better, easier and cheaper solutions (Guttentag, 2013).

Möhlmann's (2015) research concludes that rational thinking and the self-interest of users are typical of users in collaborative consumption. Her research is based on well-established concepts, such as Hardin's tragedy of the commons, the prisoner's dilemma and Olson's logic of collective action (Möhlmann, 2015). After examining Car2Go, a car sharing business, she identified the five most important factors influencing the choice of sharing options as cost savings, familiarity, service quality, trust, and utility (Möhlmann, 2015). She also concludes that utility and social involvement motivates repeated participation.

Somewhat contrary to Möhlmann's results, Hamari et al. (2016) emphasize the importance of the altruistic behaviour of participants in the sharing economy. The authors use self-determination theory to describe the sharing economy and conclude that inner motivation factors promote the use of the sharing economy while motivation factors coming from the outside do not. Similarly to other authors, they also find that using the services of sharing economy businesses imbues users with a certain satisfaction. According to Hamari et al. (2016), economic benefits motivate users more than sustainability perspectives. McArthur (2015) describes experiences of land sharing by using the self-determination theory, which focuses on people's motivation and inner needs for perpetually growing consumption (Ryan and Deci, 2000). McArthur (2015) defines five factors which motivate participation in sustainable communities: sense of community, personal development, spirituality, ethical processes, and more control. Tussyadiah (2016) uses social exchange and self-determination theory to describe the sharing economy. He concludes that the motivation of the users of peer to peer accommodation is enjoyment and cost savings (similarly to McArthur (2015)) and that users usually do not consider environmental aspects. Böcker and Meelen (2017) also explain the sharing economy using the self-determination theory. They found that there are significant differences between the types of shared goods and services and the users and providers of these. Users' motivations also differ by sector. While environmental aspects play an important role in the motivation of users of car and ride sharing, apartment sharing is more based on financial considerations. Financial motivations are more characteristic of younger users and those with lower income.

Motivation to engage in collaborative consumption can also be analysed in the context of social norms and networks (Ferrari, 2016). The sharing economy connects people who are strangers to each other and enables a market equilibrium of demand and supply (Ferrari, 2016). On-line platforms are based on trust between the users (Olaisen and Revang, 2017). Ferrari (2016) explains the sharing economy using the social capital theory: ratings of users play an important role in the choice of "partners". Kim et al. (2018) also used the social capital theory to analyse Couchsurfing, and conclude that participating users place a high value on being part of a group of like-minded people while expecting to receive similar services in exchange for what they provided.

Another theoretical approach which may contribute to a better understanding of sharing economy businesses is network theory, which evolved from graph theory in the mid-1900s. A network is defined as "a specific set of relations making up an interconnected chain or system for a defined set of entities that forms a structure" (Thompson, 2003:p.54). According to Silva and Zhao (2016), complex networks can describe a variety of systems of high technological and intellectual importance such as the Internet, coupled biological and chemical systems and financial, social, neural, and communication networks. Complex networks may take several forms, such as random networks, small-world networks, clustered random networks, scale-free networks, and core-periphery networks (see for example Silva and Zhao (2016)).

A spatial network is used to describe geographical links between nodes, but physical distance can be substituted by other parameters. According to Barthélemy (2011) these may include social distance measured by salary, socio-professional category differences, or the costs associated with the formation of a link.

According to Blondel et al. (2008:p.2) "weighted networks are networks that have weights on their links, such as the number of communications between two mobile phone users". The idea of weighted networks can also be utilized for ride share initiatives, since some links are more popular with users than others. Hubs are "groups of vertices within which the connections are dense, but between which they are sparser" (Newman, 2004).

According to Sedgewick and Wayne (2011:p.566) "a directed graph (or digraph) is a set of vertices and a collection of directed edges that each connects an ordered pair of vertices". In other words, directed graphs have a head (from where the link originates) and a tail (the ending point of the link). Weighted graphs have two degrees: an in-degree (link to the node) and an out-degree (link out of the node) (Fortune et al., 1980).

Another useful approach to examining the sharing economy is social network theory, which places social connections in the framework of network theory. Social network theory is a special type of spatial theory (Barthlémy, 2011) - in this case nodes are people or groups of people, while edges are social connections. Granovetter (1973) asserts that social networks involve diverse types of relationships and suggests that in certain situations weak connections are more effective than stronger ones (e.g. while searching for a job).

