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Purchase Intention Of Self-Driving Cars: Exploring Association With Demographic And Psychological Factors

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ABSTRACT

The present study attempts to explore the behavioural intention to buy self-driving cars and its association with demographic and psychological variables in a sample of 68 respondents in the Amritsar district in Punjab. The study found that more than ¾ of the respondents are aware of self-driving vehicles. However, 38.2 percent of respondents reported that they are slightly familiar with self-driving vehicles and only 1.5 percent of respondents reported to have extreme familiarity with self-driving vehicles. Almost 63 percent of the respondents reported that they had never used any automated function in their car before. 36 percent of respondents disclosed their intention to buy self-driving cars. The study also revealed that there is no significant difference between the mean values of intention to buy self-driving vehicles based on various demographic and psychological variables except the working status of the respondents.

KEYWORDS

ANOVA, family background, purchase intention, self-driving cars, T-test.

INTRODUCTION

Connected autonomous vehicles (CAV) refer to those vehicles which are independent and self-driving wherein there is no requirement for Human driver's input, as per NHTSA 2013 (Baccarella et.al, 2020). There is a substantial increase in the usage of automated functions (AF) in vehicles in various countries across the globe. Chaudhry et al. (2018) conducted a survey in which the participants were asked about whether self-driving vehicles could be relied on to which about 84% of them had a positive point of view. Autonomous vehicles could be of great use in the industrial supply chains as well as the logistical operations in the time ahead and would increase productivity and flexibility (Berton Cello and Wee, 2015). Additionally, autonomous vehicles are a huge advantage for the elderly as they reduce fatal crashes caused due to the lack of mobility and functional capabilities caused by the aging of the elderly. Bansal et al. (2016) also reported a reduction in the rate of crashes as a major benefit involved in the use of AVs. Nevertheless, it also helps the elderly maintain their mobility and remain independent (Rahman et. al, 2019). It also contributes to developing an appreciable parking infrastructure as it reduces space by almost 5.7 billion square feet by parking automobiles in congested areas (Micele Berton Cello and Dominik Wee, 2015). Hilgarter et al. (2020) professed that the inclusion of AVs in the transport system helped improve traffic and made transportation of goods easier considering the circumstances they faced and proved to be beneficial. In spite of all its benefits, Junquera et al. (2016) reported that the willingness of a consumer to pay for the AVs primarily depends upon its price and the time it takes to get charged. However, the most critical feature of an automated vehicle (AV) is whether it is trustworthy enough to avoid crashes and get through all the hurdles; whether it functions properly during traffic and does not lead to a fatal crash (Chaudhry et. al, 2018). According to the National Highway Traffic Safety Administration (NHTSA) report, fully autonomous vehicles have caused about 11 deaths over 10 months (NHTSA, 2022). Haboucha et al. (2017) revealed that about 44% of the people were still hesitant about the notion to adopt self-driving vehicles and were not willing to move on from the regular vehicles. However, students and youngsters were highly interested in the concept of autonomous vehicles.

The literature shows that the study of autonomous vehicles and factors influencing the purchase of autonomous vehicles have gained popularity among the scholarly community (Becker Axhausen, 2017; Gkartzonikas and Gkirtza, 2019; Peng, 2020). The present study attempts to explore the behavioral intention to buy self-driving cars and its association with demographic and psychological variables in a sample of 68 respondents in the Amritsar district in Punjab.

LITERATURE REVIEW

Dixon et al. (2018) revealed that age and sex play a crucial role in examining the demographic variables and in supporting the technology involved. It was also seen that males have provided a lot more support than females have. Hohenberger et al. (2016) examined about 1603 participants in Germany based on sex, age, and education and found proof of the affective responses related to automotive cars and their willingness to use them. Liu et al. (2019) analysed that the risks and benefits involved played a major role in predicting the maximum price a consumer is willing to pay for the SDV. Raue et al. (2019) claimed that the feelings of control were directly related to the perception of the risk and benefit involved and were in accordance with

