Anticipating the impact of sharing economy drivers on consumer intention for using a sharing economy service*

*Tanja Živojinović, Nikola Zornić***

Abstract

This paper explores main drivers that influence consumers' decision related to the usage of a sharing economy service: trust, interaction, and experience. These three driving forces are put together in the functional form in order to explore its synergy influence on potential consumers' interest in SES. The theoretical contribution of the paper is reflected in the design of the original simulation model for predicting the number of potential sharing economy users. Our findings and qualitative cluster analysis provide an insight into the behaviour of sharing economy customers which might help sharing economy providers to thoroughly analyse target users in order to meet their preferences. The proposed approach is tested through a small-scale experiment for the peer-to-peer carsharing service.

Keywords: peer-to-peer sharing, consumer behaviour, experimental study, potential demand, sharing economy market
JEL Codes: D12, D16, E27

1. Introduction

One of the new economic models that aspire to make a significant impact on the future development of the economy and society is known as the sharing economy (SE). The sharing economy is slowly but surely becoming a global socio-economic trend that is changing lifestyles and consumers' habits. According to Hamari and authors (2016), the sharing economy represents "peer-to-peer based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services". Although the very idea of these activities is not new, the contrary is as old as humankind; the maturation of the SE business models and new forms of sharing depended on the Internet and especially Web 2.0, which enabled bi-directional communications between SE participants (Belk 2014). In addition to the development of the Internet, the global integration of consumers and providers in the process of sharing goods/services is also enabled by the development of specialised internet platforms (web services) and mobile applications.

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** *Tanja Živojinović*, (Corresponding author) PhD, Assistant Professor, University of Belgrade – Faculty of Transport and Traffic Engineering, Department of Economy, Management and Organisation in Traffic and Transport. Email: t.zivojinovic@sf.bg.ac.rs. Main research Interests: Urban Mobility, Sharing Mobility Services, Decision Making Models in Transport and Communications
Nikola Zornić, PhD Candidate, Teaching Assistant, University of Belgrade – Faculty of Organisational Sciences, Department of Business Systems Organisation. Email: nikola.zornic@fon.bg.ac.rs. Main research Interests: Business Decision Making, Business Analytics, Simulation Methods.

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There are three main appearances in the field of SE: product-service systems, redistribution markets, and collaborative lifestyles (Botsman/Rogers 2010a). This paper is focusing on the third one, also called collaborative consumption, which is grounded on peer-to-peer (P2P) interaction and communication between consumers (Barnes/Mattsson 2016; Heinrichs 2013; Joo 2017).

Trust is probably the most important factor of SE success, whether it is about trust in the system (i.e., digital platform) or trust among participants. Starting from the fact that a number of studies had already given credibility to this dimension, and considering the nature of the SE, this paper explores two additional forces influencing the consumers' decision related to sharing economy service (SES): readiness for interactions with other people, and positive previous experiences. These three driving forces are put together in the functional form in order to explore their simultaneous effect on potential consumers' interest in SES.

This study specifically addresses the following research questions:

1) What is the influence of social factors on consumer intention to take part in sharing economy?
2) What is the joined influence of other service-related factors like technological and financial (e.g. reduced service prices) on the number of potential consumers?

In order to answer these questions, we designed an agent-based approach tailored to model consumers' behaviour driven by social interactions and technological drivers. The consumer's preferences are building into three major pillars – *trust, interaction,* and *experience* which are joined together in the function labelled as intention function. This function presents a basis for extracting those fractions of consumers that can be characterised as prospective ones, meaning that there is a believable chance that he/she may use SES. The presumption is that the conversion from unreceptive or ambivalent consumer to the potential one happens only when a consumer reaches the desired level (threshold) of his/her preferences.

The paper continues as follows. Section 2 provides theoretical and methodological argumentation for the study. The proposed methodology is elaborated in Section 3. In Section 4 the application example of the model is demonstrated. The theoretical and practical implications of the proposed model are summarised in the concluding section.

2. Literature review

2.1. Theoretical background

Drivers to participate in SE are quite diverse and dependent on what, how and with whom is shared. Past research suggests that, beyond economic utili-

ties, many diverse determinants stimulate people to collaborative consumption ranging from displaying environmental awareness and modern lifestyle (Hawlitschek/Teubner/Gimpel 2018) to more specific motivations like the perceived risk of product scarcity (Lamberton/Rose 2012). There are also many demotivating factors like ICT incompetence for using online platforms, lack of trust, the complexity of P2P transactions, etc.

As pointed out in (Cheng/Su/Yang 2020), *trust* may be considered the most important determinant of SE. Some of the recent studies (Biswas/Pahwa 2015; Hawapi/Sulaiman/Abdul Kohar/Talib 2017; Hawlitschek et al. 2018; Mittendorf 2018) confirmed that trust is decisive for the consumers' willingness to participate in sharing, but also key precondition for the expansion of specific sectors like carpooling (Correia/Viegas 2011; Massaro/Chaney/Bigler/Lancaster/Iyer/Gawade/Eccleston/Gurrola/Lopez 2009). Botsman (2012) argues that trust is the *currency* in the SE market, while trust as a crucial factor for business model development is elaborated in a number of studies (Botsman/Rogers 2010b; Ert/Fleischer/Magen 2016; Hawlitschek/Teubner/Gimpel 2016a; Hawlitschek/Teubner/Weinhardt 2016b; Möhlmann 2015, 2016; Thoo/Muhammad Hafizuddin/Zuraidah/Adaviah/Norhayati/Sabrinah/Tan 2019).

