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Attitudes of Greek drivers towards autonomous vehicles – a preliminary analysis using stated preference approach

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Abstract

The advent of autonomous vehicles will soon transform transportation in a substantial way, but at the same time their public acceptance is questionable. Although there is much research carried out, studies analyzing choices of people regarding autonomous, semi-autonomous, and traditional vehicles are relatively scarce. Thus, the purpose of this paper is to add to current literature by surveying Greek drivers on their acceptance and willingness to obtain an autonomous vehicle, as well as their opinion on self-driving technology. Moreover, this study is one of the first attempts in Greece to utilize Stated Preference (SP) methods and Discrete Choice models for that purpose. In our approach, we included hypothetical scenarios of cost, time, and safety, which were distributed in a carefully developed questionnaire. By applying random parameters multinomial logistic and binary logistic models we explored drivers' attitudes towards autonomous vehicles and accounted for unobserved heterogeneity. Results showed that the choice is associated with cost, time, level of safety, existence of driving support systems (GPS, parking assistant), attitudes towards autonomous public transport and taxis, driving experience, age and family income.

Keywords – autonomous vehicles, stated preference, random parameters multinomial model, binary logistic model

1. Introduction and background

Autonomous vehicles are likely to change not only the way we utilize the transportation network but even the way we live. The use of autonomous vehicles is generally expected to have a lot of benefits to safety, environment and economy. According to a study by Fagnant and Kockelman [1], annual economic benefits for US could be in the range of $27 billion with just 10% market penetration rate.

Therefore, it is not surprising that over the past several years, autonomous vehicles have inspired much research investigating their operation, as well as their impact on transportation and society. Greece however represents an interesting case in the city of Trikala, in the region of Thessaly. More specifically, this city has already implemented the pilot platform of Automated Road Transport Systems (ARTS) as part of the CityMobil2 project [2]. In that study [2], it was showed that 76% of respondents would drive an autonomous vehicle, while 22% would not consider to drive it at all. Furthermore, 51% of those who would drive an autonomous vehicle stated they would buy one, whilst 49% would prefer a car pooling or sharing service instead. It was also showed that the most critical factor affecting the acceptance of autonomous vehicles is safety. Indeed, 70% stated that autonomous vehicles are at least as safe as conventional vehicles.

In general, the respective international literature has mostly tackled the issue of autonomous vehicle acceptance and choice from a hypothetical perspective, due to the fact that the technology is not available yet and that the vast majority of people are not yet familiar with autonomous vehicles. The common method applied is the analysis of questionnaires and stated preference as well. In a recent paper by Gkartzonikas and Gkritza [3], a review of stated preference and choice studies on autonomous vehicles is provided. Thus, for a detailed review of relevant studies in the past, the reader is encouraged to follow the aforementioned review paper [3]. An interesting remark of that study is that all previous international studies which targeted at the general public had a primary focus on the socio-demographic and travel characteristics of the respondents. On the other hand, studies targeting vehicle owners further attempted to classify the respondents into different levels of adopters.

A very recent study [4] used an extension of the original Technology Acceptance Model (TAM) to investigate in what extent consumers intend to use autonomous vehicles in the future. The results of the present analysis revealed that perceived usefulness, perceived ease of use, perceived trust and social influence had an impact on behavioral intentions to autonomous vehicles. It is important that perceived usefulness was found to have the strongest impact on autonomous vehicle adoption intention. In a similar study carried out in Greece by the same authors as well [5], 50% of the respondents indicate that such cars will be useful in meeting their driving needs, and almost 60% answered that using Autonomous Vehicles would decrease road crashes. Moreover, respondents who believe that Autonomous Vehicles are useful tend to be more willing to use these technologies when they will be available.

