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Insights from User Preferences on Automated Vehicles: Influence of Socio-Demographic Factors on Value of Time in Romania Case

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Abstract: New transport technologies, such as autonomous vehicles, are increasingly discussed in the debate on the transition to a sustainable urban future. Automated vehicles (AVs) are expected to reduce the value of travel time (VoT), allowing the use of time for other types of activities during travel, including working, reading, sleeping, entertainment, etc. Our study aims to provide empirical insights on future modal choice preferences for regular trips for Romanian citizens, using a sample of 309 respondents to a web survey on issues related to automated vehicles. Using multinomial logistic models (MNL), we analysed the relationship between three mode choices: regular car, private automated vehicle, and shared automated vehicle, along with the individual and household characteristics. In addition, we calculated the VoT for each mode choice based on the results of MNL analysis. Results showed that VoT is strongly influenced by travel cost and travel time, by socio-economic characteristics such as age, gender, and education, and has the lowest value for the shared AV compared with a regular car or a private AV. Future research may conduct comparable studies in European countries but also explore the opinions and perceptions of vulnerable road users on AVs and VoT.

Keywords: shared automated vehicle; discrete choice; multinomial logit model; user preferences; value of travel time

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1. Introduction

Research investigating the acceptability of connected and automated vehicles (CAVs) has become consistent since the early 2000s, when it was evident that automated (shared) vehicles would increasingly influence people's mode of travelling and determine a disruption in the way urban planning has been considered [1–5]. CAVs are expected to have revolutionary impacts on transportation systems and the configuration of urban areas, but the level of market penetration and their take up remains uncertain, even though some predictions have already been made. Technologically, automated vehicles are expected to become common place and affordable between 2040–2060 [6], while the travel demand for AVs needs to consider several factors, such as age composition, individual travel needs, and level of service for alternative modes of transportation, that may influence this adoption [7]. From an urban development perspective, it is very clear that the introduction of connected and automated vehicles will produce disruptions in many ways, but there is still a lack of knowledge on these disruptions and what policy strategies are needed to address them [6]. The important influence of CAVs is assumed to be on land-use planning and the built environment, and these assumptions are not always in favour of CAVs. It is estimated that the quality of built environment will be improved by re-densification, or regeneration of inner-city areas [7], and redesigning of street infrastructure for a wide user access [8] but they will increase urban sprawl [9]. From an environmental perspective, researchers generally agree that CAVs are expected to have a positive impact, these being electrical vehicles and the source of energy can be renewably generated [10–14]. Another important disruption is foreseen in the field of urban transportation [10], with the introduction of smart mobility [15] bringing new business models for collective transport [16] or shared automated transport [17–19]. However, it is still unclear whether shared automated vehicles would be easily accepted or not by the public, as this depends on several factors, such as price [20,21], density of the area of residence [22,23], and personal and data privacy [24–26].

Besides these aspects, CAVs are expected to provide important benefits by reducing the role of the human driver and allowing more time for other activities during travel, but the real effects are still under investigation. In recent years, substantial research has been focused on determining the changes that CAVs will influence on the value of travel time (VoT or VoTT) as a result of the adoption of automated (shared) vehicles, considering that the time spent during the travel could be allocated to other activities. A number of authors, based on different types of research, estimate different values for VoT reduction: 41% compared with private cars [27], and 8–32% (8–14% for shared automated vehicles) compared with driving [28]. In some cases [29], it has been found that driving a private automated vehicle might reduce the VoT by 31% compared with driving manually, but travelling in a shared automated vehicle is perceived 10% less negatively than driving manually. Research [30–32] has shown the influence of socio-demographics, trip characteristics, and on-board activities on monetizing the value of time. However, Gao et al. recommended a need for caution in making predictions based on current consumers' perceptions of automated vehicle (AV) technology [33].

In Romania, Andrei et al. [34] explored citizens' perceptions, concerns, and attitudes which may influence their mobility behaviour when using automated and connected transport (ACT) systems. The paper demonstrated that the perceptions of Romanian citizens are broadly similar to those of citizens in other countries, in terms of security, privacy, vehicle sharing with other occupants, and women's reluctance to use AVs.

Considering all the above, and keeping in mind that value of time for automated vehicles has never been discussed in Romanian scientific literature, in order to continue the research on AV for Romania [34] and to extend the analysis performed in European countries [35–37] in terms of VoT for AV, the following research questions are proposed. (1) What are the socio-demographic factors influencing VoT for automated vehicles? (2) Which type of vehicle (CAR, PAV, or SAV) corresponds to the lowest value of VoT? (3) How do the results in Romania compare with those in other countries that used the same survey?

To answer these questions the objectives of the paper are: (1) to provide the first exploratory study on automated vehicles and perception of value of travel time in Romania, and (2) to discuss the results by comparing them with the results obtained by applying similar questionnaires in several countries all over Europe [35–37]. Thus, our paper aims to analyse how autonomous driving may change mode choices for regular trips considering: (i) regular private CAR, (ii) privately owned automated vehicle (PAV), and (iii) shared autonomous vehicle (SAV). The results of this study aim to provide empirical insights on future modal choice preferences for regular trips for Romanian citizens, positioning them within a wider range of preferences of Europe's citizens. Considering that AVs are not widely available, data collection will be a stated preference (SP) survey using hypothetical scenarios.

The hypotheses tested in the present investigation are: (1) the mode choice depends on travel time and travel cost, (2) the mode choice depends on socio-demographic characteristics of the population, and (3) VoT has the lowest value for SAVs. All these hypotheses are closely related to the survey questions described in the materials and methods section with the aim of providing comparable and consistent research at the European level.

This paper is organized as follows: Section 2 provides a literature review followed by the materials and methods used in the research in Section 3. Section 4 discusses the results in comparison with the results obtained in other countries by applying the same questionnaire. Section 5 provides the conclusions and discusses policy implications.

2. Literature Review

The studies conducted so far have been oriented towards shaping the future of the CAV system based on user preferences and investigating how people will benefit from travel time for any other activity. Most of the research used different mode choice scenarios for this estimation. Asgari et al. performed a comprehensive analysis of mode choice and influencing factors [38], suggesting that on-demand AV services (with lower operating costs) could become a viable option for many travellers despite most drivers and passengers preferring single trips over shared trips at the moment, for both daily or occasional travel. Using a stated preference experiment and a mixed logit model, Zhou et al. [39] revealed that women, elderly, and non-driving people have negative opinions on the use of SAVs. In a study conducted in Germany and USA, Kröger et al. [40] indicated that contextual factors determined by national policy will influence AV adoption and impact the development of travel demand. The influence of time, cost, and technological factors for public transport users on the decision to switch to ridesharing were analysed by Azimi et al. [41]. In addition, the study revealed that the main concerns of drivers when choosing ridesharing are travelling with unknown people and pleasure of driving. On the other side, Webb et al. [42] and Lavieri et al. [43] found that commuters are more likely to accept travelling with unknown people when using SAVs. Haboucha et al., using discrete choice modelling, performed a comparative study on mode choice between cars, PAVs, and SAVs [44] showing that hesitation towards AV adoption still exists and the early AV adopters are likely to be younger, students, more educated, and spend more time in vehicles.

Further research has shown diverse opinions and willingness of potential users to adopt PAVs or SAVs depending on socio-demographic perspectives. Automated vehicles are expected to reduce the VoT as long as they allow the use of time during travel for other types of activities, including working, reading, sleeping, entertainment, etc. [35,45–48]. Hammadneh and Kiss showed that each onboard activity has a different impact on the transport mode choice, public transport (PT) being preferred to SAVs in terms of multitasking possibility, travel time, and cost [49], and demonstrated that PAV is preferred over SAV and PT, with the lowest likelihood of choosing SAV [30]. Furthermore, reading and social media use are preferred to writing alone activities.

Thus, another question raised in adoption of different form of CAVs concerns their social impact on travel time use and travel costs. The perceived value of travel time savings (VTTS), expressed as value of (travel) time (VoT), described as the cost of travel time, is conceptualized as a willingness to pay for reducing travel time or avoiding an additional hour of travel. The influence of the introduction of self-driving vehicles on their VoT acceptance has been investigated in numerous studies worldwide [50–54], as VoT is an important factor that determines the use, and the route choice [50,55]. Typically, VoT is inferred from stated preference experiments, from discrete choice modeling [51], predominantly using either the multinomial probit model (MNP) [52], or the multinomial logit model (MNL). Rashidi et al. [53] generally agreed that AV will lead to a reduction in travel time but specified that the results are influenced by the individuals' characteristics, location (urban, rural), use of a personal AV or shared AV, and the type of experiments used in these forecasts.