Some scholars have engaged in relating different aspects of trust to sharing disposition. De Roover (2016) and Möhlmann and Geissinger (2018) distinguish trust in the system (i.e. platform and providers) and trust among participants. The former involves processes that take place on sharing platforms like exchanging personal data, financial transactions, etc. (e.g. Hawlitschek et al. 2016b). The latter arises from the very essence of SE, which is grounded on interpersonal relationships. It includes trusty skills and competencies, benevolence (e.g. good intentions of hosts) and the so-called integrity, which refers to careful treatment of sharing objects (Hellwig/Morhart/Girardin/Hauser 2015; Mayer/Davis/Schoorman 1995; Möhlmann/Geissinger 2018).

The genuine *interactions* with other consumers may also be a strong motive for participating in SE. Unlike in e-commerce, where P2P matchmaking occurs mainly in the digital world, in collaborative consumption, people also meet physically, which fuels their social connections. Perceived enjoyment when getting to know new people and connecting with other users sharing the same values is found to positively affect intention to use SES (Botsman/Rogers 2010b; Hallem/Ben Arfi/Teulon 2020; Hamari et al. 2016; Tussyadiah 2015). Certainly, while some consumers value social interaction, others are less willing to interact. Affinity for social connections in the context of collaborative consumption is generally high among the younger generation (see Mittendorf 2018), but other aspects can also be influential. For example, Xu (2020) found that consumers at a higher sharing level care more about social interaction than consumers at a lower sharing level. This is consistent with previous findings by Tussyadiah

(2016), who revealed that consumers at the lower level of share might even avoid social interactions.

Online and face-to-face interactions between peers in the SE generate intentions to share *experiences* (Moon/Miao/Hanks/Line 2019). Word-Of-Mouth and Internet-enabled electronic Word-Of-Mouth (eWOM) is a powerful instrument for sharing experiences, especially in a service industry where outcomes are nonmaterial and delicate to measure (See-Kwong 2015). Liang (2015) and Liang and authors (2018) define eWOM as *"any statements made by future, present or former customers about a product or enterprise, either positive or negative, and is accessible by anyone online".* Electronic Word-Of-Mouth communication in collaborative consumption occurs in several forms, including comments, photos, videos, online reviews, and rating systems. The positive experience delivered by other consumers reduce the perceived risk both on provider and consumer side and is crucial for market growth. Unlike controlled experience on vendor e-commerce websites, positive consumer feedback in SE platforms comes as a consequence of trust (Kong/Wang/Hajli/Featherman 2020). Some authors investigated the effects of experience on sharing intentions. Wu et al. (2017) found that experience enhances utilitarian motivations while weakens hedonic motivation to participate in room-sharing platforms. Nah et al. (2019) detected a positive relationship between social influence (reflected through social media and eWOM) and intention to use ridesharing service. Aruan and Felicia (2019) showed that eWOM directly and positively influence Airbnb and Couchsurfing customers' consumption intentions. Thoo et al. (2019) also confirmed that consumer intention towards collaborative consumption is significantly and positively linked with eWOM.

We can summarise that past research on consumer behaviour and intention to participate in SE confirms not only the triggering role of trust, social interactions and positive experience but also point to their interrelations. Trust is built upon experience and, at the same time, created from interpersonal interactions (Mittendorf 2018; Möhlmann/Geissinger 2018); interactions and trust are the keys for intentions to share positive experience (Moon et al. 2019; Wang/Herrando 2019).

From a number of reviewed papers dealing with SES consumer usage intention, we may draw the following conclusions. First, a prevailing approach is a statistical analysis where authors test the hypotheses on motive(s) and scope of the impact(s) on consumers' intention to use an SES. However, there is a lack of literature on the simultaneous effect of motivating factors. Second, to our knowledge, former studies on consumer behaviour in SE do not deal with a prediction on a number of potential users. Attempting to fill these gaps, our paper develops a predictive model for determining the fraction of potential consumers uphold-

ing their trust, experience, and interactions. It exploits agent-based modelling and simulation, which is elaborated below.

2.2. Methodological background

One of the artificial intelligence concepts which have been successfully used to model consumer's purchase intentions and behaviour is known as agent-based modelling and simulation – ABMS (see for example de Haan/Mueller/Scholz 2009; Mueller/de Haan 2009; North/Macal/Aubin/Thimmapuram/Bragen/Hahn/Karr/Brigham/Lacy/Hampton 2010; Said/Bouron/Drogoul 2002; Schramm/Trainor/Shanker/Hu 2010; Twomey/Cadman 2002; Zhang/Zhang 2007).

Agent-based models consist of a set of elements (agents) characterised by specific attributes, which interact with each other, following the appropriately defined rules in a given environment (Marković/Zornić 2016). ABMS provides designing models that more accurately and with more details represent a complex phenomenon or real system, as well as human behaviour and individual decision making. It is also the reason for their application in many scientific fields (Čavoški 2016). The most important characteristic of the agent, also often used in literature to justify the usage of ABMS over other methods, is its independence and capability to act autonomously. This paper deals with consumers' behaviour and interactions, as well as observing consumers' behaviour changes due to changes in market conditions. ABMS fits as a perfect method for adequately capturing all of these points.

Potential users – agents that make up the so-called synthetic population are presented as software abstractions that are characterised by learning ability and goal orientation. While agents are illustrating the demand side, the artificial environment in which they operate reflects the supply side. The advantage of such a model is reflected in an authentic and comprehensive presentation of the real system, which takes into account a number of complex factors that illustrate demand and supply. According to Miller and Page (2009), an agent's behaviour is interpreted by simple rules and interactions with other agents and the environment. Due to the interactive nature and the acquisition of new experiences, agents can adjust or change their behaviour or decisions over time. The most important characteristics of an agent are its flexibility (adapting and responding to changes in the system) but also the ability to make decisions on its own (Macal/North 2015; Wooldridge/Jennings 1995).

