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Unveiling Crucial Factors Shaping Ridesharing Usage Intention: Insights from Serbia

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***Abstract**. The aim of our paper is to reveal crucial factors related to the intention towards adoption of ridesharing service. To determine the importance of the factors we employ machine learning technique. Employing a survey methodology and a total of 325 questions, we gathered data from students at the University of Belgrade – Faculty of Organizational Sciences. We then analysed responses using a Random Forest Classifier to predict ridesharing service usage intention. Our findings reveal that social influences, including word-of-mouth and perceived enjoyment, are paramount in shaping intentions to use ridesharing services. Negative perceptions about the complexity and safety of ridesharing also emerged as influential. Since our research was focused on first-time users of ridesharing concept the findings can be of great importance for the emerging sharing mobility providers. Outlined top preferences can dictate market operators' penetration strategies that should be adjusted based on the potential consumers' perceptions and motives.*

***Keywords.** carpooling, experimental study, machine learning, potential user motives, sharing economy*

1 Introduction

Along with tourism, transport is the sector on which the sharing economy has the greatest impact. Various models within the 'shared/sharing mobility' or 'collaborative mobility' sphere have emerged in the transportation sector. These models range from car sharing to ridesharing, with the latter focused on optimising vehicle capacity by increasing occupancy. While ridesharing can occur organically, there is a rising need for technological platforms to connect drivers and passengers, particularly in the context of pre-arranged carpooling, which we examine in this study.

Our paper aims to elucidate the crucial factors that play a role in individuals' intention to adopt ridesharing service, and determine the most significant ones. To determine the importance of the factors we employ machine learning technique. Employing a survey methodology and a total of 325 questions, we gathered data from students at the University of Belgrade – Faculty of Organizational Sciences.

The paper is organised as follows. After we review recent research aimed at determining the key factors of participation in the ridesharing concept, we explain methodology and present the results of our experimental study. We complete the paper with implications and perspectives of our future research.

2 Influential Factors of Ridesharing Adoption

There is a significant body of research focusing on the influences that are essential for the utilisation of ridesharing service. The studies typically highlight recurring factors, which can be classified in different ways. For example, Neoh et al. (2020) categorised carpooling factors based on whether they are internal or external to the commuter. While the internal aspects manifest at the individual level of each commuter

(i.e., socio-demographic and psychological factors), external factors include everything that surrounds the commuter (i.e., third party interventions and situational factors). Similar report of factors influencing the decision-making of an individual on use of ridesharing was outlined in the study of Malichova et al. (2020). The group of authors highlighted the considerable importance of finding enjoyment in travel time for ridesharing adoption, especially for commuting trips. Additionally, economic benefits and social enjoyment were underlined as major stimulators for ridesharing adoption. Wu & Neill (2021) discovered that both cognitive and affective trust in service provider (i.e., driver) positively impact users' intention to utilize ridesharing platform. Their findings further revealed that platform reputation and security assurance, along with online interaction among potential participants, positively influence the trust components considered in the study.

Research done by Wand and associates (2020) revealed that the consumers' personal innovativeness, environmental awareness as well as perceived usefulness are positively related to intention to use ridesharing services. Cheah et al. (2022) also confirmed that perceived usefulness as well as word-of-mouth positively influence consumers' attitudes towards ridesharing. Akbari et al. (2021) found out that intention to use ridesharing services is predicted by perceived usefulness, user satisfaction, the effect of social pressure – subjective norms, and price value. According to this study, the most notable impact observed was the influence of consumer satisfaction on the intention to use ridesharing services. In their empirical study, Si et al. (2022) also detected crucial factors influencing the continuance intention of using ridesharing service. These are satisfaction, perceived usefulness, economic benefits, and environmental awareness. Also, platform incentives play a significant role.

3 Methodology

3.1 Survey design

In addition to socio-demographic questions and questions related to previous experience with ridesharing concept, our questionnaire consisted of the factors adapted from prior research, with adjustments made to align with the research context. The research model (Figure 1) includes these constructs: perceived risks (PER), perceived economic benefits (PEB), social reputation (SRE), perceived enjoyment (PEN), perceived social (PSO) and media (PME) influence as well as the influence of electronic Word-Of-Mouth (eWOM). Each outlined construct is described by a group of measurement items and measured by 5-point Likert scale covering options ranging from „strongly disagree" to „strongly agree".

