ADOPTION OF SUSTAINABILITY-ORIENTED INNOVATION: CASE OF SHARED MOBILITY IN THE CZECH REPUBLIC

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Purpose: The aim of the paper is to investigate whether use of shared mobility could be explained by an attitude towards risk while controlling for sex and age on a sample of Czech university students. Methodology: An online questionnaire was used to collect data. There were 529 respondents. Ordinal regression was used to test an effect of risk-aversion, gender, and age on use of shared mobility. Findings: Risk-aversions and age were found to have a significant impact. Risk-aversion is negatively associated with use of shared mobility, and age is positively associated with use of shared mobility. Research limitations: The research was conducted on a sample of university students. This may explain why the effect of age on shared mobility is positive though other research found it to be negative when surveying also older respondents than in the sample at hand. Implications: It would be advisable for shared mobility platforms to decrease perceived risk of shared mobility (obviously it would be appropriate to minimize actual risk as well), so even more risk-averse people feel fine using it. Originality/value: The original approach in this paper was to risk risk-aversion as a trait as opposed to measuring perceived risk of shared mobility.

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1 Introduction

As the world continues to face numerous environmental and social challenges, the adoption of sustainability-oriented innovation has become increasingly imperative.

In the pursuit of sustainable development, the adoption of sustainability-oriented innovation plays a crucial role (Silvestre & Ţîrcă, 2019). In the policy discourse, there is a consensus that to find solutions to these challenges, we need to do things differently and that innovation is key.

Shared mobility services, such as ride-sharing, bike-sharing, and carpooling, have gained popularity in 21st century as a sustainable alternative to traditional transportation methods (Goldman & Gorham, 2006). However, the adoption of shared mobility has faced challenges in finding a viable business model (Sxoinaraki & Πάνου, 2017). Operators in the car-sharing industry have struggled to create sustainable business models, leading to a highly competitive and unstable market.

The transportation sector, in particular, has been a focal point for implementing sustainable solutions, with the rise of shared mobility services offering a promising avenue for reducing environmental impact (Storme et al., 2021; Brůhová Foltýnová et al., 2020).

2 Theoretical Background / Literature Review

Numerous studies have examined the socio-demographic attributes associated with the utilization of shared mobility. Martin et al. (2010), identified that carsharing drivers were predominantly young (mostly under 30), university educated, and had moderate incomes (with a majority reporting slightly above the median household income). Efthymiou et al. (2013) confirmed this fining when identified a higher propensity for carsharing among individuals aged up to 25 years. Age was as a factor identified also by PrietEo et al. (2017), Becker et al. (2017), and Hjorteset and Böcker (2020) – all of them found that carsharing users were predominantly young, highly educated males. Burghard and Dütschke (2019) identified significant carsharing usage among young, car-free couples without children or young parents, often utilizing carsharing as a supplementary transport option. Education was further highlighted as a significant factor in carsharing adoption by Münzel et al. (2020).

In summary, the consensus suggests that being male, younger, highly educated, and of middle-income status increases the likelihood of carsharing adoption.

Apart from that, Turn (2023) identified a total of 151 individual criteria affecting car-sharing (both quantitative and qualitative) in 6 thematic areas - Economic and technical issues; Transport issues; Social issues; Environmental issues; Organizational issues; and Other issues.

Shared Mobility in the Czech Republic

In this context, the case of shared mobility in the Czech Republic provides a compelling example of how sustainability-oriented innovation is being embraced within the transportation industry. Sharing economy initiatives, such as carpooling and ride-hailing services, are a bit behind in the Central Europe when compared to Western counties, where it helps revolutionizing traditional mobility concepts and paving the way for more sustainable practices. The concept of carsharing remains nascent and innovative for Czech constituents. Despite a noticeable surge in its utilization in recent years, the adoption rate has not yet reached a substantial threshold, notwithstanding the considerable prospects for its proliferation. As indicated by the Czech Carsharing Association (2023), the presence of carsharing vehicles on Czech roads was limited to a mere 90 in 2015. By 2019, this figure had escalated to approximately 760, and by 2023, the aggregate number of carsharing vehicles reached 1890, underscoring the burgeoning trajectory of carsharing services within the Czech Republic (Association of Czech Car-sharing, 2024). Just to put it into context, the population of the Czech Republic was 10,900,555 as of 31 December 2023.

Hartmanová et al. (2020) in their groundbreaking article Psychosocial aspects of the use and provision of carsharing services in the Czech Republic identified following common barriers to carsharing use: Societal mindset or lack of financial literacy among Czech citizens; Limited carsharing coverage in urban and suburban areas; Requirement for advanced travel planning (logistics); Higher operational costs for frequent and long-distance trips.

Regarding the benefits of carsharing, both users and providers highlighted: Resource conservation, particularly financial savings compared to car ownership; Time efficiency in comparison to alternative transportation modes, such as public transit;

Environmental sustainability; Enhanced convenience, as users are relieved of concerns regarding car service and maintenance.