Querbes (2018) uses an agent-based simulation model to observe SE platform governance and participants' behaviour. He concluded that there is an inverted-U relationship between decision-making freedom available to participants and SE platform's allocative efficiency. Also, due to too much freedom or too many barriers, low-tier consumers are banned from the marketplace, while high-tier

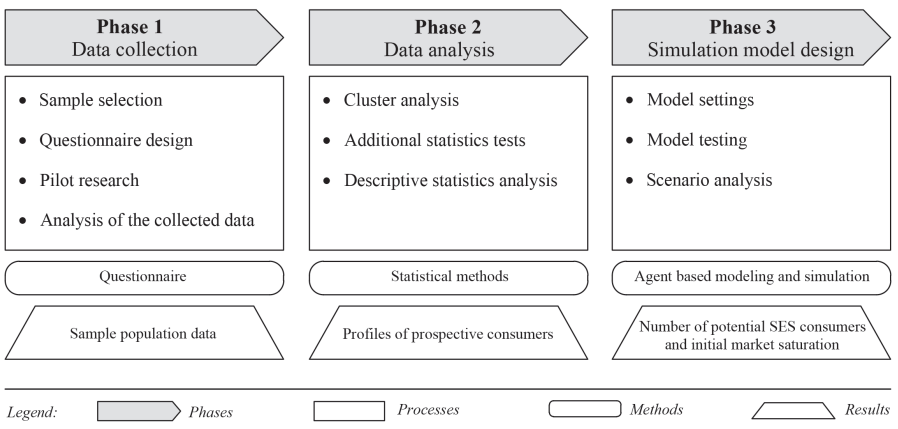
providers have a lower level of activity. On the other side, Bruno and Faggini (2020) observe competition between the SE and the traditional short-term accommodation industry using an agent-based model. Their results show that the main determinant for market performance in both sectors is the demand level, with the minor influence of price and competition between and within markets.

In this paper, the functionality of ABMS is utilised for tracking communications and information exchange among the sample population. Based on threshold preferences, willingness to use SES is checked for every agent in order to come up with the expected number of prospective consumers. The proposed approach is explained in detail in the next section.

3. Methodology

The schematic representation of the devised methodology is depicted in Figure 1. It is a three-phase approach. The results of the first two phases are inputs for the third one, where the simulation model for predicting potential consumers of SES is designed. The detailed description is given in the following subsections.

Figure 1. The framework of the proposed approach



3.1. Phase 1 and 2 – Data collection and analysis

The first stage of the proposed approach is gathering data about the range of relevant issues like attitudes, previous experience, knowledge on SE, etc. For that purpose, different methods can be used. In markets where the service does not exist, data is usually relying on field survey, i.e., questionnaires and interviews, to gather information on prospective consumers. Before releasing the survey, pilot research to improve the survey quality has to be done.

In order to determine if there is a common opinion regarding specific attributes of SES among some survey respondent groups, cluster analysis is applied. Clusters are used to segment agents based on their different expectations, motives and concerns about SES. For closer insight into potential users, it is necessary to determine their essential characteristics using descriptive statistics. Additionally, to find out if there is a statistically significant difference between clusters, more advanced statistical tests have to be conducted.

3.2. Phase 3 – Simulation model design

This phase first explains the behavioural framework of the respondents, which is further embedded in the simulation model. Rules of consumers' behaviour and decision-making in the proposed model can be explained through the following steps (Figure 2):

Step 1. Group of agents (so-called initial population, i.e., agents whose behaviour is analysed in simulation experiments) are *moving* in a defined environment. One agent replicates the behaviour of one respondent;

Step 2. When two agents meet, it is being checked if they know each other, and (if the answer is no) if they are ready to communicate with strangers;

Step 3. If they know each other or if they are ready to communicate with strangers, it is being checked if any of them uses/used SES;

Step 4. If both agents are SES users, they keep *moving* in the simulation space (i.e., go back to Step 1);

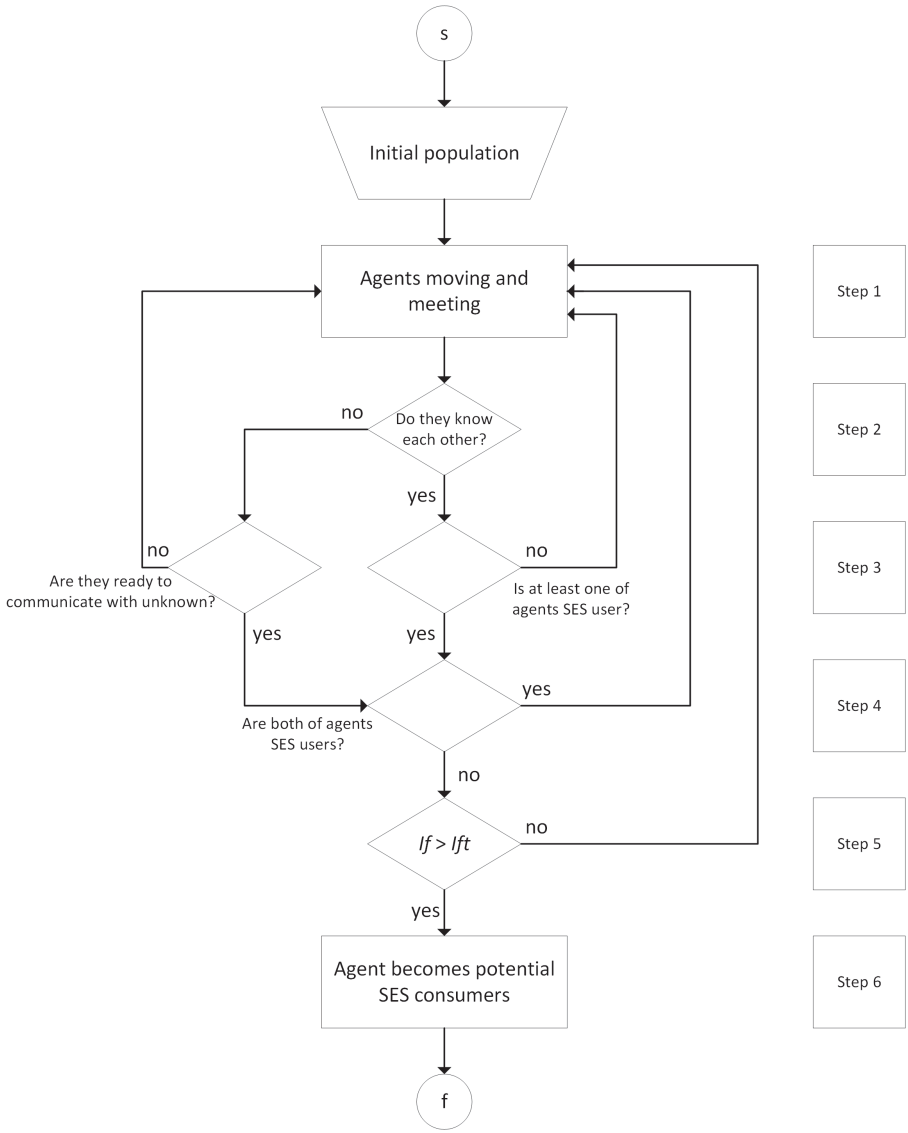
Step 5. If one of the agents is SES user, then the value of intention function (*If*) of another agent is calculated;

