

# What factors drive ridesharing for commuting trips the most? Comparison of three different institutions in one city

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## SHORT SUMMARY

This paper presents the results of a survey on the potential of ridesharing for regular trips to work and school. Using data from three different organizations from one Czech city, it analyses main barriers and drivers of ridesharing among institutions and the significant factors most likely to cause an increase in the share of ridesharing for journeys to work/school.

The data were collected using an electronic questionnaire, which was distributed during October 2019. Our findings indicate that ridesharing is influenced by age, education, distance travelled and attitudes and opinions. No effect of gender on the willingness to use ridesharing was identified in our sample. The character of the institution influences the share of ridesharing among their employees substantially. Our study reveals that ridesharing can contribute to more sustainable institutions, especially the university campus, and that younger people are more willing to use ridesharing.

**Keywords:** Carpooling; choice of transport mode; commuting trips; factors; ridesharing

## 1. INTRODUCTION

Commuting by car is a major component of daily travel demand and an important source of congestion and pollution in cities (Schafer and Victor, 2000). Urban planners and decision-makers thus try to find efficient solutions to deal with these negative effects of cars, above all by supporting alternatives to cars such as public transport and non-motorized traffic.

Although public transport is well developed in many countries, suburbs outside the agglomeration cores are often difficult to reach by efficient public transport systems. Therefore, ridesharing is perceived as a more sustainable alternative to individual car journeys. It helps to reduce costs (of fuel and maintenance), extend the life of cars (due to a reduction in car usage), improve parking availability and comfort of travelling to places outside the public transport system or with decreased accessibility by public transport (Canning et al., 2010; de Almeida Correia et al., 2013). Enjoying the company of others while traveling, saving time, a possibility to use high occupancy vehicle lanes, cost reduction, saving the environment and helping society were identified by ridesharing users as other important advantages of ridesharing (Li et al., 2007).

In spite of the described advantages of ridesharing, the vehicle occupancy is usually low. A bulk of literature focuses on barriers to wider usage of ridesharing - longer travel times required when using ridesharing compared to a trip by car without additional passengers or reduced flexibility of travel (Belz and Lee, 2012; Malodia and Singla, 2016). Furthermore, the fact that potential users have to wait for additional passengers makes the usage of ridesharing less attractive (Tsao and Lin, 1999).

Most of the literature comes from the USA and Western European countries. However, in the Central and Eastern European countries (CEECs), the potential of sharing rides is still not analyzed very much.

Using data from three different organizations in one city, all of them important employers in the region, this paper focuses on commuting among employees and students of these institutions and attempts to answer the following questions:

- What are the significant factors most likely to cause an increase in the share of ridesharing for journeys to work in a medium-sized Central European city?
- Can any differences be identified among students and employees and among the different institutions involved in our survey?
- What is the potential of sharing rides with colleagues and students in different institutions in a medium-sized Czech city?
- What type of sustainable transport policies can be advocated based on these significant factors?
- How does the character of the institution influence the rate of ridesharing?

Answering to these questions can help policymakers and institutions prepare better conditions, new policies and programs supporting further usage of ridesharing as a way of strengthening sustainable urban mobility.

## **2. METHODOLOGY**

Data were collected using an electronic questionnaire distributed to three organizations in Ústí nad Labem, a city of 92 thousand inhabitants situated in the north of the Czech Republic near the border with Germany. The Ústí nad Labem Region is one of the regions with the lowest education levels and the highest unemployment rates in the Czech Republic. According to the 2011 census, more than one fifth of the region's population had only primary education and only 7-8% had university education, while the nationwide average was 5.5% higher, although Ústí nad Labem is a university city. The city lies in a hilly terrain, which affects the transportation in the city – there is nearly zero usage of bicycles and a substantial share of cars in the modal split.

Three of the most important employer organizations were selected as the participants in our survey: the Ústí nad Labem Municipal Authority, the Regional Authority of the Ústí nad Labem Region and the Jan Evangelista Purkyně University in Ústí nad Labem (UJEP). The employees of the organizations and students from university were asked to complete an online questionnaire. The questionnaire was created in the SurveyMonkey software.

The electronic version of the questionnaire was distributed to all employees' and students' e-mail addresses by the participating institutions themselves and it was available for completion from 7 to 21 October 2019. One reminder was sent out in the meantime.

The total number of the completed questionnaires was 2334. The response rate was differed across the institutions: the highest response rate was at the Regional Authority at 55.08%, followed by the Municipal Authority, where the response rate reached 39.9%, the UJEP employees with a 24% response rate, and the lowest response rate was among UJEP students at only 19.29%. After the elimination of incomplete questionnaires (without answers to the socio-demographic questions), their number decreased to 1669, which were used for further statistical analyses.

The questionnaire consisted of several segments covering current travel behavior and commuting to work/school, individuals' attitudes to sharing rides, expression of (dis)agreement with various opinion statements about main transport modes and sustainable mobility, and respondents' socio-economic status and their access to different transport modes.