4 Research methodology

To highlight the most important features of the sharing economy using a network theory approach, we use the case of a regional ride share company, Oszkár, based in Hungary. Oszkár operates a platform through which both domestic and international travel is facilitated. Oszkár started its operations at the end of 2007 when the two founders realized the benefits of internet-based platforms for ride sharing purposes.

In terms of the definitions introduced earlier, Oszkár is an internet-based peer-to-peer sharing economy business. After registering for the system, users can either offer routes to fellow members or search for trips based on a number of criteria. Users of the Oszkár platform can be either "drivers", "passengers" or both. Apart from "casual" drivers, professional drivers (defined as having more than 40 passengers per month) have also started to offer their services through the Oszkár platform. Passengers can select trips based on the destination, the price of the trip, the type and age of car used and the comments of previous travellers. As soon as the trip is chosen for a particular date and place users receive more information about each other (phone number, license plate). The role of the platform ends here and users connect offline before and during the trip. Payment is handled between the users: Oszkár does not take part in the transaction – but charges a moderate fee transferred by the driver. After trips users – both passengers and drivers – comment on their experiences and rate each other on a 1-5 scale according to a number of criteria (punctuality, kindness, etc.).

Oszkár is a successful Hungarian business, which has been growing steadily over the years and which has competed successfully with alternative platform operators in the region.

In order to use the insights of network theory to analyse Oszkár, we identify vertices as departure and arrival settlements and edges as the trips taken between them. Previous research by Bálint and Trócsányi (2016) analysed the 50 most popular routes of Oszkár and data collected from questionnaires filled in by Oszkár users. They came to the conclusion that the most common reason for using Oszkár is to reach the capital city from regional centres. Additionally, they identified the seasonality of the network.

The data required for our analysis was provided by the company for the period 2008-2015. This included the following:

- reservations and actual trips made through the platform
- settlement (town/city) and country of origin and destination
- date and time of reservation and trip
- age and gender of drivers and passengers
- maximum number of empty seats offered
- data regarding reservations
- type of driver: casual or professional.

The database received from the company required only minor amendments[1] and allowed us to examine the full database of more than 860,000 trips over a period of eight years.

5 Results and discussion

Looking at the number of points of origin and destinations ("settlements") and the trips taken between them by registered drivers and their passengers, the Oszkár network shows rapid growth over the years (Figs. 1 and 2).

Although Oszkár is based in Hungary, its users make numerous trips abroad using the platform. Fig. 3 shows the ratio of Hungarian and foreign destinations during the period of 2008-2015 indicating an increase in the latter.

In 2008 international trips were around 2 %, while in 2014 they reached almost 12 % meaning that almost every 9th trip crosses the Hungarian border. The list of most popular destination countries is shown in Fig. 4.

Over the years the number of countries in the Oszkár network has increased. From 2011 Germany became the most frequently chosen origin/destination country followed by Austria and Great Britain - countries popular among Hungarian citizens for both employment and holiday purposes.

The growth in reservations is significant, as Fig. 5 demonstrates.

In the early years of the platform most reservations were made for one single person, but data shows that the number of seats booked per trip has increased (Fig. 5).

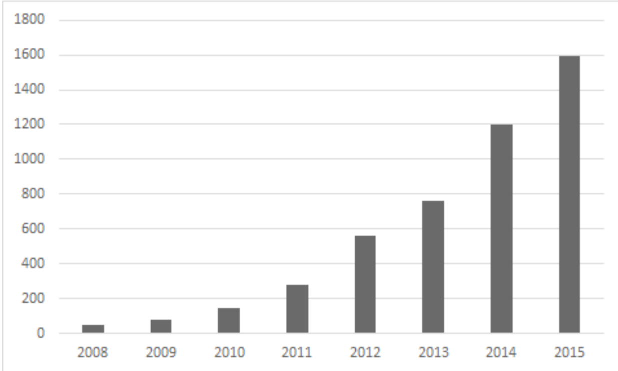


Fig. 1 Number of settlements where at least one Oszkár trip started or ended, 2008-2015