Step 6. The agent with the intention function value higher than the threshold value (*Ift*) will become a potential SES consumer.

In order to check whether the above conditions are met in the simulation model, we have to determine threshold values for model parameters. Some of these values arise as a result of previous phases, like *readiness to communicate with unknown* threshold (shortly *communicate-with-unknown-threshold*) and *initial sharing economy users* (shortly *initial-sharers*), while some are to be determined based on experts' assessment – e.g. *probability that two agents that met in simulation environment are friends* (shortly *met-friend-chance*).

The simulation ends when the saturation of the system is reached, i.e., until agents with particular values of intention function become potential consumers. In our model, saturation is defined as a *moment* in which the number of potential consumers reached the maximum value under the analysed conditions.

Figure 2. The flowchart of agent's behavioural framework



Respondents' preferences regarding the most influential factors that drive SES usage are built into the intention function. It is composed of three components – experience, interaction, and trust. Each component includes multiple variables that are the result of data collection. The intention function value is calculated for each agent based on the values of his preferences. Taking into consideration previously mentioned, the basic intention function setting is (Eq. 1):

$$If = \sum_{a=1}^{x} EX_a + \sum_{b=1}^{y} IN_b + \sum_{c=1}^{z} TR_c \quad (1)$$

where: If – intention function; EX_a – experience-related variables; IN_b – interaction-related variables; TR_c – trust-related variables; $a,\ b, c$ – number of variables of each component ranging from 1 to $x,\ y,\ z$ respectably.

In addition to identified groups of variables, the simulation model allows expansions with other dominant factors (e.g., due to market changes). In the case of analysing prominent external factors related to SES, the intention function gets a new, weighted form (Eq. 2):

$$Ifw = \left(1 + \sum_{d=1}^{g} w_d\right) * \sum_{a=1}^{x} EX_a + \left(1 + \sum_{e=1}^{h} w_e\right) * \sum_{b=1}^{y} IN_b + \left(1 + \sum_{f=1}^{i} w_f\right) * \sum_{c=1}^{z} TR_c \quad (2)$$

where: Ifw – weighted intention function; $w_d,\ w_e,\ w_f$ – weights of additional parameters; $d,\ e,\ f$ – number of additional parameters ranging from 1 to $g,\ h,\ i$ respectably.

Setting the intention function threshold (*Ift*) value is to be defined by an analyst. It can be done based on the expert's judgment while taking into account some assumptions from literature at the same time; for example based on (Réka 2015), consumer satisfaction higher than 70 % leads to service usage. When the value of *If* is higher than *Ift,* then the agent becomes a potential SES consumer.

Finally, the designed simulation approach has to be tested. In this study, the open-source multi-agent programmable modelling environment called NetLogo (Wilensky 1999) was used. The advantage of this environment is a quick and easy design of simulation models, the capacity to perform a large number of simulation experiments, as well as the ability of textual and graphical presentation of the output data.

4. Case study

According to Ps2Share Horizon 2020 project report (Newlands/Lutz/Fieseler 2017), SE in Europe is dominated by car- and home-sharing. Currently, SE adoption trends are unevenly distributed between European countries. The leading countries in SE practice are France, the UK, Poland and Spain (Revinova/Ratner/Lazanyuk/Gomonov 2020). Differences in progress are particularly pronounced due to a "fragmented regulatory environment and divergent regulatory approaches, both at national and local level" (Smorto 2018). This fact further leads to consumers being confused about their rights and obligations and providers being suspicious about investments due to future legal challenges (Smorto 2018).

Unlike Western European countries that have reached higher maturity levels, it can be said that most East European members are new to the SE scene. However, it should be noted that although there are regional differences, SE cannot be brought into a clear context with east/west geopolitical divisions. As Torrent-Sellens (2020) found out in his extensive study, people living in large cities or metropolitan areas and people from continental Europe (Belgium, France, Luxembourg, the Netherlands, Austria, and Germany) are more likely to participate in SE transactions. On the other hand, people from Mediterranean Europe (Greece, Spain, Italy, Portugal, Cyprus, Malta, and Croatia) have shown the opposite trend. Another relevant survey (Flash Eurobarometer 467 2018) dealing with the use of the collaborative economy in EU-28 countries showed considerable variation between countries. This survey showed that the largest number of users are in Latvia, Malta and Ireland (40 %, 35 % and 34 %, respectively), while the smallest share of consumers is in Bulgaria and Portugal (with 17 % per country).