Howard and Dai [6] found that safety and comfort were the most attractive attributes in autonomous driving, while legal responsibility and cost were the least attractive attributes. Overall, over 40% of respondents were willing to buy an autonomous vehicle. Schoettle and Sivak [7] conducted an investigation among 1533 participants in the US, United Kingdom and Australia with 57% of respondents expressing a positive attitude towards autonomous vehicles. The advantages of autonomous driving were the reduction in road crashes, pollution and fuel consumption, while there was significant concern about the effect of autonomous vehicles on increasing traffic congestion and travel time. The same research showed that women were more concerned than men and were more conservative about the potential benefits derived from autonomous driving.

The public opinion and acceptance of driverless vehicles has received increased attention [8,9,10]. For example, one of the largest experimental designs was carried out online by Kyriakidis et al. [8] over 109 countries gathering over 4,886 questionnaires. Results revealed that 33 percent of participants would prefer autonomous to traditional driving, but there are significant concerns, for instance software hacking, legal matters, and safety. In general, people showed great interest in autonomous vehicles, but reluctance in actually paying to buy one. Nordhoff [10], surveyed 7,755 respondents from 116 countries on their acceptance of driverless vehicles using a 94-item online questionnaire. They state that respondents considered driverless vehicles easy to use and convenient.

The preferences and choices towards shared autonomous vehicles have also been explored [11,12]. For instance, Krueger et al. [11] used integrated choice and latent variable analysis to identify the characteristics of potential users of shared autonomous vehicles with and without Dynamic Ride-Sharing Schemes (DRS) and showed that shared autonomous vehicles are more likely to be chosen by young travellers.

As for the methodology, most of the research was based on questionnaires, while different types of regression analysis were utilized depending on the actual objective of the paper. Lustgarten and Le Vine [13] used a stated-preference model to offer a choice between a traditional vehicle/bus, an airplane flight, a semi-autonomous vehicle and a fully autonomous vehicle. The hypothetical scenario was based on a questionnaire, regarding the visit of a family member in a distant part of the country. The variables in these scenarios were cost, duration, and maximum speed of travel. A multinomial logistic regression and mixed logit model were used for the analysis. Variables of cost and travel time turned out to have a negative influence, as it was expected, with respondents showing a strong preference to the cheapest and fastest means of transportation in each scenario. Respondents also valued the maximum speed of travel, regardless of the total duration of the trip.

Other methods have also been applied. For instance, Howard and Dai [6] applied logistic regression and log-linear approach. Payre et al [14] used hierarchical linear regression to find the variables affecting the use of an autonomous vehicle. Menon [15] used ordinal logistic regression, since all dependent variables used were ordinal in nature, meaning there was an order in the possible values of these variables. Thus, an ordinal logistic regression was used to analyze consumer familiarity, their beliefs on the advantages and concerns on autonomous vehicles, and their intention to adopt this technology.

Willingness to pay for automation was also deeply explored in international literature [6,12,16-20]. For instance, Daziano et al. [8] examined the willingness to pay for automation in a nationwide sample consisting of 1260 participants. Using discrete choice modelling, the survey concluded that the average household is willing to pay \$3.500 for partial automation and \$4.900 for full automation. Interestingly enough, a number of respondents were not willing to pay anything at all, while others are willing to go over \$10.000 for full automation. Talebian and Mishra [21] applied an innovative approach by combining the theory of Diffusion of Innovations and agent-based modeling to forecast long-term adoption of connected and autonomous vehicles. Moreover, the concept of resistance was applied to explain why people typically tend to defer adoption of an innovation [21]. The applicability of the proposed methodological approach was tested through a survey of 327 employees at the University of Memphis. The results showed that the automobile fleet will be almost homogenous about 2050 only if connected and autonomous vehicles prices decrease at a significant rate. It is noted thus that the Stated Preference (SP) approach and the willingness to pay are very frequently applied methods, not only for automation but also for reducing road crashes by considering cost, time and level of safety [22,23,24].