the interests of various participants. Rahman et al. (2019) professed that people who possess a negative view/disapprove of the idea of automatic vehicles lack confidence and are incompetent to deal with tricky manoeuvres of life. Baccarella et al. (2020) revealed that the people who possessed a negative view of self-driving vehicles were mostly those who were afraid to handle the new technology. Xu et al. (2020) claimed that when it was checked whether SDVs could be permitted to ride on public roads, a changed attitude was noticed. Though, when people experienced the vehicle personally their point of view became positive. Peng (2020) examined that there was an ideological divide in the public's reaction to self-driving cars. Conservatives and Republicans were seen supporting the idea of restrictively regulating autonomous vehicles and showed greater concern than the liberals and democrats. Buckley et al. (2018) analyzed that the theory of planned behavior played a major role in the behavioral attitude and its control of the intentions including the use of autonomous vehicles. Zhang et al. (2019) discovered the most important factor that developed a positive attitude of the public towards the Avs was initial trust. Hassan et al. (2019) examined that in Canada, older adults are more bothered about AVs than the younger generation which helps in describing the factors that are liable to affect the preferences of the people related to AVs in Canada. Islam et al. (2022) stated that about 57% of respondents were quite familiar with the AVs though 51% had a negative point of view about the same and about 34% remained neutral about it, it was believed that the majority was still in support of the AVs and would help decrease the concerns related to them. Kassens-Noor et al. (2020) revealed that there was a significant difference in the viewpoint related to self-driving and autonomous vehicles. It said that autonomous vehicles show more negative and concerned responses as compared to self-driving vehicles. It was believed that the language reported the upcoming generation of vehicles to shape the reaction of the public and their acceptance towards it. Mirman et al. (2018) said that the intentions of parents and the technological readiness in terms of the AVs including the child's demographic profiles were important in determining the potential of AV acceptance and its impact.

RESEARCH METHODOLOGY

The study is based on the primary data. A total of 68 responses from the respondents in Amritsar district were collected. Due to time and resource constraints, convenience sampling and snowball sampling methods were used.

Variables Used: Behavioural Intention to buy a self-driving car was measured with three statements; I intend to use an autonomous vehicle in the future, I expect that I will use an autonomous vehicle in the future, and I plan to use an autonomous vehicle in the future (Choi and Ji, 2015). Information on respondents' demographics such as gender, age, qualification, income level, marital status, and location was also collected. To represent the psychological factors, statements like driving experience, use of any automated function before, awareness of self-driving vehicles, and self-driving car familiarity were taken. The measurement of the variables used has been explained in Table 1.

Table 1: List of Constructs and Items

Construct	Item
Demographics	
Gender	Male/Female
Age	18-24/25-24/35-44/45-54
Education Level of Respondents	Under-Graduate/Graduate/Post-Graduate
Monthly Income of Respondents	Less than 5 lacs/5 lacs – 10 lacs/10 lacs – 15 lacs/Above 15 lacs
Location of Respondents	Rural/Urban
Marital Status	Married/Single
Psychological	
Driving Experience	None/Less than one year/1-5 years/5-10 years/More than 10 years
Use of any automated function before	Yes/No
Awareness of self-driving vehicles	Yes/No
Self-driving car familiarity	Not familiar at all/slightly familiar/moderately familiar/very familiar/extremely familiar
Behavioural Intention	I intend to use autonomous vehicles in the future. I expect that I will use autonomous vehicles in the future. I plan to use autonomous vehicles in the future.

Statistical Techniques: Descriptive statistics, independent t-test, and one-way ANOVA were employed to analyse the data in SPSS 20.

FINDINGS OF THE STUDY

The demographic profile of 68 respondents of the study is shown in Table 2 where the frequencies along with their respective percentages are presented. The female respondents constituted 38.2 percent, while the male respondents were 61.8 percent. 5.9 percent of the respondents reported that they belong to rural areas whereas the residence of 94.1 percent of respondents is in urban areas. Most of the respondents belong to the age group of 35-44 years and almost half of the respondents have a graduation degree. 41 percent of the respondents have an annual income of less than rupees five lakhs and 44 percent of respondents are engaged in jobs. 73.5 percent of respondents are married and 51.5 percent of the respondents have driving experience of more than 10 years. Almost 63 percent of the respondents reported that they had never used any automated function in their car before. More than ¾ of the respondents are aware of self-driving vehicles. However, 38.2 percent of respondents reported that they are slightly familiar with self-driving vehicles and only 1.5 percent of respondents reported having extreme familiarity with self-driving vehicles. Ackaah et al. (2021) upon examining various respondents claimed that most of them, about 66.4% are familiar with autonomous vehicles and 78.2% were keen to have an experience of the same.