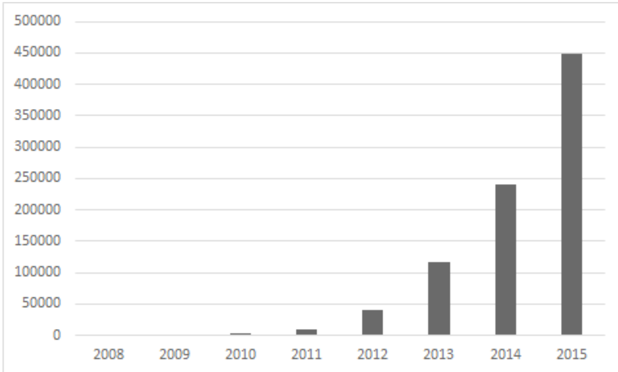


Fig. 2 Number of rides using Oszkár, 2008-2015

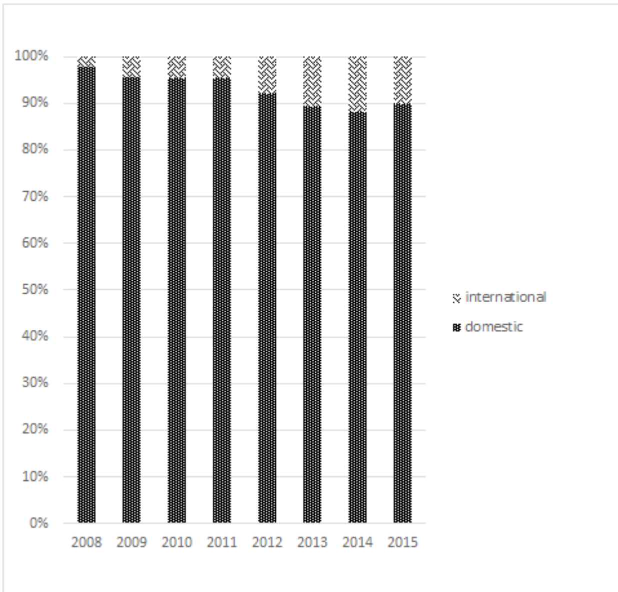


Fig. 3 Rate of domestic and international nodes (settlements), 2008-2015

This indicates that users tend to travel with friends and family and that the growth of the platform is even more pronounced if we look at the number of passengers travelling rather than the number of trips. Fig. 6 illustrates the maximum number of passengers accepted by the

1 We removed the trips undertaken by passengers with unrealistic birth dates (i.e. those born before 1920 and after 2005) – this affected less than 0.5 % of all trips. We also removed trips where the date of travel preceded the date of reservation (there were only a handful of such records) and trips which had passengers registered later than the closing date of the database (0.034 % of all the trips), since these also represented errors in the database.

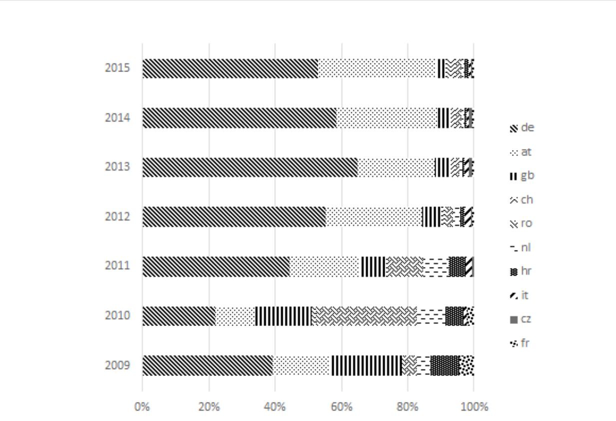


Fig. 4 Distribution of foreign countries among cross border trips, 2009-2015

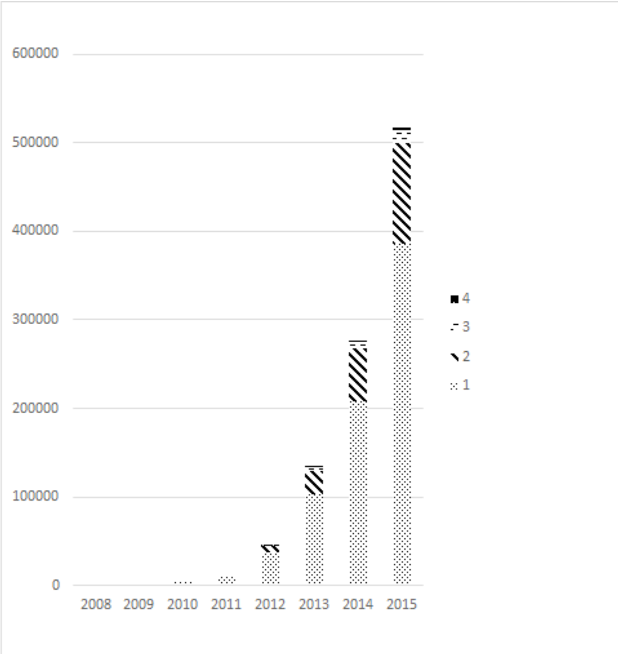


Fig. 5 Number of reserved seats by the number of reservations per trip, 2008-2015