Keeping in mind the legacy of the socialist system and consequently a more pronounced cultural desire for sharing (Belk 2018), it might be expected that the East European region could be a fertile ground for SE establishment. However, monopolistic market conditions and an unregulated legal system prevent unlocking this region for new business models. In some recent studies, insights from Romania and Hungary sharing evidence were elaborated (Andrei/Zait 2018; Nabradi/Kovacs 2020). As the authors pointed out, people from these countries have been used the most accommodation and transportation SES, with the greater experience as consumers, whereas participation as providers is almost insignificant. The study of Andrei and Zait (2018) also showed a generation gap where the younger generations (around 25 years) are more enthusiastic about sharing than older people. Another study, dealing with a Western Balkans region, indicated similar findings. According to Cavalic (2017), accommodation services (through Airbnb) are presented in almost all Balkan countries, while other SE domains are lagging. The main reason for this disproportion lies in still unclear private property concerns leading to not being a fully controlled market (Cavalic 2017). To summarise, although this region shares some characteristics with Western Europe, it has some specifics like underrepresented services other than sharing accommodation and sharing mobility, as well as a dominant interest in participating as a consumer rather than a provider.

As an emerging market, Serbia is in the process of integrating SE into a business ecosystem. Accommodation (via Airbnb and Couchsurfing platforms) and transportation sharing options (platforms and online services like Blablacar, CarGo, Yandex Go Serbia) are the most represented forms of sharing practice. As regards the other SES, it is worth mentioning the increased interest in workspace sharing or coworking. As reported by International Telecommunica-

tion Union (ITU) and national statistical office[1], Serbia is among countries with high Internet penetration (77.4 % in 2019)[2] and with extensive use of online social networks (71.2 % of Internet users in 2020)[3], which suggests that technological prospects for SE development are well established. However, among major problems that hinder its faster development are regulatory barriers to market access, uncertain business viability and lack of trust among participants (Parezanović 2018). Nevertheless, by learning from peers from mature markets, Serbia could take advantage of its late-comer position while timely engaging all stakeholders.

The proposed approach (described in Section 3) is illustrated in a small-scale experiment related to sharing mobility service known as P2P carsharing. This kind of carsharing service can be interpreted as a process in which people outsource their vehicle, which becomes a shared vehicle. The study is conducted in Belgrade (Serbia) – a market where carsharing is in its infancy, with some pilot research being published recently (see Bojković/Jeremić/Petrović/Tica 2019).

4.1. Sample and survey

The application of the proposed approach starts with a selection of sample and design of the questionnaire. Students were selected as a target group of respondents due to their tendency to interact, share experiences, and use modern information technologies. Since students mostly do not have their own vehicles, they are not analysed from the perspective of providers.

A largely student-based sample suits a study of novel services since this particular demographic group is generally more familiar with modern technologies and uses them more than the general population (Jayawardhena/Kuckertz/Karjaluoto/Kautonen 2009). More broadly, students belong to centennials – the young generation that is much more motivated to join SE since they find numerous potentials in it, e.g. connections and socialisation with other people, unique experiences, fun, financial profit, resource and time savings, community benefits, etc. (Andrei/Zait 2018). Unlike the older generation, who have the assets but are sceptical about sharing, young people mostly do not own property but have more disposition to share. As regards sharing mobility schemes, owning a vehicle is downscaling for centennials, mainly because of pricey vehicle ownership and generally higher aspirations for alternative modes of mobility, especially in urban areas (Singh 2019).

1 Statistical Office of the Republic of Serbia, http://www.stat.gov.rs/.

2 Available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

3 Statistical Office of the Republic of Serbia (2020). Usage of information and communication technologies in the Republic of Serbia. Available at https://publikacije.stat.gov.rs/G2020/PdfE/G202016015.pdf.

When it comes to students as a target group for carsharing, Davison, Ahern and Hine (2015) point out that students still do not have fully formed mobility habits, so it is possible to shape them in their formation phase. Major carsharing service operators in the world (e.g. car2go, Zipcar, etc.) have concluded partnership agreements with large universities based on which students are offered lower prices and more favourable conditions. For instance, some carsharing operators (e.g. Hertz 24/7 and Zipcar in the UK) have reduced the minimum customer age from 21 to 18 years, if it is about students of an affiliated university (Le Vine/Zolfaghari/Polak 2014). Also, as the National Academies of Sciences, Engineering, and Medicine (2005) pointed out, universities represent markets that are easier to conquer because they are stable and have a similar destination.

Our sample consisted of 197 students from Belgrade University. The questionnaire (Traditional Paper and Pencil Interview (PAPI) was selected as a questionnaire form) was developed and used to examine students' attitudes and behaviour regarding P2P services. During the design process, the questionnaire went through several phases and expert evaluations to avoid ambiguous and incorrect formulation of the questions and to select the appropriate level of agreement (scales) for the provided statements. All variables are measured using a 4-point Likert scale, with addition of *no opinion* option. Using 4-point scale midpoint is evaded, thus ensuring there are no indifferent responses (Raaijmakers 2000). Also, the questionnaire was further tested through a pilot survey. After checking the completed surveys, five incorrectly filled questionnaires were rejected as invalid. After encryption of the inquiries, the answers of the remaining respondents (a total of 192) were recorded using the *EpiData Entry Client* program (Lauritsen/Bruus 2018).

4.2. Findings of the study

After statistical data processing in software packages *R* and *IBM SPSS Statistics*, the cluster analysis was applied. Clustering the respondents who participated in the study was performed based on the variables given in Table 1. The chosen variables represent a reasonable basis for determining the interactions between respondents.