Collected data were analyzed using independent-samples t-test to determine whether a statistically significant difference exists between users and non-users of ridesharing and using choice modelling to investigate which factors influence the ridesharing decision.

### **3. RESULTS AND DISCUSSION**

We divided our respondents according to their potential to use ridesharing. One group comprises those who already use ridesharing and those who expressed their interest to use it (N=834); the other group of nearly identical size comprises those who do not use or do not have any intention to use ridesharing (N=835).

Age is a significant variable among the socio-demographic variables considered in this study. The highest interest in using ridesharing was expressed by the age group 35-49 (17.2%); on the contrary, the lowest interest was in the oldest category of 65+, as was confirmed by the Pearson chi-square test.

The respondents, both users and non-users, were queried about their reasons for using ridesharing and for refusing ridesharing (see Tables 1 and 2). The main reasons for using ridesharing differ between those who already use ridesharing and those who would consider using it. The users appreciate above all the possibility to share costs (64%), enjoyment of the trip with more people in the car (52%), and the possibility to discuss work-related topics during the trip (51%). The potential users appreciate the possibility to lower costs by sharing them (55%), and the comfort (52%). They also expect that ridesharing trips are more pleasant (42%), faster (40%) and they provide an opportunity to discuss work (41%), to find new friends (41%) and to have a faster trip (40%). Interestingly, the last two factors are not appreciated by the ridesharing users. The least important factors influencing willingness to use ridesharing which we analyzed are positive environmental impacts of ridesharing and the possibility to change the commuting route, as summarized in Table 1.

**Table 1: Reasons for ridesharing**

	Users (N=207)	Potential users (N=627)
Pleasant being together	52%	42%
Money – lower costs	64%	55%
Speed – ridesharing is faster	28%	40%
Comfort	48%	52%
Possibility to discuss work	51%	41%
Possibility to discuss other topics	41%	30%
Possibility to make new friends	29%	41%
More environmentally friendly	22%	27%
Can leave home later	38%	39%
Can change the route	23%	19%
Flexibility	33%	26%

On the contrary, those who do not use and do not plan to use ridesharing argue that they would be less flexible (57%), they could not arrange other business during the trip (34%), their trip is too short to take a car (34%), and they would have to arrange their trips with other people (32%), what are their main barriers to using ridesharing (see Table 2).

**Table 2: Reasons against ridesharing**

	Non-users N=835
Short distance	34%
Strangers	21%
Accidents	11%
Difficult arrangements	32%
Other than car	15%
<b>Flexibility</b>	57%
Choice of route	9%
Arrangements during trips	34%
Luggage	4%
Organisation	19%

Variables that increase the chance of using ridesharing were identified based on the logistic regression results. Specifically, the probability of using ridesharing is more than 4 times higher in the case of university students when compared to the Regional Authority employees. Therefore, the student status can be considered as a significant variable that affects an individual's willingness to use ridesharing.

Having a driving license has also been found as an important factor affecting the use of ridesharing. Specifically, if the respondent holds a driving licence, their interest in ridesharing decreases. Likewise, commuting time can be considered another factor that significantly positively affects an individual's willingness to use ridesharing (longer commuting time increases the probability to rideshare).

We also analysed the role of or opinions on ridesharing based on agreement or disagreement with various statements about transport-related topics, transport planning and regulation in cities. Respondents who agree the least with an increase in parking fees are more likely to use ridesharing. Similarly, respondents who strongly agree with the necessity to own a car are more willing to use ridesharing. The probability of ridesharing use is 5 times higher for these respondents compared to those who strongly disagreed with the statement. Respondents' attitudes towards carsharing were also found to be an important factor influencing willingness to use ridesharing. Respondents who find carsharing as a way to reduce negative effects of motor traffic are more likely to use ridesharing. The reason may be that these people are more open to using alternative modes of transport.

#### **4. CONCLUSIONS**

Support to ridesharing is one of the strategies for supporting sustainable mobility of institutions. We examined experience with ridesharing and the potential for its use at three different institutions in Ústí nad Labem. This is a very important topic as CEE countries face increasing challenges in the form of negative impacts of motorized traffic and low car occupancy.

The study revealed that ridesharing can contribute to more sustainable institutions, especially the campus, as younger people are more willing to use ridesharing. The character of the institution influences the share of ridesharing substantially. We found statistically significant differences even in similar (administrative) institutions in one city. The main difference was driven by the length of the trips made by the employees, the age structure and gender. The University has the highest potential for ridesharing, as the students are more flexible. Surprisingly, the Municipal Authority showed the least potential for ridesharing; on the contrary, the highest potential is among the university students.

Fear from unknown people sharing rides can be a substantial barrier to ridesharing. Our data show that web applications which are available only to a limited group of people for ridesharing (such as employees of one institution) can be more trustworthy for the potential users. However, our research did not identify any specific ridesharing behavior connected with the regional specifics. The main difference is in the approach to implementation of various measures supporting ridesharing, as the institutions have not adopted any measures to motivate more ridesharing.

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