In a large-scale study of 1800 U.S. commuters, Zhong et al. [28] demonstrated a potential travel time reduction rate of 24% for AVs and 13% for SAVs in urban areas. In the same study, the potential VoT reduction rate was 17% in the rural area for AVs and 7% for SAVs. In Germany, Kolarova et al. [27] found that the estimated reduction in VoT compared with conventional cars was 41% for the commuters and no change for leisure or shopping trips. An interesting approach was undertaken in an experiment by Correia et al. in the Netherlands, where a trip in a conventional car was compared with a chauffeur-driven car and an AV [54]. The average VoT of conventional car travellers in both experiments (AVs and chauffeur experiments) was 7.5 €/hour and, in addition, travelling alone was preferred to travelling with companions in an AV.

Nevertheless, Singleton et al. [56] argued that AV users may feel more like passengers in a car than passengers on a train, with shared AVs potentially attenuating the use benefits of travel time, productivity gains being limited to long-distance travel, and recommended further empirical research on the experiential, time use, and VoT impacts of AVs.

Etzioni et al. [35] and Polydoropoulou et al. [36] approached the VoT on automated vehicles as part of the studies carried out during the WISE ACT action, funded by the COST programme. Etzioni et al. demonstrated that in six European countries (Cyprus, UK, Slovenia, Montenegro, Hungary, and Iceland), VoT estimates are higher than expected, reflecting the degree of uncertainty in AV implementation in countries of all sizes and GDP per capita, while Polydoropoulou et al. highlighted the importance of analysing the effect of SAV attributes and shared-ride conditions on future acceptance and adoption rates, and calculated willingness-to-pay values for private non-autonomous vehicles and private and shared autonomous vehicles in seven EU countries (Cyprus, Greece, Hungary, Israel, Iceland, Finland, and United Kingdom). Both travel time and travel cost were calculated based on the responses received from each participant regarding the time they spent on a regular trip.

From reviewing the relevant literature, we can observe that the discussion on the influence of socio-demographic factors on VoT is still a work in progress; only a few papers discuss the VoT for automated vehicles in the former communist countries, which have certain specificity, being predominantly car-oriented [34]. The present paper enriches the research, representing the first exploratory study on AV and perceptions of VoT in Romania.

3. Materials and Methods

A European survey focusing on travel behaviour and user attitudes towards future AV deployment was developed and applied during COST WISE-ACT Action. The survey was written in English, translated into the local language, and distributed to the different interest groups, as universities, national and regional agencies, NGOs, network of mobility interests, and public transport providers. In Romania, the data was collected during the COVID-19 outbreak, but the responders were asked to think about their usual travel behaviour before the pandemic restrictions, so the data collected and analysed in this study reflect pre-COVID-19 conditions.

The definition of AV has been included to avoid any misunderstanding of this notion: "An Autonomous Vehicle (AV) is a vehicle which takes over speed and steering control completely and permanently, on all roads and in all situations. The driver-passenger cannot drive manually because the vehicle does not have a steering wheel. The driver-passenger only sets the travel destination" [57]. The responders were asked to consider the SAE level 5 of autonomy of this vehicle [56]. The survey received ethical approval and all the data collected were anonymous.

The present research investigates the mode in which travel time/travel cost and socio-demographic characteristics of Romanian citizens influence the decision to choose between CARs, PAVs, and SAVs, based on stated preference discrete choice modelling (SPDCM) experiment, with different scenarios. The stated preference method is often used in analysing the transport behaviour research to determine the response to different choice situation to reveal situations that are not present in the market [58].

3.1. Survey Design and Variables Analysed

The survey was designed in three parts, as follows:

The first part aimed to investigate the daily transport habits specific to the most important journeys and the modes of transport used, as well as awareness, perception, and attitudes on automated vehicles. In the first part of the questionnaire, after explaining the notion of autonomous vehicle [57], the respondents were made familiar with the activities they could carry out while travelling in an autonomous vehicle. The question was developed based on a 6-point Likert scale approach (from 1 = strongly disagree to 6 = strongly agree) and the results are shown in Figure 1.

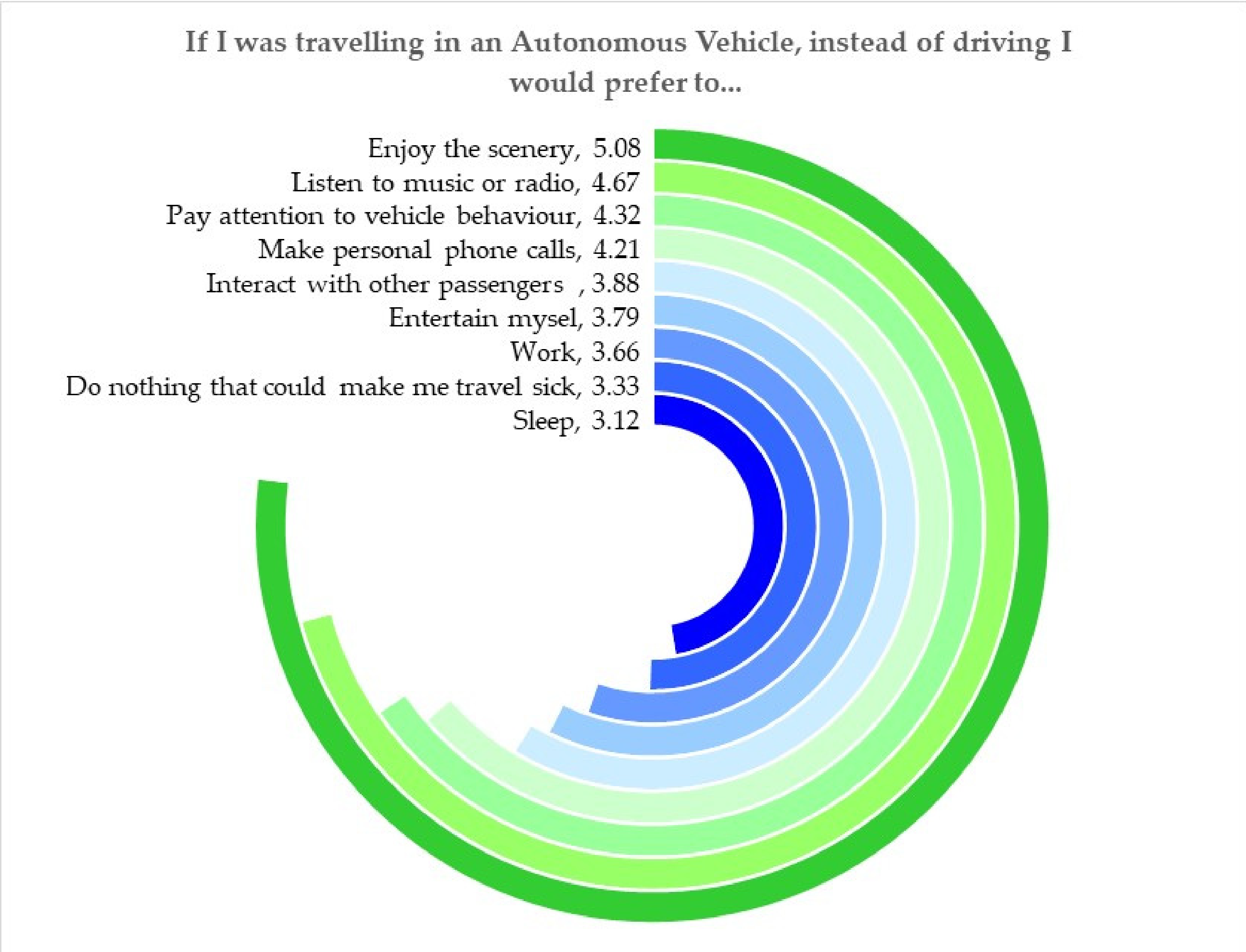

Figure 1. Preferred activities to be carried out during a travel in an AV, based on the survey analysis.

We observed that most of the responders preferred to enjoy the scenery, listen to the music, or pay attention to the vehicle behaviour. These preferences could result from the fact that the autonomous vehicle concept is currently not very well understood or tested.

The second part was conceived as a stated choice experiment. It included 24 scenarios, divided into 4 blocks, each block having 6 choice scenarios and the respondent being randomly allocated to each block. At the beginning of the second part, responders were asked to estimate the travel time for a regular trip by car, for a usual journey, even if they do not use this type of transport mode and they inputted as well the regular trip scope. For this specific travel cost, a national average travel cost value was used, based on a journey of approximately 10 km by taxi from an international airport to the main city in the country where they lived. For Romania, the cost considered was 1.7 lei/km (approximate EUR 0.37/km). The travel time (TT) and travel cost (TC) values provided to the respondents in the scenarios were based on these values, as presented in Figure 2. The construction of the stated preference (SP) sample scenario is presented in Table 1. In the survey, it was assumed that AVs are already operating in the city environment.