Table 1. Variables included in cluster analysis

Variable[a]	Short description of the variable
Positive experiences of people I know would motivate me to participate in sharing	*influenced-by-acquaintance*
Positive experiences of people I do not know would motivate me to participate in sharing	*influenced-by-unknown*
Getting new experiences and acquaintances would motivate me to participate in sharing	*motivate-ready-for-acquaintance*
Confirmation that my data will be protected against abuse would motivate me to participate in sharing	*motivate-data-privacy*
I often travel to college with friends	*travel-with-friends*
If someone from acquaintances recommended, it would encourage me to use P2P carsharing	*recommended-by-acquaintance*
If any of my colleagues would be interested in sharing rides and expenses with me, it would encourage me to use P2P carsharing	*carsharing-sharing*
I trust only the recommendation of people I know	*trust-only-acquaintance*
I am inclined to make new acquaintances	*ready-for-acquaintance*
I tend to communicate with strangers when I get a chance	*ready-for-communicating-unknown*

[a] – Due to the homogeneity of the sample, other variables – for example, the socio-economic characteristics of the respondents, were not included in the analysis

For the grouping of respondents, K-means clustering (Hartigan/Wong 1979) was used, resulting in the following distribution of cluster respondents: the first cluster – 26 %, the second cluster – 38 %, and the third cluster – 36 %. For further interpretation of the results, Kruskal-Wallis and Dunn's test were conducted. These tests are carried out to indicate whether there are statistically significant differences among clusters (Kruskal-Wallis test) and between which clusters (Dunn's test). The basic parameters of descriptive statistical analysis (mean value and standard deviation) used to describe the prospective consumers in the simulation model are given in Table 2.

Respondents from the first cluster are called *Introverters* since they are not motivated by interactions or exchanges of experience with either known or unknown people. They are also characterised by a lack of trust in other people and the platform. On the other hand, respondents from the second cluster are labelled as *SocialisingFirst* since they represent an amicable group. They are very prone to achieving interactions with known and unknown people, making them extra motivated to participate in the SE. Additionally, the exchange of experience with people they are familiar with is significant for them. The third group of respondents has been designated as *TrustOriented,* meaning that trust is the most important motivating factor.

Table 2. Descriptive statistical analysis for selected variables

Variable	*Introverters*		*SocialisingFirst*		*TrustOriented*	
	m[a]	*SD*[b]	*m*	*SD*	*m*	*SD*
influenced-by-acquaintance	2.420	0.785	3.370	0.589	3.618	0.519
influenced-by-unknown	1.500	0.580	2.486	0.822	2.529	0.610
motivate-ready-for-acquaintance	2.020	0.829	2.736	0.872	2.217	0.802
motivate-data-privacy	3.080	0.922	3.548	0.782	3.783	0.591
travel-with-friends	2.520	0.953	3.630	0.842	2.116	0.777
recommended-by-acquaintance	1.720	0.671	2.521	0.648	2.565	0.737
carsharing-sharing	2.540	0.813	3.056	0.710	3.397	0.626
trust-only-acquaintance	2.383	0.644	2.603	0.702	2.609	0.691
ready-for-acquaintance	2.560	0.861	3.435	0.528	2.985	0.702
ready-for-communicating-unknown	2.500	0.707	3.313	0.528	2.500	0.782

[a]*m* – mean value; [b]*SD* – standard deviation

The previous results represent the inputs into the next phase in which the simulation model is tested. The basic settings in NetLogo, which have to be prepared before performing simulation, include several prearrangements described in the next Subsection. After the initial setup, the intention function can be defined as follows (Eq. 3):

$$\boldsymbol{If} = (\boldsymbol{EX}_1 + \boldsymbol{EX}_2 + \boldsymbol{EX}_3) + (\boldsymbol{IN}_1 + \boldsymbol{IN}_2 + \boldsymbol{IN}_3 + \boldsymbol{IN}_4 + \boldsymbol{IN}_5) + (\boldsymbol{TR}_1 + \boldsymbol{TR}_2) \quad (3)$$

Variables incorporated in the intention function are obtained as a result of the previous two phases of the model. Unlike the variable *known-carsharer* (noted as KCs), whose value is expressed by probability, the values of other variables are described with a normal distribution (Table 3).

Table 3. Value ranges of variables included in the intention function

Id	Short description of the variable	Variables value ranges by clusters		
		Introverters	*SocialisingFirst*	*TrustOriented*
EX_1	*influenced-by-acquaintance*	N(2.420[a], 0.616[b])	N(3.370, 0.347)	N(3.618, 0.270)
EX_2	*influenced-by-unknown*	N(1.500, 0.337)	N(2.486, 0.676)	N(2.529, 0.372)
EX_3	*recommended-by-acquaintance*	N(1.720, 0.451)	N(2.521, 0.420)	N(2.565, 0.543)
IN_1	*motivate-ready-for-acquaintance*	N(2.020, 0.687)	N(2.736, 0.760)	N(2.217, 0.643)
IN_2	*travel-with-friends*	N(2.520, 0.908)	N(3.630, 0.709)	N(2.116, 0.604)
IN_3	*carsharing-sharing*	N(2.540, 0.662)	N(3.056, 0.504)	N(3.397, 0.392)
IN_4	*ready-for-acquaintance*	N(2.560, 0.741)	N(3.435, 0.279)	N(2.985, 0.492)
IN_5	*ready-for-communicating-unknown*	N(2.500, 0.500)	N(3.313, 0.279)	N(2.500, 0.612)
TR_1	*motivate-data-privacy*	N(3.080, 0.851)	N(3.548, 0.612)	N(3.783, 0.349)
TR_2	*trust-only-acquaintance*	N(2.383, 0.415)	N(2.603, 0.493)	N(2.609, 0.477)
KCs	*know-carsharer*[c]	P(true)=0.22	P(true)=0.43	P(true)=0.25

[a] – mean value; [b] – variance; [c] – this variable does not directly refer to the intention function, but the agents who know any user of SES have a boosted value of weight coefficient for trust and interaction