Overall, it can be observed that studies analyzing choices of people regarding autonomous, semi-autonomous, and traditional vehicles are relatively scarce. Consequently, this study attempts to add to current literature as it is one of the first attempts to utilize Stated Preference (SP) methods and Discrete Choice models for analyzing people's preferences towards autonomous, semi-autonomous, and traditional vehicles. In our approach, we included hypothetical scenarios of cost, time, and safety, which were distributed via a questionnaire. By applying a random parameters multinomial logistic and binary logistic models it was possible to explore drivers' choices towards autonomous vehicles. More specifically, the purpose of the study is twofold: first, understand the factors affecting respondents' preferences given a set of alternatives by simultaneously accounting for unobserved heterogeneity and secondly, the investigation of factors affecting the probability of respondents to select or not an autonomous vehicle.

2. Data

A questionnaire was designed and handed out during a three-week period in October-November 2016 at a random sample of respondents. At the same time, an online version was created using SurveyMonkey's software (www.surveymonkey.com). Half of the respondents participated in the online survey due to the fact that were living somewhere else, while the other half of respondents participated in the personal interviews. It is also noted that this approach helped us design the experiment because it was not feasible to carry out a full factorial design, due to the extremely high number of possible combinations produced by 3 alternatives and 3 attributes (with 4 levels each). The levels of the attributes are illustrated in section 2.1. As a result, the "block" approach was used; 1 block for the online survey and 1 block for the personal interview. The experimental design was selected to be the rotation design, which was optimized via the R package "supportCE's" [25]. The optimal design was therefore 2 blocks and 8 scenarios each.

Overall, 144 people participated in our scenario-based study, while each questionnaire contained 8 different scenarios. As a result, a total of 1152 observations were gathered to build our model. The questionnaire itself was split into four parts spanning seven pages, including the cover page and 8 scenarios. The average time of completion was approximately 13 minutes per questionnaire, which is considered to be above the normal threshold, but acceptable. In practice, people considered the topic as of particular interest and showed no signs of fatigue while being surveyed. Random sampling was used, whilst the eligibility criteria were namely, to be older than 18years old and having a driving license.

Regarding vehicle automation, levels of autonomy were presented to the respondents according to the NHTSA classification proposed by the Society of Automotive Engineers (SAE) into five levels. As a result, a traditional vehicle falls into Level 0 and/or Level 1, whereas a fullyautonomous vehicle classifies as Level 4 and/or Level 5. Levels 2 and 3 would describe a semi-autonomous vehicle. For more information the reader is encouraged to follow the SAE International's levels of driving automation for on-road vehicles [26].

2.1. Questionnaire structure

The questionnaire consisted of 4 distinct parts. The first part of the questionnaire included a number of questions aiming to acquire general information of the travel habits and attitudes of drivers.

The second part included a brief introduction to the concept of autonomous driving in order to provide a simple definition and clarify a number of misconceptions around autonomous driving. That procedure ensured that all participants understood what autonomous driving means and they would be able to make an unbiased decision regarding the pros and cons of autonomous vehicles.

The third part included 8 scenarios, in which participants were asked to choose between a traditional, a semi-autonomous and a fully autonomous vehicle depending on the values of three variables (cost and duration of travel and safety level) in a hypothetical home-to-work trip. Duration of travel represents the total time required for a home to work and back trip. Different scenarios take into consideration possible special traffic lanes and time to park with values ranging from 30 to 60 minutes in total (30, 40, 50 and 60), which is typical for those living in a city. Cost of travel takes into consideration the operational costs like gas prices, insurance costs, and parking fees. Values range from 30 to 60 euros per trip (30, 40, 50 and 60). Lastly, safety had 4 levels (very low, low, medium and high).

The fourth part was used to build the demographics of the sample that is gender, age, education, profession, marital status, and income.

In our survey and scenarios, questions were kept as simple as possible, using a four-point Likert scale (‘None’, ‘Little’, ‘Enough’ and ‘Very’) to make the respondents as little confused as possible and the analysis less complicated. In order to participate in the survey, each individual was required to have a driver’s license and be over 18 years old. Table 1 sums up the demographic information of the survey.