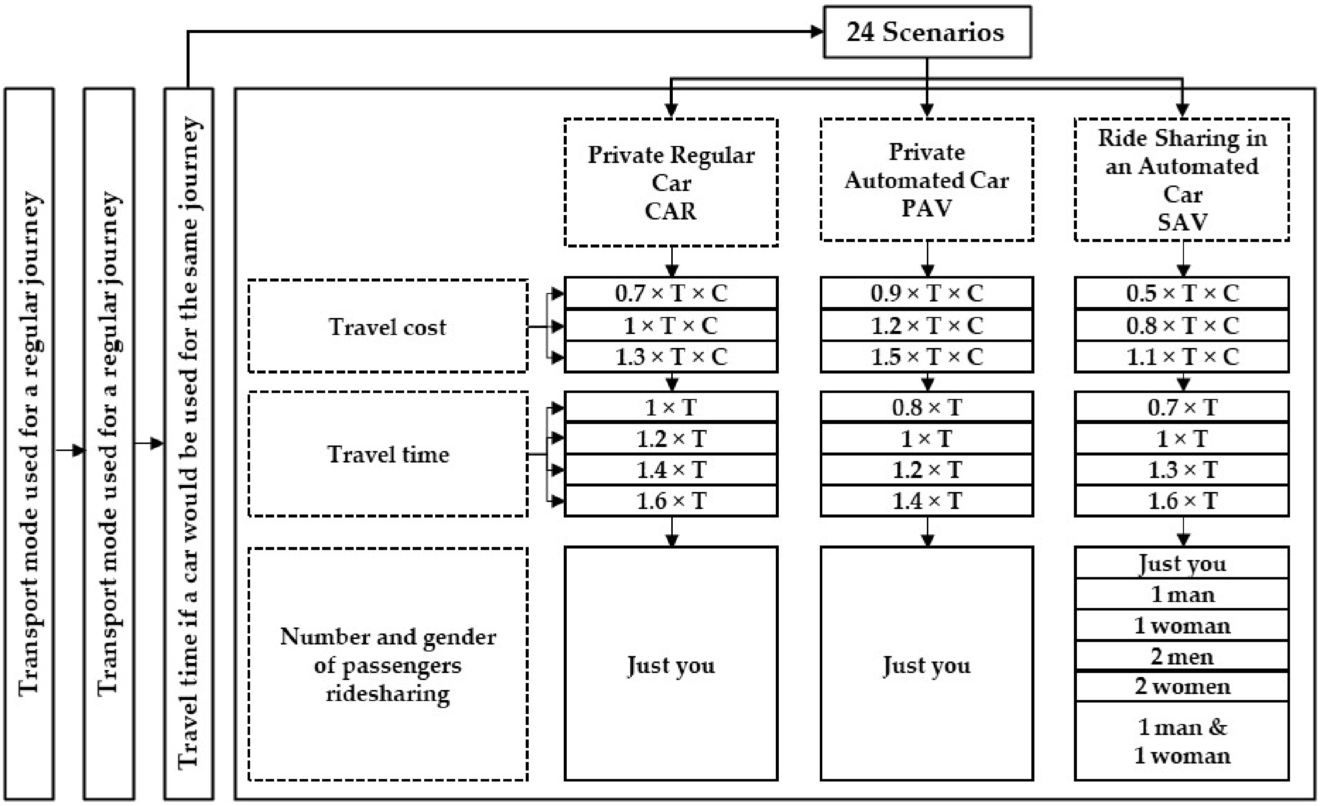

Figure 2. Design scheme used for the SP attribute levels.

Table 1. Stated preference (SP) sample scenario.

	Assume that you are about to leave your home for your regular journey to **Work**. Please choose your **preferred travel option based on the characteristics provided below:**			
		☐	☐	☐
WISE-ACT COST ACTION CA16222	**For my regular journey to Work I would choose...**	**31.5 lei 48 min OTHER PASSENGERS: 0 PRIVATE REGULAR CAR**	**40.5 lei 42 min OTHER PASSENGERS: 0 PRIVATE AUTOMATED VEHICLE**	**36 lei 21 min OTHER PASSENGERS: SHARED AUTOMATED VEHICLE**

The alternatives the responders were exposed to are as follows:

a. Private Regular Car—similar to the existing conventional cars—CAR
b. Private Automated own Vehicle—a self-driving vehicle owned by the respondent, without a human driver—PAV
c. Shared Automated Vehicle—this vehicle is not owned by the respondent and is shared or not with other unknown people—SAV. If the SAV is shared, the cost displayed becomes lower.

The third part was allocated to socio-demographic characteristic of the responders.

For the present investigation, we used the responses from the second and the third part of the survey.

In the second part of the questionnaire, before exposing the different scenarios, the survey participants were asked to choose the main scope of their regular journey and the preferred modes for this regular journey. The majority of respondents (Figure 3) stated that the main purpose for their journey was work (61%), administrative purposes (11%), and leisure (7%), while the most used means of transport for a regular journey (Figure 4) was personal car (58.4%), followed by public transport (22.4%), walking (6.5%), and cycling (3.6%).

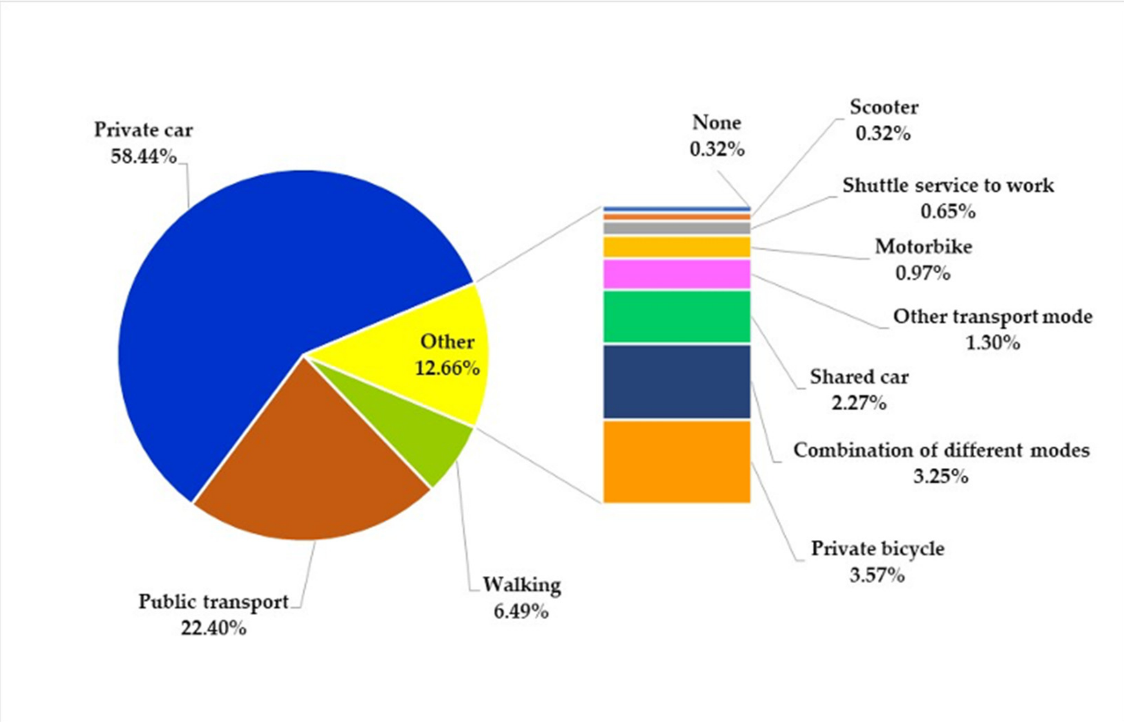

Figure 3. Transport mode use for a regular journey.

