Available online at www.alphanumericjournal.com

alphanumeric journal
The Journal of Operations Research, Statistics, Econometrics and Management Information Systems

Volume 7, Issue 3, 2019

ULUK 2018 Congress Special Issue

Received: December 28, 2018
Accepted: June 24, 2019
Published Online: September 22, 2019

AJ ID: 2018.07.03.STAT.01
DOI: 10.17093/alphanumeric.505195
Research Article

Driver and Pedestrian Trust Analysis On Integration of Autonomous Vehicles To Infrastructure of Turkey

Hakan Başargan*

Budapest University of Technology and Economics, Transportation and Vehicle Engineering Faculty, Department of Control for Transportation and Vehicle Systems, Budapest, Hungary, hakanbasargan@edu.bme.hu

* Sa 1111 Budapest, 2 Stoczek street, ST Building, 1. floor 110 Budapest, Hungary

ABSTRACT

Due to development in technology; technological revolution has been occurred in many sectors. The automotive sector is at the head of these technological revolutions. Autonomous vehicle technology and the development of sensors, cameras, radar and decision-making mechanisms under this technology have made the design and development of autonomous vehicles possible for every company. The aim of this study is to analyze the public's confidence in autonomous vehicles. In this study, driver and pedestrian/passenger trust was analyzed with online survey which was performed with 107 participants. Furthermore, briefly autonomous vehicle market analysis was performed with same survey and same participants. While 60,7% of participants have basics knowledge about autonomous vehicles and their systems, 10,3% of attenders didn't have any knowledge before. The presence of autonomous vehicles in the traffic is not disturb 73,8% of participants, conversely it can be problem for 6.5% of attenders. 63,5% of participants can drive on same line with autonomous vehicle while 9,6% of attenders do not prefer that. 60,7% of respondents have trust to autonomous vehicle as pedestrian who crosses over. 56,1% of participants prefer domestic produced autonomous vehicle instead of other brand who produces autonomous vehicle and 66,3% of attenders prefer autonomous vehicle in lieu classical vehicle in case of availability. According to this analysis, majority of community in Turkey have positive perspective on autonomous vehicle.

Keywords: Autonomous Vehicles, Trust On Autonomous Vehicles, Attitude Toward Autonomous Vehicles, Integration of Autonomous Vehicle, Autonomous Vehicle

Otonom Araçların Türkiye Altyapısına Entegrasyonunda; Sürücü ve Yaya Güven Analizi

ÖZ

Teknolojideki gelişmeler ile birlikte, birçok sektörde teknolojik devrim yaşanmıştır. Otomotiv sektörü, bu teknolojik devrimlerin başında gelmektedir. Otonom araç teknolojisi ve bu teknoloji kapsamında bulunan sensör, kamera, radar ve karar alma mekanizmalarının gelişimi, her şirket için otonom araçların tasarımını ve geliştirilmesini mümkün kılmıştır. Bu çalışmada 107 katılımcı tarafından internet üzerinden gerçekleştirilen anket ile sürücü ve yaya / yolcu güveni analiz edilmiştir. Ayrıca, aynı anket ve aynı katılımcılar ile küçük bir otonom araç piyasası analizi yapılmıştır. Ankete katılanların % 60,7'si otonom araç ve sistemleri hakkında temel bilgilere sahipken,% 10,3'ü daha önce hiç bilgiye sahip değildir. Trafikteki otonom araçların varlığı, katılımcıların% 73,8'ini rahatsız etmediği halde, % 6,5'I için problem olabilmektedir. Katılımcıların% 63,5'i otonom araç ile aynı şeritte seyir edebilirken,% 9,6'sı bunu tercih etmemektedir. Yaya olarak karşıdan geçmek isteyen katılımcıların % 60,7'si otonom araçlara güvenmekte. Ankete katılanların % 56,1'i otonom araç üreten diğer marka yerine yerli üretilen otonom araç kullanmayı tercih ederken,% 66,3'ü ise klasik otomobil yerine otonom araç kullanmayı tercih etmektedir. Bu analize göre, Türkiye'deki toplumun çoğunluğu otonom araca karşı olumlu bir bakış açısına sahiptir.