Tab. 1 - Demographic statistics

Gender	**Percentage**	**Age**	**Percentage**
Male	66%	18-24	21%
Female	34%	>24	79%
Employment	**Percentage**	**Income**	**Percentage**
Student	24%	<10.000€	37%
Employed	65%	10.000-25.000€	34%
Unemployed	11%	>25.000€	29%
Marital status	**Percentage**	**Education**	**Percentage**
Married	28%	Highschool	11%
Not Married	72%	University	72%
		Technical University/Vocational Institution	17%

Tab. 2 - Demographics of the sample in the «would you buy an autonomous vehicle» question*

	Gender		Age		Income		
	Male	Female	18-34	>34	<10.000€	10.000-25.000€	>25.000€
Yes	47%	24%	51%	20%	26%	23%	22%
No	19%	10%	23%	6%	11%	11%	6%

*Regarding the random parameter multinomial model, the variable ‘age’ was recoded as a binary variable, namely 18-24 and over 24.

Tab. 3 - Sample of two of the SP scenarios used in the questionnaire

Scenario 1	Traditional vehicle	Semi-autonomous vehicle	Fully autonomous vehicle
Cost (€)	40	50	60
Duration (minutes)	60	30	40
Safety level	Very Low	Low	Medium

Scenario 2	Traditional vehicle	Semi-autonomous vehicle	Fully autonomous vehicle
Cost (€)	50	60	30
Duration (minutes)	60	30	40
Safety level	Low	Average	High

3. Methods of analysis

Unobserved heterogeneity is a common issue in stated preference studies. In our paper, two modelling approaches were utilized. In order to analyse people's preferences towards various levels of autonomy (traditional, semi-autonomous, fully autonomous) and in order to account for unobserved heterogeneity, a random parameters multinomial logit model was applied. In the random parameters approach, parameters may vary across observations, in a sense that they follow a distribution, e.g. normal, uniform etc. Therefore, unobserved heterogeneity can be addressed.

Following Washington et al. [27], random-parameter model has for observation n, outcome probabilities defined as as $P_n^m(i)$:

$$P_n^m(i) = \int_x P_n(i) f(\beta|\varphi) d\beta \tag{1}$$

where $P_n(i)$ is the probability of observation n having discrete outcome i, f(β|φ) is the density function of β with φ referring to a vector of parameters of that density function (i.e. mean and variance). Thus:

$$P_n^m(i) = \int_x \frac{\exp[\beta_i X_{in}]}{\Sigma_I \exp[\beta_i X_{in}]} f(\beta|\varphi) d\beta \tag{2}$$

where *I* denotes all possible outcomes for observation n, while $i \in I$. As for the second part of the analysis, a binary logistic model was used since the variable of interest takes only two values. In the binary logistic regression, if the 'utility function' is *U*:

$$U = \beta_0 + \Sigma \beta_j x_j \tag{3}$$

then the probability P is:

$$P = \frac{exp^U}{exp^U + 1} \tag{4}$$

where, β_o is the model constant, β_j are the values of the coefficients, and x_j are the values of the independent variables (j=1,2,3,…n the set of independent variables). The goodness-of-fit of the model can be assessed with the McFadden R^2, which is based on the likelihood ratios of the full model (L_f) and the empty model (L_0). Values over 0.2 suggest a reasonable fit [28].

4. Results and discussion

Data regarding the respondents' preference among autonomous, semi-autonomous and traditional vehicle, were analysed by applying a random parameter multinomial logit model. That kind of model, as stated earlier, is able to capture and address potential unobserved heterogeneity [27, 29]. The dependent variable was the choice of transportation mode (traditional, semi, or fully autonomous vehicle). Then two utility functions for the autonomous and semi-autonomous vehicles were produced, both interpreted and compared with the traditional vehicle. In the random parameter multinomial model specification, convergence of the model was ensured, only when a number of variables did not vary between the two utility functions of fully and semi-autonomous vehicle choice. It is noted that the conventional (traditional) vehicle was used as a reference category.