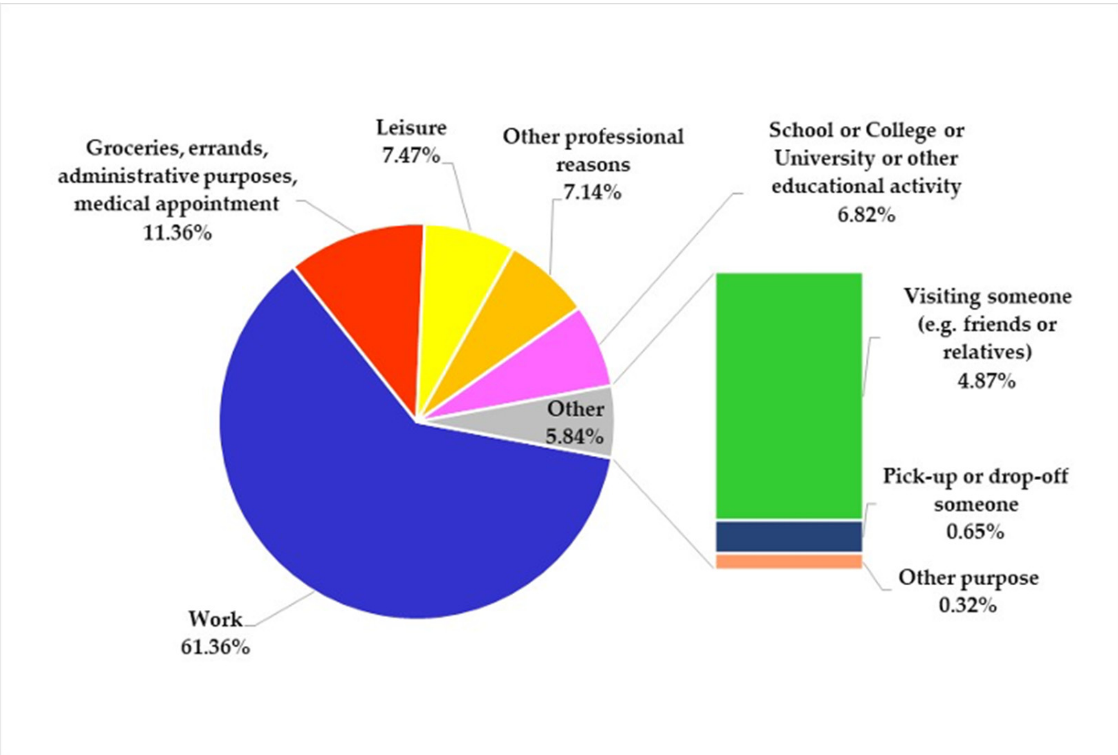

Figure 4. Purpose of the regular journey.

3.2. Model Formulation

3.2.1. Analysis Framework

The hypotheses mentioned above are tested by using multinomial logistic regression (MNL). MNL is an extension of binary logistic regression that allows for more than two categories of the dependent or outcome variable and is considered an attractive analysis because it does not assume normality, linearity, or homoscedasticity [59]. MNL, one of the most used statistical models for determining mode choice is used in conjunction with the utility function for travel behaviour analysis [59]. In addition, the research aims to determine the value of time (VoT) of each choice, based on the parameter coefficients of the travel cost (TT) and travel time (TC). This can be defined as the price users willingness to pay for the additional unit of time by maximizing his/her utility under the time and budget constraints [60].

To analyse the survey results and to perform the correlations, we used IBM SPSS Statistics Grand Pack 28.0 PREMIUM. IBM SPSS is designed to perform various statistical calculations, from descriptive statistics to inferential statistics, data management and graphs, and it is widely used as a research tool in engineering, marketing and education, social science, healthcare, and data mining.

3.2.2. Construction of the Utility Theory

Mode choice modelling represents the most important model in transport planning based on random utility theory [51,60]. An individual chooses an alternative to maximize his/her utility. The utility function (U) is an economic term for measuring relative satisfaction and has the property that an alternative is chosen if its utility is greater than the utility of all other alternatives in the individual choice set [61–63]. The utility of a service or good consists of two parts: one part is represented by the factor influencing the utility of alternative i, of mode t of each individual n (V_{itn}) and the unobserved utility ε_{it}. The error term simplifies an arbitrary usage pattern by integrating variables that have not been observed.

$$U_{itn} = V_{itn} + \varepsilon_{itn} \tag{1}$$

where:

U_{itn} = the utility function of the alternative (i) to the mode choice (t) for the individual n,

V_{itn} = the deterministic or observable portion of the utility estimated and includes variables related to the choice alternatives (travel cost, travel time) and to the individual itself (gender, age, education, etc.),

ε_{itn} = the error or the portion of the utility which could not be observed (capture the uncertainty).

The deterministic term V_{in} of each alternative is a linear function, determined by the attributes of the alternative itself and by the characteristics of the individual.

$$V_{itn} = \sum_k \beta_k X_{intk} \tag{2}$$

where:

β_k = vector of parameters representing a coefficient of variables that defines the alternative of mode choice. It provides information on how a parameter positively or negatively, influences the choice.

X_{intk} = vector of parameters representing a coefficient of variables that defines the alternative of mode choice.

The mathematical structure of multinomial logistic Model (MNL) can be expressed as the probability (P) that a given individual chooses alternative i from a choice set of M (i = 1, 2, 3, . . . , M) for a mode choice (t) and is given by equation:

$$P_i = \frac{e^{V_{it}}}{\sum_{i \in M} e^{V_{it}}} \tag{3}$$

where:

P_{ik} = the probability of utility for a mode choice (t) by the individual choosing alternative (i),

V_{it} = the utility of systematic component for a mode choice (t) by the individual using alternative (i).

Value of travel time (VoT) is a key indicator for cost-benefit evaluation of transport-related projects when choosing an alternative mode. It usually refers to the value of money equivalent for a minute spent in travelling, influencing the travel behaviour, and it varies across individuals [61,64]. It is calculated as the ratio between the time coefficient and cost coefficient in discrete choice model [65]:

$$VoT_t = -60\,\text{sec} * \frac{\beta^t_{TT}}{\beta^t_{TC}} \tag{4}$$

where:

β^t_{TT} = coefficient of variables estimated for travel time,

β^t_{TC} = coefficient of variables estimated for travel cost,

t = travel mode choice.

It was considered that, as long as an individual agrees to share an automated car with other unknown people (SAV choice), the number of co-travellers and their gender does not significantly influence this choice.

3.2.3. Modelling Framework

Figure 5 presents the modelling framework for the mode choice behaviour, respectively, CAR, PAV, and SAV as a function of two types of variables: individual characteristics and household characteristics. Table 2 shows the variables that are investigated, coded, and sorted for the specific group of variables.

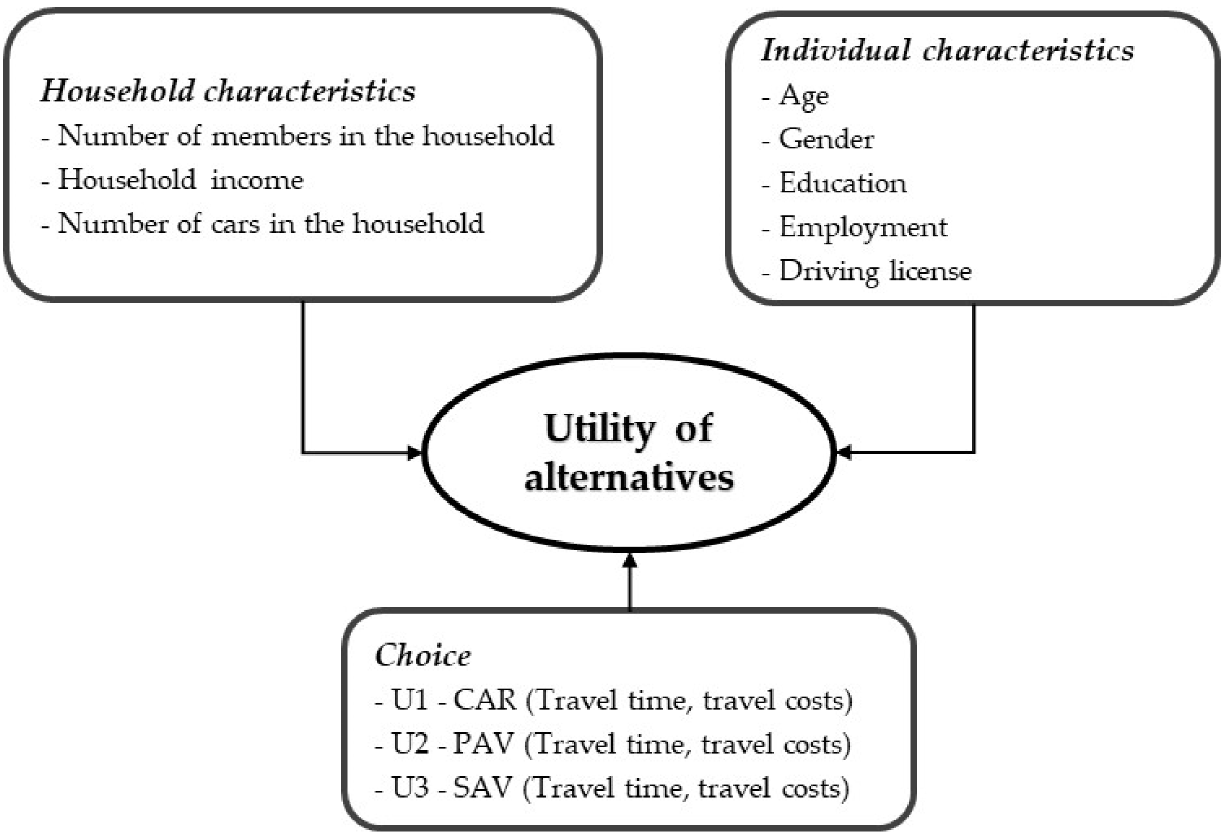

Figure 5. Schematic representation of the attributes' integration into the Utility function.