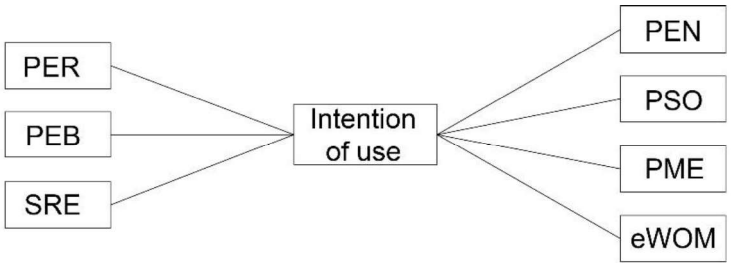

Figure 1. The research model framework (Source: Authors' work)

Perceived risks are related to the negative impacts that potential users of ridesharing concept may be exposed to. Studies suggest that ridesharing poses a wide spectrum of threats for its users, including physical, privacy, financial and service performance risks (e.g. service quality). Perceived economic benefits address the improvements of the economic status of the potential user of ridesharing concept. Perceived sustainability of the ridesharing involves users' perceptions of the various environmental benefits associated with the considered sustainable transportation option. The remaining constructs capture the various social impacts that the ridesharing concept has on potential consumers. Social reputation refers to attitudes about social acceptability and social status that a potential user of ridesharing can have. Perceived enjoyment is related to different social activities resulting in meeting new people, engaging in conversation, having fun during the shared ride, etc. This component also contains negative enjoyment connotation of ridesharing meaning that can be complicated and demanding, pointless or boring for potential users. Social, media and eWOM influence is reflected in

both direct and indirect interactions with different sources (friends, family, social platforms, online reviews and ratings, etc.) and their experiences of utilizing the concept.

3.2 Data collection

Our sample consisted of students from University of Belgrade – Faculty of Organizational Sciences. The anonymous survey was organised in May 2023. Questionnaire was distributed through the Microsoft Forms service, while the data were analysed using SPSS 28 software. A total of 558 students participated in the research, but only 449 were included as a valid for further data analysis. The demographic information of respondents is presented in Table 1. The majority of respondents are between 21 and 22 years old (with median 21) indicating that students belong to generation Z.

Table 1. Respondents' demographic information (Source: Authors' work)

Description variable	Classification	Frequency (449)	Percentage (%)
Gender	Male	129	28.7
	Female	296	65.9
	No answer	24	5.4
Monthly amount at disposal	< 20.000 RSD	156	34.8
	20.000 - 40.000 RSD	126	28.1
	> 40.000 RSD	53	11.8
	No answer	114	25.3
Household type	Live with parents	226	50.3
	Live alone	63	14
	Live with roommate	136	30.3
	No answer	24	5.3
Accommodation type	House in private property	255	56.8
	Rented apartment	101	22.5
	Dormitory	69	15.3
	No answer	24	5.3
Grown	Small city	82	18.3
	A mid-sized city	125	27.8
	Big city	49	10.9
	The largest city (over million people)	169	37.6
	No answer	24	5.3

3.3 Data analysis

The dataset contains 299 entries – individuals who have never used ridesharing service for their travel. Each entry includes a variety of variables (49 in total) pertaining to individual perceptions associated with ridesharing service. Target variable is binary and presents the intention to use ridesharing service in the future.

Preliminary data analysis and classification are done using Python with packages pandas, sklearn, and numpy. The primary objective is to leverage a classification algorithm to predict an intention to use ridesharing service based on individual responses. The data is split into training (80%) and test (20%) sets, adhering to conventional practices for machine learning model validation. A Random Forest Classifier (Ho, 1995), chosen for its robustness and ability to handle complex interactions between variables, was trained with 1000 estimators, with default hyperparameters from sklearn package. Model performance was evaluated using accuracy as the primary metric, supplemented by an analysis of the out-of-bag (OOB) score for an unbiased estimate of generalization accuracy.

4 Results

The Random Forest Classifier demonstrated a noteworthy accuracy level, indicating its effectiveness in predicting the target variable from the given variables on held-out test set, based on 5-fold cross-validation. The average accuracy of 0.78 is a critical measure of the model's performance. The OOB score further validated the model's robustness and its capacity to generalise well to unseen data (0.74).

The analysis of variable importance shed light on the most influential factors in the model's predictions. By identifying which variables contribute most significantly to the outcome, stakeholders can gain valuable insights into the underlying patterns and relationships within the data (Figure 2).