Regarding the second specific objective of the study which was to examine willingness to buy an autonomous vehicle (without scenarios), a binary logistic regression method was selected. The dependent variable was a 'Yes' or 'No' value in the question 'would you buy an autonomous vehicle'.

Table 4 that follows, shows the final model with the significant variables as well as the reference categories of our models along with their Abbreviations, Coefficient, and Significance. Moreover, the prefix "1:" in the Abbreviation column denotes that the value of this particular variable is assigned to the utility function describing the choice of autonomous vehicle over traditional vehicle. Accordingly, the prefix "2:" denotes that the value of this particular variable is assigned to the function describing the choice of a semi-autonomous vehicle over traditional vehicle.

The utility function (without the standard deviations of the random parameters) for the fully autonomous vehicle is the following:

$$U1\ (fully\ autonomous\ ) = -4.651 - 0.06 * cost - 0.104 * time - 1.595 * safetyMedium - 3.702 * safetyLow - 3.355 * safetyVeryLow + 1.42 * GPS\_acceptanceHigh + 2.824 * accident\_reduction\_high + 1.433 * Income\_over\_25{,}000 \tag{5}$$

The utility function (without the standard deviations of the random parameters) for the semi-autonomous vehicle is the following:

$$U2\ (semi - autonomous) = -0.06 * cost - 0.104 * time - 1.595 * safetyMedium - 3.702 * safetyLow - 3.355 * safetyVeryLow - 1.39 * Driving\_experience\_5\_10\_years - 1.609 * Driving\_experience\_more10\_years + 0.703 * Daily\_driving\_more1hour + 1.12 * GPS\_acceptanceHigh + 1.049 * Age\_over24 + 1.225 * Income\_over\_25{,}000 \tag{6}$$

Regarding the binary logistic model and the willingness to buy an autonomous vehicle or not, the respective utility function is the following:

$$U\ (to\ buy\ an\ Autonomous\ Vehicle) = 1.191 - 1.209 * Cost\_over\_10000 + 1.077 * GPS\_acceptanceHigh - 1.895 * AV\_safety\_same - 1.821 * AV\_safety\_less + 1.376 * AV\_comfortable\_high + 1.182 * Age\_over34 \tag{7}$$

Tab. 4 - Variables included in the Multinomial Random Parameter Logit Model and Binary Logistic Model

	Variable	Abbreviation	Coefficient	P-Value
Multinomial Logit Model	Constant term (intercept)	1: Fully autonomous vehicle:	-4.651	<0.001***
		2: Semi-autonomous vehicle:	-0.06	0.939 n.s.
	Standard deviation of the constant term	1: sd of intercept 1	2.587	<0.001***
		2: sd of intercept 2	3.594	<0.001***
	Cost of trip	cost	-0.06	<0.001***
	Duration of trip	time	-0.104	<0.001***
	Standard deviation of duration trip	sd time	0.073	<0.001***
	Safety level	safetyHigh	Reference category	-
		safetyMedium	-1.595	<0.001***
		safetyLow	-3.702	<0.001***
		safetyVeryLow	-3.355	<0.001***