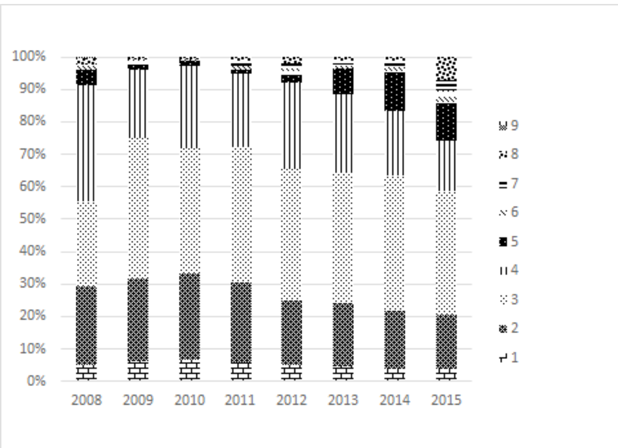


Fig. 6 Number of seats offered, 2008-2015

driver for a certain trip. While most drivers offer 2-4 seats, an increase in the number of seats offered is evident from around 2011. This can at least partially be attributed to the fact that professional drivers started to use the platform, offering up to 8-9 seats per vehicle.

Apart from a shift in the composition of drivers (professional vs. non-professional) (Fig. 7), a change in passenger behaviour can also be identified by further analysis of the data. Fig. 8 shows the number of days which elapsed between the date of the reservation and the actual trip. In the early years of operations passengers booked their trips further in advance. Since then the ratio of trips booked on the day of the trip or only one day ahead has increased, from around 48 % to more than 60 % in 2015. This shows an increased reliance on the platform, which is most likely based on the greater number of trips offered from most departure settlements and on positive experiences by the users.

Taking a network perspective, a natural way of looking at the Oszkár platform is to identify destination and arrival settlements as nodes and trips between them as edges. The platform thus creates a directed network where each settlement is characterized by an in-degree k_{in}, representing the number of other settlements from which trips originate and an out-degree, k_{out} representing the number of other settlements to where trips lead.