Table 2. Description of variables investigated.

Variable	Description	Measure
	Individual characteristics	
Age	Age	ordinal
Gender	Gender (dummy variable indicate which 0 if male, 1 if female)	scale
Education	Education level (dummy variable indicate which 1 if Primary school or equivalent, 2 if High-school, 3 if College/University, 4 if Postgraduate)	scale
Employment_status	Employment status (dummy variable indicate which 1 if Employee, 2 if Self-employed, 3 if Company owner, 4 if Unemployed, 5 if Retired, 6 if Full-time education, 0 if Other)	scale
Driving_licence	Driving license (dummy variable indicate which 0 if no, 1 if yes)	
	Household characteristics	
HHM	Number of members in the household, including responders	scale
HHM_care	No. of members in the household need caring responsibility, including yourself (children, disabled, elderly, etc)	scale
No_cars	No. of cars in the household	scale
Annual_income	Annual income (dummy variable indicate which income class a respondent belongs to 1 if Low annual income, 2 if Medium annual income, 3 if High annual income, 0 if Not disclosed)	ordinal
	Trip characteristics (stated preference)	
TT	Travel time	scale
TC	Travel cost	scale
CAR, PAV, SAV	Transport mode	nominal

Consequently, the general utility function will have the form in (6) and the utility function of each alternative (CAR, PAV, SAV) can be written as in (6)–(8):

$$U_{in}^{t} = \sum_{k} \beta_{Xk}^{t} X_{ink}^{t} + \sum_{k} \beta_{Yk}^{t} Y_{ink}^{t} + \varepsilon_{itn} \quad (5)$$

$$\begin{aligned} U_{CAR}^{n} = \beta_{TT}^{CAR} TT^{n} \quad & + \beta_{TC}^{CAR} TC^{n} + \beta_{age}^{CAR} AGE^{n} + \beta_{gender}^{CAR} Gender^{n} + \beta_{education}^{CAR} Education^{n} \\ & + \beta_{employment}^{CAR} Employment^{n} + \beta_{driving\_lic}^{CAR} Driving\_lic^{n} + \beta_{HHM}^{CAR} HHM \\ & + \beta_{HHM\_care}^{CAR} HHM\_care^{n} + \beta_{no\_cars}^{CAR} No\_cars^{n} \\ & + \beta_{Annual\_income}^{CAR} Annual\_income^{n} + \varepsilon^{CAR} \end{aligned} \quad (6)$$

$$\begin{aligned} U_{PAV}^{n} = \beta_{TT}^{PAV} TT^{n} \quad & + \beta_{TC}^{PAV} TC^{n} + \beta_{age}^{PAV} AGE^{n} + \beta_{gender}^{PAV} Gender^{n} + \beta_{education}^{PAV} Education^{n} \\ & + \beta_{employment}^{PAV} Employment^{n} + \beta_{driving\_lic}^{PAV} Driving\_lic^{n} + \beta_{HHM}^{PAV} HHM \\ & + \beta_{HHM\_care}^{PAV} HHM\_care^{n} + \beta_{no\_cars}^{PAV} No\_cars^{n} \\ & + \beta_{Annual\_income}^{PAV} Annual\_income^{n} + \varepsilon^{PAV} \end{aligned} \quad (7)$$

$$\begin{aligned} U_{SAV}^{n} = \beta_{TT}^{SAV} TT^{n} \quad & + \beta_{TC}^{SAV} TC^{n} + \beta_{age}^{SAV} AGE^{n} + \beta_{gender}^{SAV} Gender^{n} + \beta_{education}^{SAV} Education^{n} \\ & + \beta_{employment}^{SAV} Employment^{n} + \beta_{driving\_lic}^{SAV} Driving\_lic^{n} + \beta_{HHM}^{SAV} HHM \\ & + \beta_{HHM\_care}^{SAV} HHM\_care^{n} + \beta_{no\_cars}^{SAV} No\_cars^{n} \\ & + \beta_{Annual\_income}^{SAV} Annual\_income^{n} + \varepsilon^{SAV} \end{aligned} \quad (8)$$

where:

β_{Xk}^{t} = vector coefficient of the individual attributes,

X_{ink}^{t} = vector of parameters representing a coefficient of variables that defines the alternative of mode choice related to the individual characteristics.

β_{Yk}^{t} = vector coefficient of the household attributes,

Y_{ink}^{t} = vector of parameters representing a coefficient of variables that defines the alternative of mode choice related to the household characteristics.

t = travel mode choice

4. Results and Discussion

4.1. Socio Economic Characteristics

A total of 309 responses were recorded and validated. The individual and socio-economic characteristics of the analysed sample are presented in Tables 3 and 4. From the statistical point of view, the sample fits the characteristics of the national population in terms of gender [66]. The number of cars per household is 1.34, confirming the perception of a car as a status symbol that was perpetuated in Romania following the fall of the communist regime [67]. It can be observed, however, that there are significant variations between education groups, with the majority of the respondents having at least university or postgraduate education (90%), which may be partly as a result of recruitment through the authors' professional network in the web-based survey, this being a common feature of all the countries where the survey was distributed [35,36]. Respondents are generally employed, which is fully in line with the European statistics [68], and the majority hold a valid driving license. In terms of income, there was a uniform distribution among the respondents, with 11% in the middle-income range, but a relatively high percentage of the respondents (18.4%) did not want to disclose their income.

Table 3. Descriptive statistics of individual and household characteristics.

	Mean		**Std. Deviation**	**Variance**
	Statistic	**Std. Error**	**Statistic**	**Statistic**
Age	40.27	0.706	12.404	153.866
Gender	1.05	0.28	0.501	0.251
No. of members in the household	2.67	0.070	1.230	1.513
No. of members in the household need caring responsibility, including yourself (children, disabled, elderly, etc.)	0.61	0.053	0.931	0.867
No. of cars in the household	1.34	0.050	0.870	0.758

Table 4. Descriptive statistics of the socio-economic characteristics of the sample data.

		Frequency	**Percentage**
Gender	Female	155	50.2
	Male	154	49.8
Highest level educational degree	Primary school or equivalent	1	0.3
	High school	30	9.7
	College/University	141	45.6
	Postgraduate	137	44.3
Car driving license	Yes	256	82.8
	No	53	17.2
Employment status	Employee	210	68.0
	Self-employed	26	8.4
	Company owner	36	11.7
	Unemployed	1	0.3
	Retired	8	2.6
	Full-time education	27	8.7
	Other	1	0.3
Annual income	Not disclosed	342	18.5
	Low annual income	690	37.3
	Medium annual income	739	40.0
	High annual income	78	4.2

The allocation per group of scenarios is indicated in Table 5. We randomly allocated the responders, considering a balanced number of participants per group, and we did not take into account any response provided for previous questions in the survey.

Table 5. Distribution of participants per groups.

	No. of Participants	Male	Female
1st group	84	36	48
2nd group	77	43	34
3rd group	70	35	35
4th group	78	40	38
Total	309	154	155

From the total number of interviewed people, the responses for 1 person were eliminated because their questionnaire was not filled out completely. A total of 1.848 valid responses has been recorded and the choices for CAR, PAV, and SAV are presented in Table 6. We observed a high preference for regular cars (41%), followed by SAVs (37%), indicating similar reservation towards acceptance of AVs as people participating in the same survey in six European countries [35], and which also emphasized that 70% of choices are regular cars.

Table 6. Distribution of answers per choices for CAR, PAV, and SAV.

	CAR	PAV	SAV	Total
No. of answers	763	395	690	1.848

The questions and choices for each group are shown in Tables 7–10 below. For exemplification of choice scenario, the descriptive statistics are presented from the gender preferences perspective. The values in bold show the dominant preferences by gender, for each choice.

Table 7. Group 1—choice scenarios and responses for gender preferences.