An extensive adoption research carsharing users' behavior and attitudes (Vejchodska et al, 2023) was conducted in the Czech Republic to shed light on the adoption of sustainability-oriented innovation in the realm of shared mobility. The study aimed to understand the factors influencing the adoption of shared mobility services and the impact of these services on sustainable transportation practices in the Czech Republic. The study found that several factors contributed to the relatively high adoption of shared mobility in the country. These factors included the increasing importance of environmental responsibility among individuals and communities, the convenience and affordability of shared mobility options, and the support and promotion of shared mobility by government policies and regulations. It offers insights into variances in the attitudes, motivations for participation in carsharing programs, and transportation behaviors among individuals who possess another car compared to those who do not. Authors came to interesting findings:

- Individuals who adopt carsharing without access to another car tend to utilize shared vehicles more extensively compared to their counterparts with additional car availability in their households.
- They also demonstrate a reduction in overall kilometers driven by private cars.
- Presence of another car in the household influences the shift in car usage subsequent to carsharing adoption, with the sale of a car being a contributing factor to decreased overall car usage.
- Drivers with access to another car within their household exhibit a lower likelihood of reducing kilometers driven post-carsharing adoption.
- Households lacking an additional car appear to exhibit lower levels of car dependency on average compared to those utilizing carsharing as a supplementary or tertiary car option.
- Demonstrate greater environmental consciousness and a stronger inclination towards policies promoting alternative modes of transportation and limiting private car use,

These findings prompt discussion regarding whether carsharing enhances the acceptability of restrictive transportation measures aimed at curbing private car ownership and usage.

Internationally, Becker et al. (2017), and Hjorteset and Böcker (2020) also concluded that carsharing users tend to possess fewer private vehicles.

3 Methodology

Data were collected using an online questionnaire on the web platform 1ka.si. The sample size was 529 (289 men and 240 women). It was a convenience sample consisting of university students. There was no monetary nor other type of incentive given to respondents. The known limitation is that 95% of respondents were up to 24 years old.

The dependent variable was use of shared mobility. It was measured on a scale from 1 to 4 where 1 meant yes, often; 2 meant yes, sometimes, 3 meant no, but I think about it; and 4 meant no. The independent variable was risk-aversion. It was measured on a 1-10 Likert scale where 1 meant risk-loving, and 10 meant risk-averse. Control variables were gender, and age.

Ordinal regression function of IBM SPSS 27 will be used to analyze impact of risk-aversion, gender, and age on use of shared mobility. A variance inflation factor (VIF) will be used to evaluate the amount of multicollinearity.

4 Results

The ordinal regression model of shared mobility is provided in Table 1. All VIFs were lower than 1.06, therefore, collinearity is not a problem.

Cox and Snell pseudo-R^2 is 0.070, Nagelkerke pseudo-R^2 is 0.077, McFadden pseudo-R^2 is 0.030, and the significant of the full model is below 0.001.

The analysis of the sample at hand indicates that use of shared mobility has a positive and significant relationship with risk-loving (as reversed risk-aversion) and age. No significant effect of gender was identified, although the sample consisting of about 55% men and 45% women was reasonably close to a half-and-half split.

Table 1: Ordinal regression model

		Estimate	Std. Error	Wald	df	Sig.
Threshold	[use = 1]	-2.981	0.678	19.332	1	0.000
	[use = 2]	-1.124	0.660	2.897	1	0.089
	[use = 3]	-0.329	0.659	0.250	1	0.617
Location	Risk aversion	0.224	0.041	29.771	1	0.000
	Age	-0.086	0.030	8.090	1	0.004
	[Gender=man]	0.111	0.170	0.429	1	0.513
	[Gender=woman]	0[a]	.	.	0	.

Legend: a. This parameter is set to zero because it is redundant.

5 Discussion

Risk-aversion and age explain the best the threshold between frequent and occasional users, and the worst the threshold between people who never used shared mobility but consider doing so and people who do not consider doing so. The latter is not a huge problem as both categories represent non-users anyway. The threshold between occasional users and people who never used shared mobility but consider doing so is significant at 0.1 level. The reason why significance is not lower is likely the fact that some of people who had considered shared mobility already tried it and by doing so (even though they did not find appealing) moved to the other group.

Overall, findings are not in line with previous research as previous findings indicated that men are more likely to use shared mobility while there was no significant difference between men and women in our sample (it holds even when risk-aversion is removed from the model; that confirms VIF evaluation that collinearity is not an issue), and with regards to age, previous findings indicated that use of shared mobility decrease with age while the relation was positive in the sample at hand (this could be because our respondents were young adults).

6 Conclusions

The aim of the research was to investigate selected factors impacting use of shared mobility. The primary question was whether risk-aversion could explain this phenomenon as risk-aversion was mentioned in many articles on shared mobility but never actually used in the investigation. Gender and age were selected as control

variables because they were found to be significant in several studies of shared mobility.

Our findings indicate that risk-loving (as reversed risk-aversion) and age have a positive impact on use of shared mobility in young adults. No significant effect of gender was identified in the sample at hand.

A known limitation is reliance on a convenience sample - university students in particular – where 95% of respondents were up to 24 years old. This could explain why the identified effect of age was positive, though it may be an inverted U-shaped relationship in the population.

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