The additional relevant parameters (special prices benefits offered by the provider, shortly *Special prices* and electronic Word-Of-Mouth, eWOM) are tested within multiple scenario analysis. The weighted value of the intention function (denoted as *Ifw*), when these parameters are included in the model, is given by the following formula (Eq. 4):

$$\begin{aligned} \boldsymbol{Ifw} = {} & (1 + 0.25 + 0.15) * (\boldsymbol{EX}_1 + \boldsymbol{EX}_2 + \boldsymbol{EX}_3) + \\ & (1 + 0.25 + 0.15 + 0.1) * (\boldsymbol{IN}_1 + \boldsymbol{IN}_2 + \boldsymbol{IN}_3 + \boldsymbol{IN}_4 + \boldsymbol{IN}_5) + \\ & (1 + 0.25 + 0.1) * (\boldsymbol{TR}_1 + \boldsymbol{TR}_2) \end{aligned} \tag{4}$$

where:

value **0.25** indicates the weighted value of additional parameter *Special prices* that affects all three groups of variables: experience-related variables (EX), interaction-related variables (IN) and trust-related variables (TR);

value **0.15** indicates the weighted value of additional parameter eWOM that affects two groups of variables: experience-related variables (EX) and interaction-related variables (IN);

value **0.1** indicates the weighted value of additional parameter *know-carsharer* that affects two groups of variables: interaction-related variables (IN) and trust-related variables (TR).

4.2.1. Simulation experiments

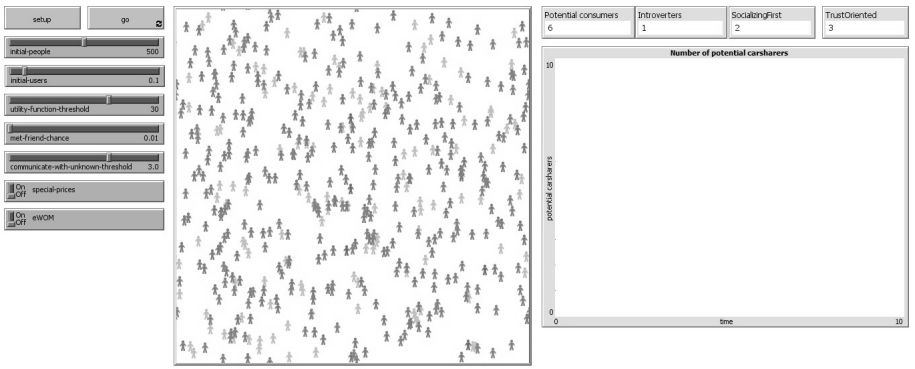
The values of the input parameters for the preliminary model (so-called the basic model, BM), as well as for the other scenarios, are shown in Table 4. For the basic model and each scenario period of 10 years (or 3650 days) was defined, and 250 experiments were carried out. For each scenario, the initial population was 500 agents. The agents are distributed in three clusters, retaining the characteristics and the same portion in the total number of agents as with the described clusters (*Introverters*-130, *SocialisingFirst*-190, *and TrustOriented*-180). The additional parameters *Special prices* and eWOM are presented as *switches* so they can be included (state *on*) and excluded (state o*ff*) from the model when analysing different scenarios.

Table 4. Parameters of the model through scenarios

Parameters of the model	***The basic model (BM)***	**Scenario analysis**		
		Special prices (S1)	***eWOM (S2)***	***Special prices + eWOM (S3)***
Initial population	500	500	500	500
Initial-sharers	0.01	0.01	0.01	0.01
Intention function threshold	30	30	30	30
met-friend-chance	0.01	0.01	0.01	0.01
communicate-with-unknown-threshold	3.0	3.0	3.0	3.0
Special prices	*off*	***on***	*off*	***on***
eWOM	*off*	*off*	***on***	***on***

The created user interface for the model (before simulation start) is presented in Figure 3.

Figure 3. Snapshot of the NetLogo user interface (the basic model)



Legend: The middle of the figure illustrates the world with agents. Switches to the left are for simulation experiment setup. Blank plot to the right is for representation of how the population evolves.

For each scenario, a number of potential SES consumers (in total and for each cluster), as well as initial market saturation (in total), are obtained. The market would be considered initially saturated if there was no change in the number of potential SES consumers for three months (about 90 days).

4.2.2. Experiment results

The results of simulation experiments are shown in Table 5. Firstly, we have obtained the number of potential consumers and initial saturation time for the basic scenario (BM). Then, *Special prices* and eWOM are alternately included as Scenario S1 and Scenario S2, respectively. To come up with the best case in scenario analysis, we have simultaneously switched on both additional parameters in Scenario S3. Due to the clarity of results, outputs for the basic model and other scenarios are shown in time intervals (with cumulative effect), that is after the first, fifth and tenth year (while T_0 stays for the initial moment), although the NetLogo offers results for all 3650 days. Also, both outputs are given in total, while the numbers of potential SES consumers are shown for each cluster separately. For both the basic model and other scenarios, the results indicate that the highest growth rate in the total number of potential consumers was observed during the first year. This result points out that in real business conditions, the initial period when the service appears on the market is the most important for attracting (new) consumers.

Table 5. Simulation results

		Time snapshota	*Outputs*				
			Number of potential SES consumersb				*Initial market saturationa*
			Total	***Introverters***	***SocialisingFirst***	***TrustOriented***	**Total**
BM		***T0***	5	1	2	2	599
		365	123	2	98	23	
		1825	166	2	123	41	
		3650	185	2	133	50	
Scenario analysis	***S1***	***T0***	5	1	2	2	1927
		365	222	23	135	64	
		1825	385	50	180	155	
		3650	419	56	188	175	
	S2	***T0***	5	1	2	2	1713
		365	190	7	131	52	
		1825	303	13	171	119	
		3650	333	14	181	138	
	S3	***T0***	5	1	2	2	1904
		365	243	37	138	68	
		1825	431	86	182	163	
		3650	460	93	189	178	

Legend: [a] – expressed in days; [b] – average value for 250 experiments

When it comes to the number of potential consumers per cluster, we can observe the strong influence of their determining preferences. For example, *Introverters* are *immune* to interactions with other people showing no increase in interest even in a longer period of time in the basic model. The unexpected finding is that the notable synergy effect of *Special price* and eWOM can be detected only among *Introverters*. A finding like this indicates that to reach this group, pricing strategies, and web presence would be the most effective instruments.