		Gender	
		Female	Male
Choice 1	1.3 × T × C lei, 1 × T min, other passengers: 0 CAR	29.2%	**38.9%**
	1.2 × T × C lei, 0.8 × T min, other passengers: 0 PAV	22.9%	22.2%
	1.1 × T × C lei, 0.7 × T min, other passengers: 0 SAV	**47.9%**	**38.9%**
Choice 2	0.7 × T × C lei, 1.2 × T min, other passengers: 0 CAR	**54.2%**	**55.6%**
	1.5 × T × C lei, 1.2 × T min, other passengers: 0 PAV	10.4%	5.6%
	0.5 × T × C lei, 1.3 × T min, other passengers: 0 SAV	35.4%	38.9%
Choice 9	0.7 × T × C lei, 1.2 × T min, other passengers: 0 CAR	**60.4%**	**69.4%**
	1.2 × T × C lei, 1.4 × T min, other passengers: 0 PAV	8.3%	5.6%
	1.1 × T × C lei, 0.7 × T min, other passengers: 1 W + 1 M SAV	31.3%	25.0%
Choice 11	1.3 × T × C lei, 1 × T min, other passengers: 0 CAR	31.3%	30.6%
	0.9 × T × C lei, 1 × T min; other passengers: 0 PAV	**41.7%**	**50.0%**
	0.5 ×T × C lei, 1.6 × T min, other passengers: 2 M SAV	27.1%	19.4%
Choice 18	0.7 × T × C lei, 1.2 × T min, other passengers: 0 CAR	39.6%	44.4%
	0.9×T×C lei, 1.4×T min, other passengers: 0 PAV	6.3%	8.3%
	0.5 × T × C lei, 1 × T min, other passengers: 0 SAV	**54.2%**	**47.2%**
Choice 24	1 × T × C lei, 1.2 × T min, other passengers: 0 CAR	39.6%	**47.2%**
	1.2 × T × C lei, 0.8 × T min, other passengers: 0 PAV	18.8%	19.4%
	0.8 × T × C lei, 1 × T min, other passengers: 1 M + 1 W SAV	**41.7%**	33.3%

Table 8. Group 2—choice scenarios and responses for gender preferences.

		Gender	
		Female	**Male**
Choice 5	1 × T × C lei, 1.2 × T minutes, other passengers: 0 CAR	**73.5%**	**67.4%**
	1.5 × T × C lei, 1.4 × T minutes, other passengers: 0 PAV	14.7%	7.0%
	1.1 × T × C lei, 1.6 × T minutes, other passengers: 0 SAV	11.8%	25.6%
Choice 12	1.3 × T × C lei, 1.6 × T minutes, other passengers: 0 CAR	32.4%	23.26%
	1.5 × T × C lei, 1 × T minutes, other passengers: 0 PAV	29.4%	13.95%
	0.5 × T × C lei, 0.7 × T minutes, other passengers: 1 M SAV	**38.2%**	**62.79%**
Choice 16	0.7 × T × C lei, 1.2 × T minutes, other passengers: 0 CAR	**61.8%**	**51.16%**
	1.2 × T × C lei, 1 × T minutes, other passengers: 0 PAV	32.4%	37.21%
	1.1 × T × C lei, 1.6 × T minutes, other passengers: 1 M SAV	5.9%	11.63%
Choice 19	0.7 × T × C lei, 1.4 × T minutes, other passengers: 0 CAR	38.2%	30.23%
	1.5 × T × C lei, 1.4 × T minutes, other passengers: 0 PAV	11.8%	6.98%
	0.5 × T × C lei, 0.7 × T minutes, other passengers: 1 W SAV	**50.0%**	**62.79%**
Choice 20	1.3 × T × C lei, 1.6 × T minutes, other passengers: 0 CAR	32.4%	18.60%
	1.5 × T × C lei, 0.8 × T minutes, other passengers: 0 PAV	**41.2%**	**41.86%**
	0.5 × T × C lei, 1.6 × T minutes, other passengers: 1 W SAV	26.5%	39.53%
Choice 21	1 × T × C lei, 1.6 × T minutes, other passengers: 0 CAR	29.4%	16.28%
	0.9 × T × C lei, 1 × T minutes, other passengers: 0 PAV	**52.9%**	**60.47%**
	0.8 × T × C lei, 1.6 × T minutes, other passengers: 0 SAV	17.6%	23.26%

Table 9. Group 3—choice scenarios and responses for gender preferences.

		Gender	
		Female	**Male**
Choice 4	1.3 × T × C lei, 1.6 × T minutes, other passengers: 0 CAR	25.7%	31.4%
	1.5 × T × C lei, 1.4 × T minutes, other passengers: 0 PAV	5.7%	11.4%
	1.1 × T × C lei, 1.3 × T minutes, other passengers: 0 SAV	**68.6%**	**57.1%**
Choice 6	1 × T × C lei, 1.4 × T minutes, other passengers: 0 CAR	25.7%	25.7%
	1.2 × T × C lei, 0.8 × T minutes, other passengers: 0 PAV	14.3%	28.6%
	1.1 × T × C lei, 0.7 × T minutes, other passengers: 0 SAV	**60.0%**	**45.7%**
Choice 8	1 × T × C lei, 1 × T minutes, other passengers: 0 CAR	**57.1%**	**54.3%**
	1.5 × T × C lei, 0.8 × T minutes, other passengers: 0 PAV	20.0%	17.1%
	0.8 × T × C lei, 1.3 × T minutes, other passengers: 2 M SAV	22.9%	28.6%
Choice 10	0.7 × T × C lei, 1.6 × T minutes, other passengers: 0 CAR	22.9%	28.6%
	0.9 × T × C lei, 0.8 × T minutes, other passengers: 0 PAV	**51.4%**	**54.3%**
	0.8 × T × C lei, 1.3 × T minutes, other passengers: 0 SAV	25.7%	17.1%
Choice 14	0.7 × T × C lei, 1.6 × T minutes, other passengers: 0 CAR	42.9%	**48.6%**
	1.5 × T × C lei, 1.2 × T minutes, other passengers: 0 PAV	11.4%	8.6%
	1.1 × T × C lei, 1 × T minutes, other passengers: 2 W SAV	**45.7%**	42.9%
Choice 17	1.3 × T × C lei, 1.4 × T minutes, other passengers: 0 CAR	17.1%	22.9%
	0.9 × T × C lei, 1.2 × T minutes, other passengers: 0 PAV	**62.9%**	**48.6%**
	0.5 × T × C lei, 1.6 × T minutes, other passengers: 1 M + 1 W SAV	20.0%	28.6%

Table 10. Group 4—choice scenarios and responses for gender preferences.

		Gender	
		Female	**Male**
Choice 3	0.7 × T × C lei, 1 × T minutes, other passengers: 0 CAR	**52.6%**	**52.5%**
	1.5 × T × C lei, 0.8 × T minutes, other passengers: 0 PAV	7.9%	15.0%
	0.5 × T × C lei, 1.3 × T minutes, other passengers: 0 SAV	39.5%	32.5%
Choice 7	1.3 × T × C lei, 1.2 × T minutes, other passengers: 0 CAR	18.4%	30.0%
	0.9 × T × C lei, 1.4 × T minutes, other passengers: 0 PAV	13.2%	10.0%
	0.5 × T × C lei, 0.7 × T minutes, other passengers: 0 SAV	**68.4%**	**60.0%**
Choice 13	0.7 × T × C lei, 1 × T minutes, other passengers: 0 CAR	**63.2%**	**62.5%**
	0.9 × T × C lei, 1 × T minutes, other passengers: 0 PAV	5.3%	25.0%
	0.5 × T × C lei, 1.6 × T minutes, other passengers: 2 W SAV	31.6%	12.5%
Choice 15	1.3 × T × C lei, 1 × T minutes, other passengers: 0 CAR	31.6%	42.5%
	1.5 × T × C lei, 1 × T minutes, other passengers: 0 PAV	5.3%	7.5%
	0.8 × T × C lei, 1 x T minutes, other passengers: 2 W SAV	**63.2%**	**50.0%**
Choice 22	1 × T × C lei, 1 × T minutes, other passengers: 0 CAR	**55.3%**	**65.0%**
	1.2 × T × C lei, 1 × T minutes, other passengers: 0 PAV	13.2%	17.5%
	1 × T × C lei, 1.3 × T minutes, other passengers: 1 W SAV	31.6%	17.5%
Choice 23	0.7 × T × C lei, 1.6 × T minutes, other passengers: 0 CAR	36.8%	32.5%
	0.9 × T × C lei, 1.4 × T minutes, other passengers: 0 PAV	13.2%	12.5%
	0.8 × T × C lei, 0.7 × T minutes, other passengers: 2 M SAV	**50.0%**	**55.0%**

In the case of the first group, we can see that the respondents, both male and female, generally preferred the cheaper option of travel (Choices 1, 9, 18, 24), regardless of whether the trip was made with a CAR, PAV, or SAV. When the interviewees were exposed to a cheaper option, but would have to travel with other people (1 man + 1 woman or 2 men), they chose the next option as a cost, regardless of whether it was CAR or PAV. It is also noted that in three cases (Choice 1, 11, and 24) women in this group prefer to share the vehicle with other passengers, while men prefer to share a vehicle only in two cases (Choice 1 and 18).