Table 2.: Respondents' Demographic Profile and Driving Familiarity

	Frequency	Percentage
Gender		
Male	42	61.8
Female	26	38.2
Total	68	100.0
Age		
18-24	12	17.6
25-34	15	22.1
35-44	23	33.8
45-54	18	26.5
Total	68	100.0
Qualification		
Under Graduate	7	10.3
Graduate	34	50.0
Post Graduate	27	39.7
Total	68	100.0
Income Level		
Less than 5 lacs	28	41.2
5 lacs- 10 lacs	25	36.8
10 lacs- 15 lacs	13	19.1
Above 15 lacs	2	2.9
Total	68	100.0
Working Status		
Business	20	29.4
Govt	1	1.5
Home Maker	4	5.9
Job	30	44.1
Profession	5	7.4
Salaried	1	1.5
Student	7	10.3
Total	68	100.0
Marital Status		
Married	50	73.5

Single	18	26.5
Total	68	100.0
Residence Location		
Rural	4	5.9
Urban	64	94.1
Total	68	100.0
Driving Experience		
Less than 1 year	5	7.4
1-5 years	9	13.2
5-10 years	9	13.2
More than 10 years	35	51.5
None	10	14.7
Use of an automated function before		
Yes	25	36.8
No	43	63.2
Total	68	100.0
Awareness of self-driving vehicles		
Yes	52	76.5
No	16	23.5
Total	68	100.0
Familiarity with self-driving cars		
Not familiar at all	18	26.5
Slightly familiar	26	38.2
Moderately familiar	14	20.6
Very familiar	9	13.2
Extremely familiar	1	1.5
Total	68	100.0

(*Source: Compiled through survey).*

To calculate the score for behavioural intention to buy self-driving cars, participants' ratings on the survey items were averaged. An average score equal to 3 was considered neutral, a score below 3 was considered to be negative implying not willing to buy self-driving cars, and any score higher than 3 was considered evidence of the intention to buy self-driving cars. The table 3 shows that 24 percent of the respondents have an average score of less than 3, whereas 36 percent of respondents disclosed an intention to buy self-driving cars.

Table 3: Behavioural Intention to Buy Self-Driving Cars

Behavioural Intention (Percentage)	Score less than 3	24
	Score equal to 3	8
	Score more than 3	36

(Source: Calculated through SPSS).

Association of Gender with Intention to Use Self-driving Vehicles

To analyse the difference between the mean values of behavioural intention to buy self-driving vehicles with demographic and psychological variables, t-test and ANOVA have been employed and results are given in Table 4. The study finds that there is no significant difference between the mean values of intention to buy self-driving vehicles based on gender, location, age, respondent's qualification, respondent's income level, and respondent's marital status. Psychological factors such as driving experience, use of automated function of a car before, heard of Self-driving vehicles before, and familiarity with self-driving vehicles were not found to have any significant difference in the behavioural intention to buy self-driven vehicles. There was a statistically significant difference among different occupations as determined by one-way ANOVA ($F(4,61) = 2.070$, $p=0.096$). A Tukey Posthoc test revealed that the intention to buy self-driving vehicles is significantly higher in the respondents having business over the respondents practicing a profession.