Although *TrustOriented* group in the basic model is inferior to *SocialisingFirst*, after turning on both *switches,* this cluster contributes significantly and approximately as well as cluster *SocialisingFirst* in the total number of potential SES consumers. Additionally, *Special prices* has a greater impact on *TrustOriented* prospective consumers than eWOM. On the other side, eWOM has a strong influence on cluster *SocialisingFirst* and achieves a similar effect as *Special prices* in the number of potential SES consumers even though its weight coefficient is

smaller (see Eq. 4). In other words, eWOM is valuable for those SES potential consumers who are more prone to interaction and experience.

The initial market saturation time indicates a period of market growth, whereby the growth rate varies across scenarios. For example, the *moments* of initial market saturation for the scenario with *Special prices* (S1) and scenario with the combined effect of *Special prices* and eWOM (S3) may seem illogical (1927 days in contrast to 1904 days) if the number of potential users is not simultaneously considered. From the simulation results, it can be noticed that the SE market continues its dynamic development with the inclusion of *Special prices* and eWOM. In this case, the market expansion takes three times as long as the saturation time for the basic model. This implies that *Special prices* and eWOM have a strong influence on continuous demand generation.

5. Conclusion

With the proposed simulation model for predicting the number of potential SE users, this study adds to the related SE consumer behaviour literature. The originality of the proposed model is that it encapsulates trust, experience, and interaction between peers as the major pillars of success for many SE services. Although past research articulates each pillar individually (which is elaborated in Section 2.1.), they are not simultaneously considered to model consumer preferences and behaviour. To have a prospect of how trust, experience and interactions interplay and ultimately affect the intention to use SES, we exploited ABMS. Unlike prevailing traditional mathematical and equilibrium-related statistical models that are not characterised by robustness (Zhang/Zhang 2007), our approach allowed for replicating market conditions and studying complex and changeable consumer behaviour by imitating real-world scenarios.

Another important property of the proposed model is that it enables to follow up on how SE builds upon itself over time, from the initial state of small significance to market saturation. The increase of SE customer base over time and a magnitude of a snowball effect is measured by market growth rate. This indicator is one of the key factors for analysing business sustainability and making decisions about future strategies.

It is also important to draw attention that variables related to trust, interaction and experience on which our model is built up are relevant but not definitive. It should be kept in mind that participation in each SE domain is driven by different combinations of motivation (Böcker/Meelen 2017). Thus, to be critical enough, although the mindset of the model and the associate variables are transferable, every SES has its specificities, thus requiring special attention when founding intention determinants.

From the practical point of view, this paper contributes to learning more about Serbia as an emerging market place. Most of the previous studies from the Western Balkan area examine the attitudes of existing SE users within current types of services without exploring services that are to be developed. The findings of our experimental study can serve as a foundation to explore the potential of P2P sharing in an emerging market.

Although the empirical results cannot be generalised, we can certainly learn from them. The object lesson is for sure no "one size fits all" business strategies. It is often assumed that consumer participation in the SE largely depends on the skill to use technology. Other important drivers, such as socialisation (primarily for young people), are often underestimated. Also, what is known is that the effectiveness of the SE increases with more participants due to more chance for matching (Lobel 2016). Our results indicated exponential growth of potential SE consumers during the observed time, with the highest progress recorded in the first year. Therefore, in the initial phase of operating, in order to reach a *critical mass* of participants, owners of platforms in SE must make an effort to ensure trust and reputation. They have to invest in reliable and straightforward payment options, transparent pricing, proven providers, and insured delivery processes (Biswas/Pahwa 2015; Puschmann/Alt 2016). Profiling of potential consumers based on their preference(s) is helpful for better understanding behaviourally different consumer segments. Depending on the target group of consumers and its determining preferences, market penetration strategies should be adjusted. This is of particular importance to new SE start-ups who invest their resources and plan to take part in stealth marketing tactics. By having this information, they can reduce losses, understand what potential consumers want and increase the chances of success.

Limitations and future research

Several limitations of our study open up possibilities for further investigations. One of the apparent limitations of our research is that we observe the dynamics of the behaviour of one side of the SE market only – potential consumers. In line with that, the proposed framework could be extended with the supply side, i.e., providers of the SES. Consideration of a multi-agent-based approach would be worthwhile for simultaneously modelling the behaviour of consumers and providers, as well as their complex relationships.

Regarding the results of the experimental study, it does not provide an insight into whether and when a potential consumer is transitioning into a user. Our future research will be directed in finding ways to extract real consumers among potential ones and to reveal the impact of their mutual interactions. This could be done by incorporating other demand prediction techniques into an intention function.

While the use of a student-based sample has been proven useful in previous studies regarding branding and consumer behaviour (Cunningham/Young/Gerlach 2008), dependence on a specific demographic group limits the generalisability of the results (Hahn/Ostertag/Lehr/Büttgen/Benoit 2020; Lepp/Gibson 2008). The mindset of the model and the associate variables are transferable. Still, we cannot generalise findings from our convenience sample, although we can learn about the consumer behaviour of young people. Future studies should explore the underlying dynamics of differences between age cohorts regarding collaborative consumption and SES.

Our experimental study collects data on intention to use SES. The results are limited to intentions, not actual behaviour, which does not provide strong external validity. Therefore, it mainly serves to set the rationale for future research involving real user data. Additionally, our study examines potential user preferences while not addressing the corresponding costs. The prospective research avenue should consider cost-value proportions for the observed features of the offer and recognise the ones worth the fee.

The special aspect of future research should be the impact of the COVID-19-like pandemic on readiness to use SES (Garaus/Garaus 2021).

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