Similarly, in the case of the second group, we can notice that the respondents generally preferred (4 cases out of 6) the cheaper option of travel, regardless of whether the travel was with a CAR, PAV, or SAV.

When the interviewees were exposed to a cheaper option, but they would have to move to a SAV with other people (1 woman), they chose the next option as a cost, regardless of whether it was a CAR or PAV. In this case, both men and women (Choice 19) preferred the option of travelling with an SAV. It is noteworthy that when the cost of travel was slightly higher than in the case of an SAV, participants preferred PAV, probably due to the shorter travelling time (Choice 11).

In the case of the third group, the preferences varied among the cheapest or shorter time option, regardless of whether the travel was made with a CAR, PAV, or SAV. In this group it can be observed that there was a preference for women to share a vehicle with other women (Choice 6 and 14). The alternative PAV was chosen in only two cases (Choice 10 and 17), when the travel time was the shortest.

In the case of the fourth group, we can see that the respondents preferred the cheaper option of travel in three cases (Choice 7, 15, and 22), and in two of the three cases this was with an SAV. Regarding travelling with other people in the vehicle, it is noted that both men and women preferred this option especially if they were travelling with 2 women or 2 men (Choices 15 and 23).

The results for all groups showed that, whether female or male, the preferences were largely for the best options presented from the cost point of view and then for the shortest travel time. In addition, men were more likely to use a shared car regardless of the presence of other unknown attendant(s), while women preferred to use a shared autonomous car but without any passengers. The option for using a PAV was less chosen.

Summarizing the results across the four groups, respondents clearly preferred the cheaper option of travel in most cases, regardless of whether they travel with a CAR, PAV, or SAV, confirming the results in [69] which demonstrates consumers' sensitivity to price in relation to PAVs and SAVs. However, if the cheaper option is the SAV, the results are not completely relevant as the preference for travel with (i) one man, (ii) one woman, (iii) two men, (iv) two women, or (v) one man and one woman is equally shared by the respondents (three responses for each option). In addition, travelling with one or two people, regardless of gender, did not seem to influence the choice of SAV, thus further research should be carried out on a larger sample.

4.2. Investigation of Model Fitting

The logical step in the analysis was checking that data fit the multinomial logistic model [68]. For this, we ran goodness-of-fit analysis. The results are presented in Table 11, and show that the overall model is statistically significant (*Sig.* $\leq$ *0.05*) [70].

Table 11. Goodness-of-fit.

	CAR			**PAV**			**SAV**		
	Chi-Square	**df**	**Sig.**	**Chi-Square**	**df**	**Sig.**	**Chi-Square**	**df**	**Sig.**
Pearson	1859.729	1618	0.000	1965.947	1618	0.000	2065.738	1618	0.000
Deviance	2378.323	1618	0.000	1637.561	1618	0.362	2237.344	1618	0.000

We performed a likelihood ratio test (Table 12) to establish the contribution of each parameter on the model. The results show the existence of a statistically significant relationship between the variables. Thus, travel time and travel cost have a significant effect on transport mode choice for all scenarios. Besides this, age and number of cars in the household have a significant influence on travel mode choice. On the other hand, education does not influence the mode choice in any alternative. It can be observed that preferences for PAVs are unlikely to be influenced by gender, annual income, driving licence, or the number of household members, although it is influenced by the employment status and whether there is at least one member in the household that needs care. The option to share an AV is influenced by the annual income, driving licence, and number of cars in the household, and is not influenced by the gender, employment status, and if there is at least one member of the household in need of care.

4.3. Parameter Estimates

Parameter estimation for mode choice is presented in Table 13. In this table, we removed the subcategories that were not statistically significant. The negative coefficient indicates the decreased utility associated with increased parameters. The positive influence of travel time is observed for both CARs and SAVs, while the travel cost is more important for those who chose PAVs.

Related to the individual characteristics, age negatively influences the choice of automated, personal, or shared vehicle, with older people preferring the classic car, which confirms, on the one hand, the results of administering the same survey in three of the seven countries where the survey was applied, namely Hungary, Israel, and Iceland [35] and, on the other hand, the findings in the international literature [71]. Additionally, younger people are more interested in AVs, confirming the research results in [44]. Interestingly, it was found that education does not influence the choice for PAV or SAV, contrary to the international literature findings indicating that higher-educated people are more likely to use SAVs [43]. This aspect is probably influenced by the sample characteristics, as most responders have university or post-doctoral studies. As expected, respondents who do not have a driving licence prefer to use SAVs, while the others prefer personal classic cars. The choice for PAV is positively influenced by travel time, age (young people), employment status, number of household members needing care, and number of cars in the household, which confirms the results in previous research for the countries involved in the survey [35–37] but also the findings in the international literature [53]. Despite its potential lower convenience, SAV is more preferred by young people, and those without a driving licence or car. Furthermore, SAV use is not influenced by gender, in contrast to the results of the Israel study in [44], which suggests that men are more likely than women to prefer SAVs, and the findings in [72], which indicate that men are more concerned about using SAVs than women. Furthermore, SAVs are preferred by those with a low or medium annual income, probably due to the high cost of purchasing AVs.

Table 12. Likelihood Ratio Tests.

	CAR				PAV				SAV			
	Model Fitting Criteria	Likelihood Ratio Tests			Model Fitting Criteria	Likelihood Ratio Tests			Model Fitting Criteria	Likelihood Ratio Tests		
Effect	**−2 Log Likelihood of Reduced Model**	**Chi-Square**	**df**	**Sig.**	**−2 Log Likelihood of Reduced Model**	**Chi-Square**	**df**	**Sig.**	**−2 Log Likelihood of Reduced Model**	**Chi-Square**	**df**	**Sig.**
Intercept	2378.323 [a]	0.000	0	.	1637.561 [a]	0.000	0	.	2237.344 [a]	0.000	0	.
TT	2392.971	14.648	1	0.000	1825.147	187.586	1	0.000	2291.809	54.465	1	0.000
TC	2393.068	14.745	1	0.000	1875.599	238.038	1	0.000	2328.301	90.957	1	0.000
Age	2426.780	48.456	1	0.000	1642.566	5.006	1	0.025	2266.591	29.247	1	0.000
Gender	2382.176	3.852	1	0.050	1638.590	1.030	1	0.310	2239.328	1.985	1	0.159
Education	2380.312	1.988	2	0.370	1640.418	2.858	2	0.240	2239.361	2.017	2	0.365
Employment_status	2387.434	9.110	6	0.167	1649.067	11.507	6	0.074	2244.537	7.194	6	0.303
Annual_income	2394.328	16.005	3	0.001	1637.741	0.180	3	0.981	2253.275	15.932	3	0.001
Driving_licence	2394.225	15.902	1	0.000	1637.611	0.051	1	0.822	2251.519	14.175	1	0.000
HHM	2379.851	1.527	1	0.217	1638.714	1.153	1	0.283	2242.411	5.067	1	0.024
HHM_care	2381.580	3.256	1	0.071	1649.835	12.274	1	0.000	2238.374	1.030	1	0.310
No_cars	2381.598	3.275	1	0.070	1642.241	4.680	1	0.031	2251.946	14.602	1	0.000

The chi-square statistic is the difference in −2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0. [a]. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

We can confirm, based on the results above, that the first and second hypotheses are confirmed: the mode choice strongly depends on travel time and travel cost as well as on the socio-demographic characteristics of the population.

With regards to VoT, Table 14 shows the values calculated for each mode choice. Interestingly, it can be observed that the VoT for SAV (34% reduction rate) is the lowest, compared with the VoT for CAR and PAV, probably because the respondents consider that the time spent while travelling can be used for other activities or just for relaxation. This confirms our third hypothesis for Romania while indicating the preference of Romanian respondents for better use of travel time by sharing a vehicle, even with unknown people. The highest value of time was obtained for PAV (7.5% increase compared with classic personal car), suggesting respondents' hesitation to adopt PAV, most probably due to the expected purchase cost and concerns related to security and privacy [34].

Table 13. Parameter estimates.