Variable (i)	**Categories (ii)**	**Mean Value (iii)**	**Test (iv)**	**Test Statistic (v)**	**Result (vi)**
Demographic Variables					
Gender	Male	3.2540	T-test	0.962	No Significant Difference
	Female	2.9615			
Age	18-24	3.0278	ANOVA	0.934	No Significant Difference
	25-34	2.7333			
	35-44	3.2754			
	45-54	3.3889			
Qualification	Under-Graduate	3.7143	ANOVA	1.306	No Significant Difference
	Graduate	3.2059			
	Post-Graduate	2.9136			

Income Level	Less than 5 lacs	3.0714	ANOVA	1.202	No Significant Difference
	5 lacs - 10 lacs	3.3200			
	10 lacs - 15 lacs	3.1795			
	Above 15 lacs	1.6667			
Working Status	Homemaker	2.8333	ANOVA	**2.070***	Significant Difference
	Job	3.0889			
	Business	3.4333			
	Profession	1.8000			
	Student	3.4286			
	Retired	2.8333			
	Unemployed	3.0889			
Marital Status	Married	3.2800	T-test	1.572	No Significant Difference
	Single	2.7593			
Location	Rural	3.4167	T-test	0.462	No Significant Difference
	Urban	3.1250			
Driving Experience of Respondent	None	3.2667	ANOVA	0.720	No Significant Difference
	Less than one year	2.4000			
	1-5 years	3.0741			
	5-10 years	2.8889			
	More than 10 years	3.2952			
Use of Automated function of a car before	Yes	3.4000	T-test	1.339	No Significant Difference
	No	2.9922			
Heard of Self-driving vehicles before	Yes	3.2436	T-test	1.243	No Significant Difference
	No	2.8125			
Familiarity with self-driving vehicles	Not familiar at all	2.8333	ANOVA	1.388	No Significant Difference

Slightly familiar	3.2564			
Moderately familiar	3.2381			
Very familiar	3.5185			
Extremely familiar	1.0000			

(Source: Calculated through SPSS). *Significant at 10 percent

CONCLUSION

The present study attempts to explore the behavioural intention to buy self-driving cars and its association with demographic and psychological variables in a sample of 68 respondents in the Amritsar district in Punjab. The study found that more than ¾ of the respondents are aware of self-driving vehicles. However, 38.2 percent of respondents reported that they are slightly familiar with self-driving vehicles and only 1.5 percent of respondents reported to have extreme familiarity with self-driving vehicles. Ackaah et al. (2021) also claimed that most of the respondents, about 66.4% were familiar with autonomous vehicles and 78.2% were keen to have an experience of the same. The study also revealed that there is no significant difference between the mean values of intention to buy self-driving vehicles based on various demographic and psychological variables except the working status of the respondents. A statistically significant difference among different occupations in the behavioural intention as determined by one-way ANOVA ($F(4,61) = 2.070$, $p=0.096$) was found. A Tukey post-hoc test revealed that the intention to buy a self-driving vehicle is significantly higher in the respondents having business over the respondent's practicing profession. The reason for having an insignificant difference in the behavioural intention based on all demographic and psychological variables except the working status of the respondents might the absence of variables like personality, risk-taking aptitude etc.

REFERENCES

Ackaah, W., & Osei, K. K. (2021). Perception of autonomous vehicles–A Ghanaian perspective. *Transportation research interdisciplinary perspectives*, *11*, 100437.

Anania, E. C., Rice, S., Walters, N. W., Pierce, M., Winter, S. R., & Milner, M. N. (2018). The effects of positive and negative information on consumers' willingness to ride in a driverless vehicle. *Transport policy*, *72*, 218-224.

Baccarella, C. V., Wagner, T. F., Scheiner, C. W., Maier, L., & Voigt, K. I. (2021). Investigating consumer acceptance of autonomous technologies: the case of self-driving automobiles. *European Journal of Innovation Management*, *24*(4), 1210-1232.

Bansal, P., Kockelman, K. M., & Singh, A. (2016). Assessing public opinions of and interest in new vehicle technologies: An Austin perspective. *Transportation Research Part C: Emerging Technologies*, *67*, 1-14.

Buckley, L., Kaye, S. A., & Pradhan, A. K. (2018). Psychosocial factors associated with intended use of automated vehicles: A simulated driving study. *Accident Analysis & Prevention*, *115*, 202-208.

Chaudhry, A., Liu, P., Hussain, A., & Sanaullah, I. (2019). Safety perceptions of self-driving cars: A survey study in China and Pakistan. In *Advances in Human Aspects of Transportation: Proceedings of the AHFE 2018 International Conference on Human Factors in Transportation, July 21-25, 2018, Loews Sapphire Falls Resort at Universal Studios, Orlando, Florida, USA 9* (pp. 458-468). Springer International Publishing.