	Driving experience	2: less than 5 years	Reference category	-
		2: between 5 to 10 years	-1.39	0.003***
		2: > 10 years	-1.609	0.002***
	Duration of daily driving	2: less than 1 hour	Reference category	-
		2: more than 1 hour	0.703	0.04**
	How important is the existence of driver support systems in a car (GPS, parking assistant, etc.)	1: No/Not at all	Reference category	-
		1: YesVery much	1.42	<0.001***
		2: No/Not at all	Reference category	-
		2: Yes/Very much	1.12	0.0004***
	How important is to you the reduction in accidents by the adoption of autonomous vehicles	1: No/Not at all	Reference category	-
		1: Yes/Very much	2.824	<0.001***
	Age	2: Younger than 24	Reference category	-
		2: Over 24	1.049	0.04**
	Annual income	1: less than 10.000€	Reference category	-
		1: > 25.000€	1.433	0.002***
		2: less than 10.000€	Reference category	-
		2: > 25.000€	1.225	<0.001***
Binary Logistic Regression	Constant term (intercept)	Constant term (intercept)	1.191	0.082*
	Cost of purchasing car	Less than 10.000€	Reference category	-
		Over 10.000€	-1.209	0.021**
	How important is the existence of driver support systems in a car (GPS, parking assistant, etc.)	No/Not much	Reference category	-
		Yes/Very much	1.077	0.021**
	Do you believe autonomous vehicles will be less, the same, or more safe than traditional vehicles'	More	Reference category	-
		Same	-1.895	0.002***
		Less	-1.821	0.007***
	How comfortable would you be with autonomous taxis and public transport	No/Not much	Reference category	-
		Yes/Very much	1.376	0.011**
	Age	Younger than 34	Reference category	-
		Older than 34	1.182	0.042**

***: Significant at 1% level, **: Significant at 5% level, *: Significant at 10% level, n.s. Not significant
1: Refers to the Utility function of the fully autonomous vehicle, 2: Refers to the Utility function of the semi-autonomous vehicle.

Regarding the model fit for the random parameter multinomial model, the value of the McFadden R^2 was 0.33, while and Log-likelihood ratio test at 95% level found to be significant (the respective difference in Log-likehood was 687.71). As for the random parameters, the normal distribution was chosen and 200 Halton draws were used. The standard deviations of constant terms as well as the variable time were found to be significant, suggesting that they were correctly chosen to be random and not fixed. Regarding the binary logistic regression, the R^2 value was at 0.399, which is considered very satisfactory for such type of statistical models [28].

It is generally observed that respondents are not likely to strongly accept fully autonomous vehicles (perhaps showing a preference towards semi-autonomous and traditional vehicles). This might come from an expected lack of familiarity towards autonomous vehicles and from the fact that in semi-autonomous vehicles the driver has some sort of control over the car. Perhaps this finding might be not considered in line with Bansal et al. [12] who suggested that the primary benefit of Autonomous Vehicles will be fewer crashes. However, the authors also suggest that respondents' top concern is the equipment failure of autonomous vehicles.

It is observed that shorter travel times, lower costs, higher level of safety as well as high annual income are crucial factors which are positively associated with the preference of autonomous and semi-autonomous vehicles over traditional vehicles, due to the signs of their beta coefficients. These findings are expected and can be considered to be in accordance with past literature, for example Howard and Dai [6] and Bansal et al. [12].

Additionally, drivers who feel comfortable with autonomous public transportation and drivers who actively use their cars' advanced systems (GPS, parking assistant, etc.) are more likely to buy an autonomous vehicle (full or semi-autonomous) in the upcoming years. Familiarity with new technologies and services indeed is something showed in past studies, for instance in Bansal et al. [12].

A similar positive association was found to exist for those respondent over the age of 24. More specifically, respondents over 24 years old are more likely to choose a semi-autonomous than a conventional vehicle. This finding is in contradiction with some past studies [11,17] which showed that youngsters have a tendency towards new technologies and vehicles. Moreover, Bansal et al. [12] suggest that the oldest (60+ year-old) and the youngest (21–34 year-olds) participants expressed the highest willingness to pay to obtain self-driving technologies.

Another interesting finding is that drivers whose daily driving duration trip is more than an hour appear to prefer semi-autonomous vehicles over conventional vehicles. This variable however was not significant for fully-autonomous vehicles. Furthermore, drivers who anticipate a significant reduction in road crashes due to the introduction of autonomous vehicles are more likely to choose an autonomous vehicle over a traditional vehicle. This could be considered in line with Panagiotopoulos and Dimitrakopoulos [4] who stated that 44% of the respondents indicated that if they were to use Autonomous Vehicles they would be feeling safer. However, this variable was not significant for choosing a semi-autonomous vehicle and needs further investigation in future research.