Parameter	CAR		PAV		SAV	
	B	Sig.	B	Sig.	B	Sig.
Intercept	−1.593	0.082	−18.303	0.000	2.321	0.012
TT	0.007	0.000	-0.052	0.000	0.016	0.000
TC	−0.005	0.000	0.035	0.000	−0.018	0.000
Age	0.034	0.000	−0.014	0.026	−0.029	0.000
[Gender = Female] male as reference	0.205	0.050	−0.135	0.310	−0.153	0.159
[Education = High school]	0.108	0.593	0.322	0.200	−0.296	0.164
[Education = College/University]	−0.112	0.289	0.198	0.142	−0.032	0.775
[Employment_status = Employee] other as reference	−0.306	0.720	17.121	0.000	−1.096	0.203
[Employment_status = Self-employed]	0.183	0.832	16.678	0.000	−1.369	0.119
[Employment_status = Company-owner]	−0.401	0.641	17.173	0.000	−1.065	0.220
[Employment_status = Unemployed]	0.196	0.874	16.931	0.000	−1.489	0.219
[Employment_status = Retired]	−0.285	0.753	17.325	0.000	−1.258	0.177
[Employment_status = Full-time-education]	−0.398	0.653	16.598		−0.728	0.414
[Driving_licence = Yes] no as reference	0.627	0.000	0.046	0.822	−0.590	0.000
HHM	−0.063	0.222	−0.071	0.291	0.116	0.025
HHM_care	−0.112	0.072	0.258	0.000	−0.064	0.311
No_cars	0.122	0.070	0.183	0.030	−0.267	0.000
[Annual_income = Low] not willing to disclose as reference	−0.391	0.007	0.076	0.681	0.346	0.026
[Annual_income = Medium]	−0.572	0.000	0.066	0.722	0.592	0.000
[Annual_income = High]	−0.283	0.302	0.060	0.862	0.216	0.460

When comparing the results with the findings in [36], which used the same survey run in seven EU countries (Cyprus, Greece, Hungary, Israel, Iceland, Finland and United Kingdom), Romania shows relative values closest to those of Hungary and Cyprus: VoT increase for PAV (around 8%) demonstrating similar preferences of respondents (Figure 6).

Table 14. Value of Travel Time (VoT) (lei/hour) and reduction rate by comparison with classic car.

CAR		PAV			SAV		
VoT [lei/hour]	VoT [€/hour]	VoT [lei/hour]	VoT [€/hour]	Reduction Rate [%]	VoT [lei/hour]	VoT [€/hour]	Reduction Rate [%]
81.85	16.91	87.99	18.18	7.5	53.69	11.09	−34.4

However, in terms of absolute values, the results from Romania show that the value for PAV is the highest compared with CAR and SAV, suggesting that findings should be approached with caution and explored in future studies on larger groups of people, as various research [56] suggests that the VoT of AVs is likely to be lower than that of regular cars, since people in PAVs may engage in other activities while travelling [73], being less time sensitive.

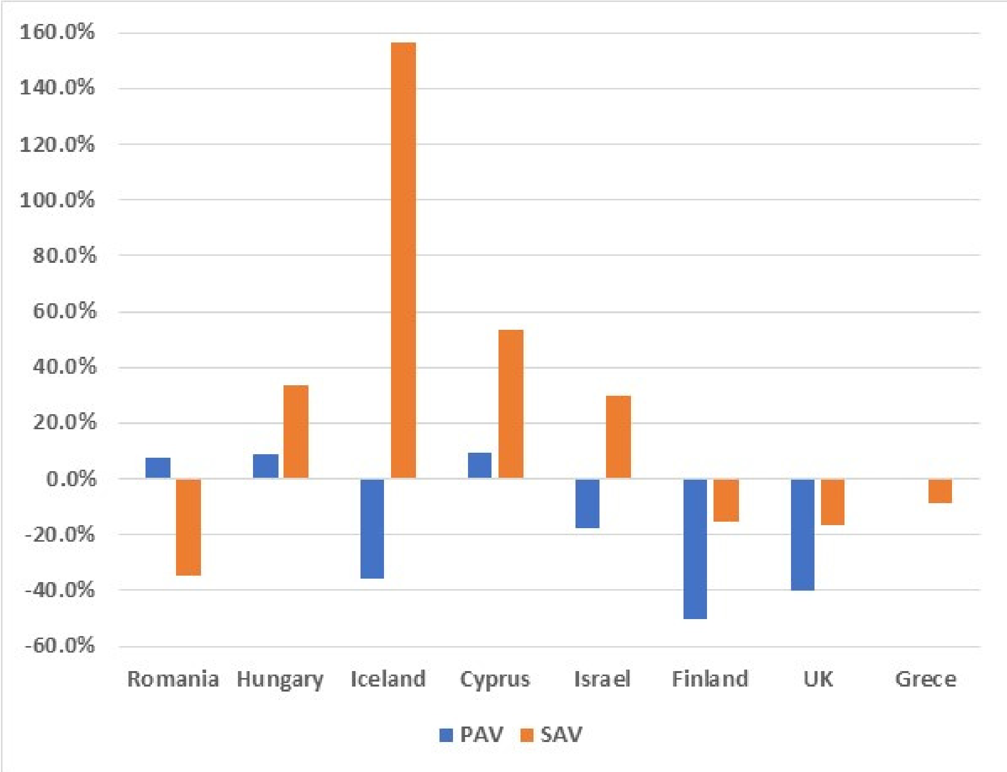

Figure 6. Comparison of reduction rate of VoT in several European countries, based on the same survey analysis. (Positive value represents a relative value of VoT higher than the VoT for CAR, while a negative value represents a relative value of VoT lower than the VoT for CAR) (based on the data from [36]).

5. Conclusions

Automated vehicles are expected to play an important role in future city transportation due to their capacity of preventing accidents caused by human errors, reducing environmental pollution, and improving mobility of citizens while saving time for the drivers.

Our research aims to estimate the influence of various mode choice factors using stated preference discrete choice. Using multinomial logistic models (MNL), we analysed the relationship between three mode choices: regular cars, private automated vehicles, and shared automated vehicles, with the individual and household characteristics. In addition, based on the results of MNL analysis, the value of travel time for each mode choice was calculated.

The results showed similarities but also differences in the behaviour of Romanian respondents compared with the other countries' citizens and the findings in the international literature; the majority of respondents preferred cheaper options for travelling, and regular car is the first choice for travelling followed by SAV. Choice of SAV is influenced by the socio-economic characteristics such as age, education, annual income, and car ownership.

This study fills an important gap in the scientific research on AV acceptance by estimating perceived VoT among the Romanian population to understand the factors influencing this acceptance, such as age, education, income, employment status, number of cars in the household, and number of people in the household needing care. The paper presents for the first time in Romania a model for estimating the value of travel time for urban areas, based on discrete choice model and complements the findings on the perception of people on AVs in the former communist countries, aiming to continue the research started for Romania in [34].

Limitations of this study include its focus on comparing classic private cars with automated cars and the fact that it does not consider public transportation. In addition, the survey was conceived as a web-based questionnaire, thus, not all the population categories were included, especially those with limited digital skills. Moreover, the questionnaire was distributed among professionals with a relatively high level of knowledge about mobility and land-use planning. Finally, more respondents are needed to increase the accuracy of the findings.

Even if the results of our study suggest that VoT has the lowest value for SAV, there is need for future research on larger sample sizes of people to (i) confirm and deepen these results, (ii) conduct comparable studies in European countries, and (iii) explore the opinions and perceptions of vulnerable road users on AVs and VoT. It is important to evaluate various scenarios for the deployment of autonomous vehicles, taking into account the views and needs of users as they may provide useful insights for a smoother adoption of AVs by the citizens. In addition, for a deeper analysis, further research in this area should include the public transportation option, to attract more users to switch to PAV and/or SAV. Conducting real life experiments would be valuable, since the findings of previous surveys are based on the respondents' imagination of AVs and their declared perceptions, expectations, and behavioural responses are likely to change as a consequence of such an experience.

On a national level, most sustainable urban mobility plans and master urban plans are currently in the process of being evaluated and upgraded [74,75], therefore it is necessary to consider alternative transport options such as shared autonomous vehicles, especially for new urban developments (last mile), following appropriate educational methods from primary school to long-life learning [76]. This study can provide policy makers and urban and mobility planners with useful insights for the acceptance and deployment of autonomous vehicles in urban spaces, whether personal or shared. The model developed in this article can be a starting point for the development of the transport model needed to update these SUMPs, and to develop new ones.

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Informed Consent Statement: Informed consent was obtained from all subjects who completed the survey in Romania.

Data Availability Statement: Survey data are available upon request according to the WISE-ACT IPR. They will be made available as OpenData after the completion of WISE-ACT via https://www.wise-act.eu (accessed on 7 June 2022).

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