Clayton, W., Paddeu, D., Parkhurst, G., & Parkin, J. (2020). Autonomous vehicles: who will use them, and will they share?. *Transportation planning and technology*, *43*(4), 343-364.

Dixon, G., Hart, P. S., Clarke, C., O'Donnell, N. H., & Hmielowski, J. (2020). What drives support for self-driving car technology in the United States?. *Journal of Risk Research*, *23*(3), 275-287.

Haboucha, C. J., Ishaq, R., & Shiftan, Y. (2017). User preferences regarding autonomous vehicles. *Transportation research part C: emerging technologies*, *78*, 37-49.

Hassan, H. M., Ferguson, M. R., Razavi, S., & Vrkljan, B. (2019). Factors that influence older Canadians' preferences for using autonomous vehicle technology: A structural equation analysis. *Transportation research record*, *2673*(1), 469-480.

Hilgarter, K., & Granig, P. (2020). Public perception of autonomous vehicles: A qualitative study based on interviews after riding an autonomous shuttle. *Transportation research part F: traffic psychology and behavior*, *72*, 226-243.

Hőgye-Nagy, Á., Kovács, G., & Kurucz, G. (2023). Acceptance of self-driving cars among the university community: Effects of gender, previous experience, technology adoption propensity, and attitudes toward autonomous vehicles. *Transportation research part F: traffic psychology and behavior*, *94*, 353-361.

Hohenberger, C., Spörrle, M., & Welpe, I. M. (2016). How and why do men and women differ in their willingness to use automated cars? The influence of emotions across different age groups. *Transportation Research Part A: Policy and Practice*, *94*, 374-385.

Islam, M. R., Abdel-Aty, M., Lee, J., Wu, Y., Yue, L., & Cai, Q. (2022). Perception of people from educational institutions regarding autonomous vehicles. *Transportation research interdisciplinary perspectives*, *14*, 100620.

Junquera, B., Moreno, B., & Álvarez, R. (2016). Analyzing consumer attitudes towards electric vehicle purchasing intentions in Spain: Technological limitations and vehicle confidence. *Technological Forecasting and Social Change*, *109*, 6-14.

Kassens-Noor, E., Wilson, M., Cai, M., Durst, N., & Decaminada, T. (2021). Autonomous vs. self-driving vehicles: the power of language to shape public perceptions. *Journal of Urban Technology*, *28*(3-4), 5-24.

Lee, Y. C., & Mirman, J. H. (2018). Parents' perspectives on using autonomous vehicles to enhance children's mobility. *Transportation research part C: emerging technologies*, *96*, 415-431.

Liu, P., & Xu, Z. (2020). Public attitude toward self-driving vehicles on public roads: Direct experience changed ambivalent people to be more positive. *Technological Forecasting and Social Change*, *151*, 119827.

Liu, P., Guo, Q., Ren, F., Wang, L., & Xu, Z. (2019). Willingness to pay for self-driving vehicles: Influences of demographic and psychological factors. *Transportation Research Part C: Emerging Technologies*, *100*, 306-317.

Peng, Y. (2020). The ideological divide in public perceptions of self-driving cars. *Public understanding of science*, *29*(4), 436-451.

Rahman, M. M., Deb, S., Strawderman, L., Burch, R., & Smith, B. (2019). How the older population perceives self-driving vehicles. *Transportation research part F: traffic psychology and behavior*, *65*, 242-257.

Raue, M., D'Ambrosio, L. A., Ward, C., Lee, C., Jacquillat, C., & Coughlin, J. F. (2019). The influence of feelings while driving regular cars on the perception and acceptance of self-driving cars. *Risk analysis*, *39*(2), 358-374.

Zhang, T., Tao, D., Qu, X., Zhang, X., Lin, R., & Zhang, W. (2019). The roles of initial trust and perceived risk in the public's acceptance of automated vehicles. *Transportation research part C: emerging technologies*, *98*, 207-22