On the other hand, drivers having over 5 years of experience appear to prefer traditional vehicles over semi-autonomous, while driving experience was not significant on the autonomous vehicle utility function. Perhaps this happens because respondents are not willing to change habits or they might be concerned about the transition to semi-autonomous ones.

The second analysis involved a binary logistic model for modelling the willingness to buy an autonomous vehicle and showed similar findings to the previous random parameter multinomial model. In general, it is observed that there is a dependence on the drivers' opinion on the importance of support systems in today's vehicles, such as GPS or parking assistant, the safety level of autonomous vehicles in relation to traditional vehicles, and how comfortable they would be with autonomous taxis and public transport on the road.

More specifically, as the cost of an autonomous vehicle rises over a 10,000 euros, respondents are more likely to resort to traditional vehicle. As expected, those who consider that advanced driving support systems like GPS etc. are important and those who are feeling comfortable with autonomous taxis and public transport are more likely to choose an autonomous vehicle. It is also expected that those who believe that autonomous vehicles are less are safe than traditional vehicles will probably not choose to buy autonomous vehicles. What is interesting is that even those who consider the autonomous vehicles to be as safe as traditional vehicles, seem to be still reluctant to choose an autonomous vehicle. Surprisingly, people who are older than 34 years are open to abandon their traditional vehicles and switch to autonomous vehicles.

Overall, in our analysis, a number of variables did not play any role in respondents' preference towards vehicle type choice. These variables are mainly of sociodemographic nature. To be more specific, gender, marital status, occupation and education as well as past crash involvement appeared to have no effect on the choice of fully or semi-autonomous vehicles. Gender in particular is an interesting variable, because two similar past studies [4,30] have found opposite results. More specifically, Panagiotopoulos and Dimitrakopoulos [4] found that females were more likely to have and/or use autonomous vehicles (78%), when they become available on the market than males (59%), whereas in the study by Piao et al. [30], males (49%) were more likely buy an autonomous vehicle than females (39%). The non-significance of gender in our survey is therefore in line with Panagiotopoulos and Dimitrakopoulos [4] who suggest that the gender gap with respect to autonomous vehicle technology acceptance is lessening.

Summarizing, it can be concluded that Greek drivers are generally positive towards autonomous vehicles, but they are still concerned about the issue of safety levels. We believe this is the area that authorities and policy makers should focus on, in order to achieve the best results in eliminating any hesitation the public might have against autonomous driving.

The study of course has its limitations. The sample size is not very large and focuses solely on Greece. It is therefore suggested that a larger survey that includes more respondents, more scenarios and alternative statistical models (e.g. latent class models) should be carried out and cover various countries around the globe. Greece, in particular, could be an interesting case where there might be geographical particularities that could greatly affect how autonomous vehicles are introduced to the public. Therefore, results might not be easily generalizable to other cases. Nevertheless, they can be useful for policy makers.

5. Conclusions

Our study utilized a stated preference survey in order to investigate Greek drivers' attitudes towards autonomous vehicles. Both multinomial and binary logistic regression models revealed that the majority of Greek drivers shows reluctance towards fully autonomous vehicles, while at the same time there is a more positive perception regarding semi-autonomous vehicles. Moreover, it is concluded that increasing the cost and duration of a trip, results in a lower probability in choosing semi- of fully autonomous vehicles, whilst on the contrary, when increasing safety levels, people are more likely to prefer autonomous vehicles.

An area that should be explored is the pilot operation of autonomous buses or other means of public transportation. Such program was implemented with great success in the city of Trikala [2] with ARTS (Automated Road Transport System), as part of the CityMobil2 initiative. This is proof that a close interaction with autonomous technology can greatly influence the minds of the public in a positive way, as long as the program runs successfully. Addressing public concern through the pilot launch of autonomous systems in select cities would be the best way to successfully introduce autonomous vehicles to the world in a way that would be beneficial both for car manufacturers and road users.

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