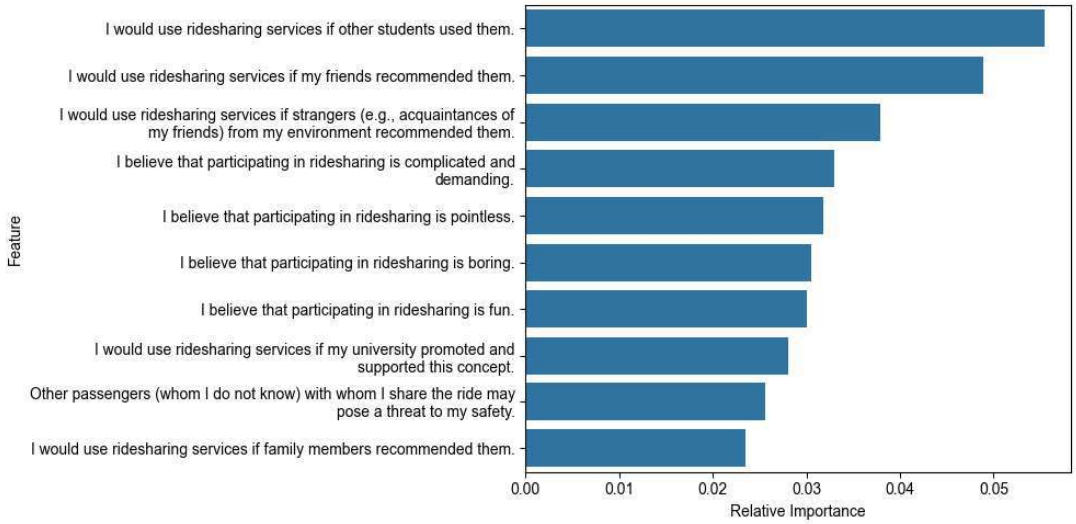

Figure 2. Top 10 variable importances in Random Forest Classifier (Source: Authors' work)

Results of our experimental study indicated the sample's strongest affinity towards various aspects of social context. Out of ten measurement items five belong to „social influence" from different peers (e.g. students, friends, strangers, university, family members) – including the top three. This influence also called word-of-mouth is very important for sharing experiences in service industries where outcomes are intangible and challenging to measure (Goh et al., 2015). Our finding is unsurprising, particularly given that social interaction between participants in the sharing economy lies at its core.

Perceived enjoyment accounts for four out of top ten items. Building friendships, connecting with other people and pleasant experiences through the shared ride impose an important social value to potential consumers. The significance of enjoyment as the most important dimension related to participation in ridesharing concept was also confirmed in other studies (e.g., Amirkiaee & Evangelopoulos, 2018).

Our research, conducted among Serbian students, sheds lights on the preferences of first-time users of ridesharing concept. The findings hold significance for the burgeoning sharing mobility market in Serbia. The top preferences identified in our study have the potential to shape market operators' penetration strategies, particularly in catering to the preferences and motives of prospective consumers, especially within the student population.

5 Conclusion

The paper considered the impact of perceived risks, perceived economic benefits, social reputation, perceived enjoyment, perceived social and media influence as well as the influence of eWOM on intention to use ridesharing service. Our findings underscore the paramount importance of social influences, such as word-of-mouth and perceived enjoyment, in determining users' intentions towards ridesharing adoption. These factors not only highlight the intrinsic social nature of ridesharing but also suggest that positive experiences and recommendations from peers are crucial in fostering adoption among first-time users. Moreover, our analysis revealed that negative perceptions regarding the complexity and safety of ridesharing pose significant barriers to its adoption. These insights are instrumental for ridesharing service providers, indicating a need for clear communication strategies to address misconceptions and enhance the perceived ease and safety of ridesharing.

As ridesharing continues to evolve as a significant component of the sharing mobility, our study offers valuable insights for market operators. The identification of key factors influencing ridesharing adoption can guide the development of targeted strategies to attract potential users, emphasizing the role of social influence, the enhancement of user experience, and the mitigation of perceived risks.

Future research should aim to expand the demographic scope beyond university students to include a broader spectrum of potential users, enhancing the generalizability of the findings. Additionally, segmenting potential consumers based on the importance of variables can be a powerful strategy for customizing services to specific market segments (see for example Živojinović & Zornić, 2022).

In conclusion, our study contributes to the burgeoning field of sharing economy research by providing a nuanced understanding of the factors influencing ridesharing adoption. For sharing mobility providers, acknowledging, and leveraging these insights can lead to more effective market penetration strategies, ultimately facilitating a transition towards more sustainable forms of transportation.

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