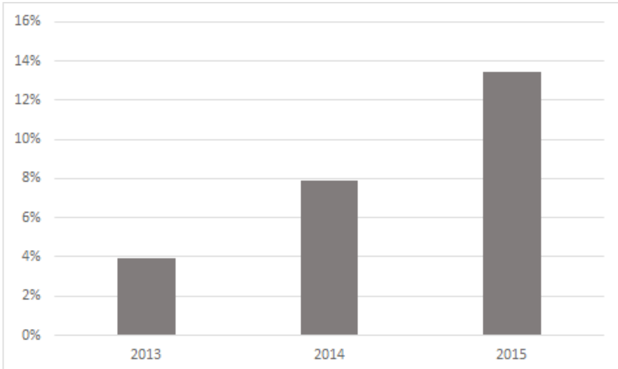


Fig. 7 Rate of professional drivers, 2013-2015

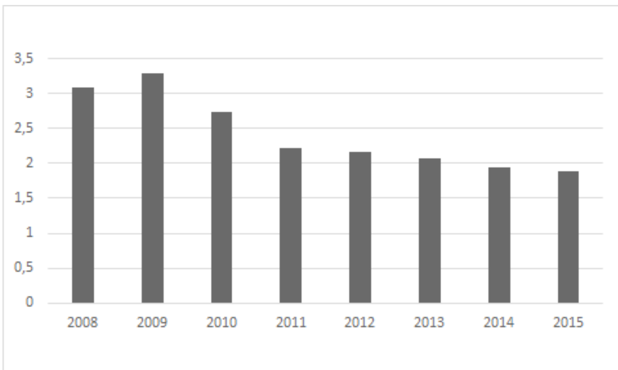
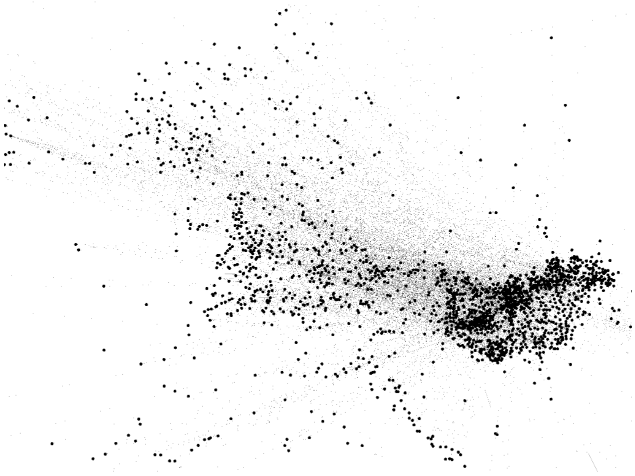


Fig. 8 Number of days elapsed between reservation and trip, 2008-2015

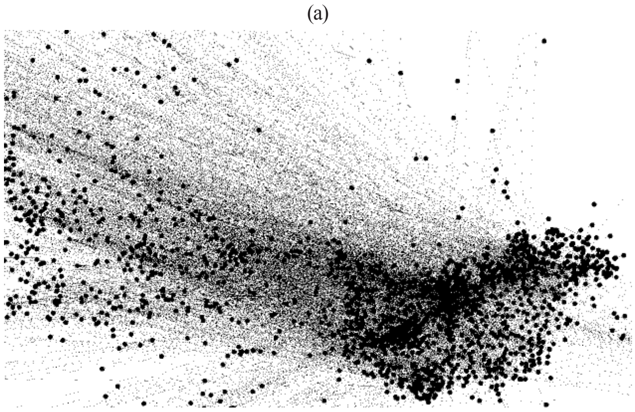
The data clearly indicates one major hub (the capital city, Budapest with k_{in} = 1148 and k_{out} = 1298 showing that passengers leave to more destinations than they arrive from using Oszkár) and about ten smaller hubs with k_{in} and k_{out} values in the range of 100 to 300. These are larger cities with active economies, often featuring a high concentration of services and a major university. Apart from these hubs there is a large number of settlements characterized by a low number of links (trips in either directions).

The geographical representation of the network shown in Fig. 9 (a) supports this interpretation: hubs can be linked to major population and economic centres. The orientation of the trips is also evident: the number of trips within the country and towards countries providing important holiday and work destinations, characteristically in a westerly direction is overwhelming.

Fig. 9 (b) shows an enlarged section of the network just West of Hungary and indicates that foreign destinations are mainly connected to places in Hungary. This indicates that most users are residents of Hungary who start or finish their trips in the country and do not use the platform to travel within other countries.



(a)



(b)

Fig. 9 (a) Geographical representation of the Oszkár network (b) Close-up of the Oszkár network

The degree distribution of the network is represented in Fig. 10 (a)-(d).

Fig. 11 (a) and (b) represents the data on a log-log scale and suggest that the degree distribution follows a power law and the network of settlements created by the Oszkár platform is a scale-free network, as described by Barabási and Albert (1999).

In a scale-free network the degree distribution follows a power law:

$$P(k) \sim k - \gamma \quad (1)$$

where exponent γ is the degree exponent.

To identify γ we used the cumulative distribution as shown in Fig. 12 (a) and (b). From these we derived the following degree exponents:

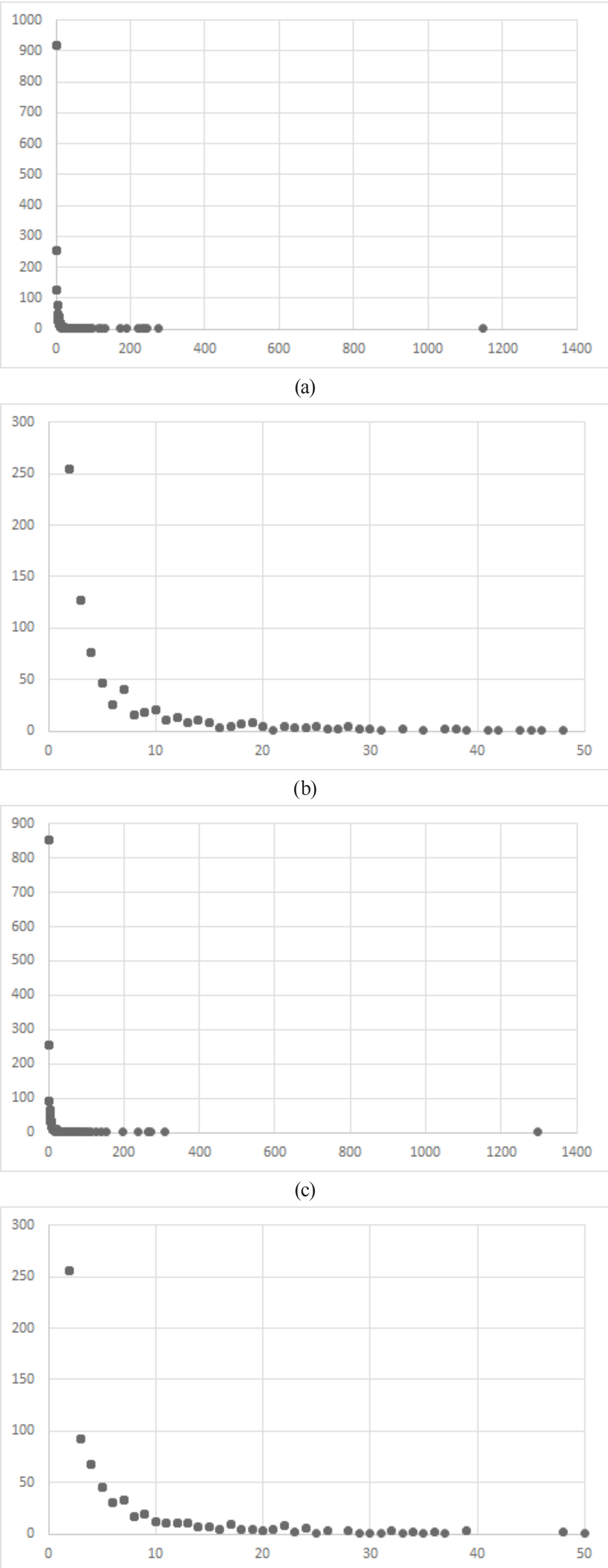
$$\gamma_{in} = 2.092\left(R^2 = 0.9851\right)$$

$$\gamma_{out} = 2.068\left(R^2 = 0.9855\right) \quad (2)$$

which fall in the $2 < \gamma < 3$ range found by Barabási (2016) as most common in scale-free networks.

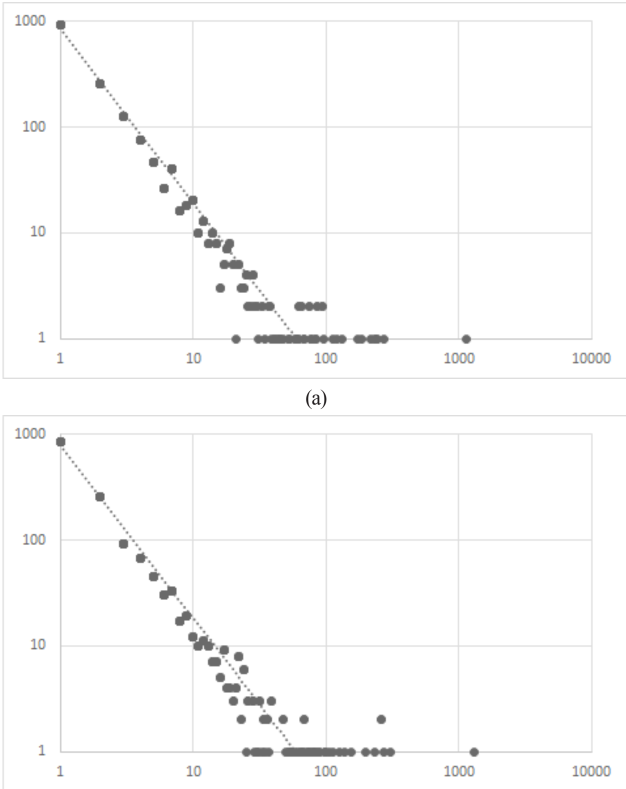
In a scale-free network a large number of nodes with only a few links coexist with a few hubs with thousands or even millions of links (Barabási, 2016). This is clearly the case for the Oszkár network, although the number of potential nodes is more limited than in other networks such as the web pages on the internet. First, the total number of settlements in Europe is dwarfed by the number of web sites on the internet. Second, several aspects limit the practical use of road transportation between settlements, such as distance, weather and other geographical patterns (e.g. sea crossings, etc.).

In Hungary, there were 3,155 settlements in 2018, with an average number of inhabitants of 3099 (KSH, 2018a). The largest hub of the Oszkár network, Budapest, is connected to around 850 other settlements inside the country, which is more than one quarter of all potential connections. The way Oszkár operates in practice also limits the number of these connections: drivers usually offer trips only to larger centres, and if the need for a diversion to a smaller settlement is requested by the passenger(s), they agree between each other without using the platform (e.g. through e-mail or phone). This results in smaller settlements being underrepresented in the Oszkár database.



(a) (b) (c) (d)

Fig. 10 (a) Incoming degree distribution, linear plot (b) Incoming degree distribution, linear plot, smallest bins (c) Outgoing degree distribution, linear plot (d) Outgoing degree distribution, linear plot, smallest bins



(a) (b)

Fig. 11 (a) Incoming degree distribution of the Oszkár network, log-log plot (b) Outgoing degree distribution of the Oszkár network, log-log plot

The change of the average degree of the network over time is shown in Fig. 13.

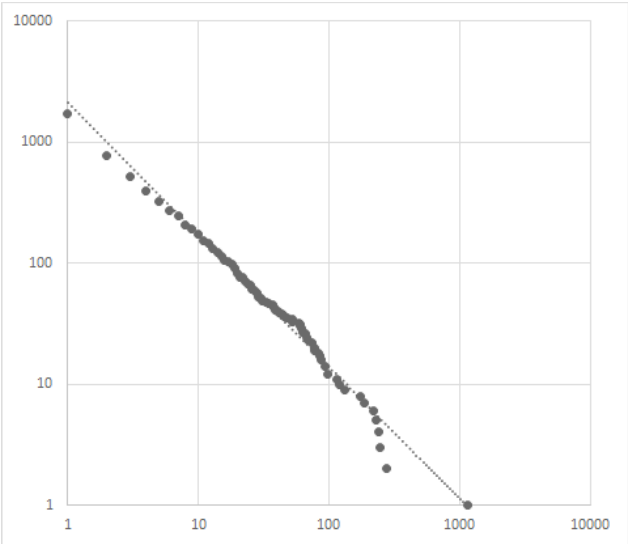
In a scale-free network, nodes with widely different degrees coexist. As a result, while in random networks degrees vary in a narrow range $\left(\sigma = \langle k \rangle 1/2\right)$ in scale-free networks the standard deviation σ can be significantly larger than the average degree $\langle k \rangle$ (Barabási, 2016).

In the case of Oszkár, the relevant data (shown in Table 2) suggests that the platform has created a scale-free network consisting of settlements and trips between them.

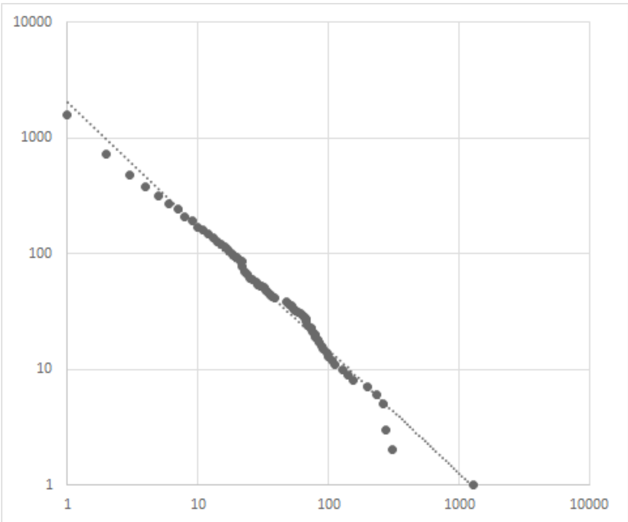
The difference between the average k_{in} and k_{out} values is interesting to note. It suggests that settlements are connected to more settlements through outbound trips than through inbound trips. This may be the result of several factors, for example users may be able to plan their departures from home better than their return from another settlement.

6 Conclusions and further research directions

Networks created by organisations utilizing the sharing economy business model have sprung up rapidly over the last few years and are predicted to dominate the market in some sectors in the near future.



(a)



(b)

Fig. 12 (a) The cumulative degree distribution shown on a log-log plot – in-degree (b) The cumulative degree distribution shown on a log-log plot – out-degree

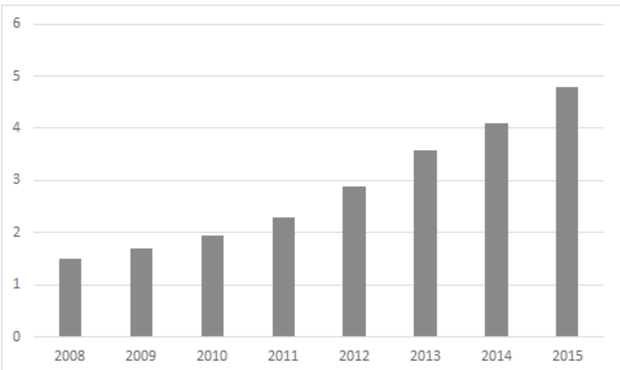


Fig. 13 Change of the average degree of the network

Table 2 Average degree and standard deviation in the Oszkár network over the period 2008-2015

	k_{in}	k_{out}
Average degree, $\langle k \rangle$	6.18	7.6
Standard deviation, σ	33.09	38.16

Networks created by drive share platforms in the transportation sector complement already existing networks created by traditional means of transportation, such as the train system and long-distance buses. Contrary to these traditional networks, drive share platforms such as Oszkár is much more flexible and can instantly adjust to changing travel needs (compared for example to train timetables, which are typically set for a six-month period of summer and winter timetables).

The number of both trips and destinations in the Oszkár platform is still very low compared to traditional means of transportation, but growth tendencies indicate that traditional operators should start to take note of the development patterns of such alternative networks. At times of high demand (e.g. before and after weekends and national holidays) Oszkár is already an important alternative to buses and trains.

Scale-free networks are characterized by continuous growth regarding the number of both their nodes and edges. As demonstrated, Oszkár is in a rapid growth phase of this type (see Figs. 1 and 2), but the number of settlements connected by it is already high in Hungary. Thus, further growth in the number of nodes – at least in the medium and long term – can only be achieved if the platform gains a foothold in the surrounding countries. At the moment, most foreign trips are taken between a Hungarian settlement and a settlement outside of the country but trips between foreign settlements are very rare. The number of trips and passengers travelling between settlements seems to be less constrained, since Oszkár handles only a small fraction of all passenger trips in the country (in comparison, the total number of train, bus and boat passengers in 2015 was 144.4 million, 508.5 million and 730 thousand respectively (KSH, 2018b).

The analysis of sharing economy platforms and their impacts on the economy, society and the natural environment is still in its infancy. Several methodological obstacles have to be overcome before a final verdict can be made regarding their impact on our societies.

The analysis introduced in this article contributes to the literature by identifying a fast-growing network and its most important features, including its scale-free characteristics.

We consider our results as only the first steps in using the insights of network theory for the study of innovative business models however, and these suggest three broad research directions to be pursued in the future.

First, Oszkár, similarly to many other sharing economy networks, is still in a fast growth phase characterized by a large number of potential nodes which are not yet part of the network. This feature may provide these networks with significant growth potential, but eventually the network will run out of "free nodes" (settlements that are not yet connected to any other settlement) and will reach a saturation point. While this does not imply that the number of edges or the weights of these edges (the number of trips between settlements) cannot grow further, we have little understanding of these saturation points and how networks behave around them.

Second, we have very limited knowledge regarding the interaction between traditional transportation networks and sharing economy businesses. While in some instances sharing economy businesses have already upset some markets (as with the conflict between Uber and traditional taxi services), large providers, such as national train and bus services do not seem to take notice of the newcomers. Moreover, by analysing the database of Oszkár alone, we cannot gain an insight into how the dynamics of choice between the available means of transportation has been affected by the new platforms.

Third, we are even more uncertain regarding the overall environmental and social impact of sharing economy platforms. Many believe that the present-day practice does not (fully) justify the positive stance adopted in the early days of these innovative models. If and when they begin to operate on a truly large scale, further research on their impacts will be warranted. Such research, however, is limited by the availability of data and an appropriate methodological framework, which should be developed in the near future, if well informed decisions are to be made for the benefit of the larger society.

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