Anahtar Kelimeler: Otonom Araçlar, Otonom Araçlara Güven, Otonom Araçlara Karşı Tutum, Otonom Araçların Entegresi, Otonom Araçların Uygulanması

1. Introduction

According to World Health Organization (WHO, 2015) 1.2 million people die in traffic accidents each year. Autonomous vehicle is an important technology to reduce a portion of those deaths due to driver errors (Kyriakidis, Happee & de Winter, 2015). With technological advancements about trajectory planning, trajectory tracking, sensing, vehicle control and more; developments about autonomous vehicle has been suddenly increased. Therefore, Avs are anticipated to enter and corner the market in near future with their several benefits such as providing higher safety, mobility and comfort. At the same time, Avs can reduce the number of vehicle ownership and can be a solution for traffic congestion problems. While Avs provide several benefits, a main barrier to its adoption is in the public trust about AVs (Kaur & Rampersad, 2018), (Bansal, Kockelman & Singh, 2016).]. Although many benefits which provide safety, comfort and efficiency; major concerns exist to adopt this technology to the public. These concerns generally related to trust, privacy and reliability. Before the adoption process; user preferences, public concern and their trust level should be analyzed.

According to the development of AV technology, trust and opinion of the public has become extremely important. Especially for Turkey as developing country, adoption of the new technology is not as easy as in other developed countries. In this area, there is one study (Nasir & Ozcelik, 2017) about consumer attitudes towards autonomous vehicles in Turkey. However, just general autonomous vehicle perspective was examined without driver and pedestrian/passenger(P-P) consideration in Turkish language.

In this study, confidence of driver and P-P in AVs was analyzed. For this analysis, online survey with 107 participants who live in Turkey was conducted in August 2018. This analysis includes general view of AVs of public, autonomous vehicle-P-P interaction, autonomous vehicle-driver interaction, future though of participants for autonomous vehicle technology and perspective of public about national autonomous vehicle.

2. Literature Review

As several governments have started to support testing and developing of autonomous vehicles, public perception of autonomous vehicle has become important. The survey with 1533 participants from the UK, Australia and USA has been performed by (Schoettle & Sivak, 2014). As a result, many of participants believed that impact of autonomous vehicle both less and fewer acute collisions. Nevertheless, they also had several concerns about AVs travelling. Safety consequences because of equipment and system failures are main concern. Besides, they were concerned that they don't have control for the vehicle. There were gender difference on nearly all questions with females less confidence by AVs than males. 5000 responses from 109 countries (40 countries with at least 25 respondents) are collected (Kyriakidis, Happee & de Winter, 2015) to investigate user acceptance, concerns, and willingness to buy autonomous vehicles. Results showed that attendees, on average, found manual driving the most enjoyable mode of driving and 22% of the respondents did not want to pay more than $0 for an autonomous vehicle. Result of Ipsos MORI research (Missel, 2014) shows that the public has yet to see benefits and advantage of autonomous vehicle and just 18% of the British public

think that it is important for car manufacturers to focus on driverless technologies. Men are significantly more likely to deem it important than women. Older people (aged 55+) are less likely to take up seriously it than the youngest group. (aged 16 – 24). AVs hold significantly greater charm to people who aim to buy a new vehicle in the next three years. Study for Turkey (Nasir & Ozcelik, 2017) was conducted with 290 people. 89% of respondents who attended the survey conscious about autonomous vehicles, nevertheless only %23 of them have knowledge about AVs technology. While a majority of the respondents (67%) have positive attitude toward autonomous vehicles, only small portion of them (13%) found the methodology of autonomous vehicles as unpleasant.

Previous studies show positive side of public opinion about autonomous vehicles (Begg, 2014), (Casley et al., 2013), (Missel, 2014). At the same time, attendees also indicate reluctance. Continental carried out a survey (Sommer, 2013) in China, Japan, US and Germany exuded that 59% of participants considered autonomous driving a useful advancement. 54% did not believe the safety operation of AVs and 31% stated that they don't have any information about development of AVs. Particularly, people in Japan (29%) were more unaware of autonomous vehicle developments to those in Germany (67%) and China (64%). Online survey (Xu & Fan, 2018) with 1164 participants be realized about investigating the risk perceptions and expectation of insurance demand for autonomous vehicles in China. The findings unclose that autonomous vehicles are familiar and have a positive impression in China. Of the respondents, 42.35% and 45.28% expect lower risk for AVs. On the other hand, the results of a survey conducted with Tesla drivers about their experiences with two ADAS systems which are Autopilot and Summon were reported (Dikmen & Burns, 2017). Drivers who experienced unexpected behaviors from their vehicles reported lower levels of trust. In time, trust in autonomous systems increased irrespective of experience.

3. Background

Autonomous vehicle(AV) is a vehicle which uses a several sensors, camera, radar and artificial intelligence (AI) to travel from departure to destination point without any human intervention. These vehicles also call as “driverless vehicle”, “self-driving vehicle” and “robotic vehicle”.

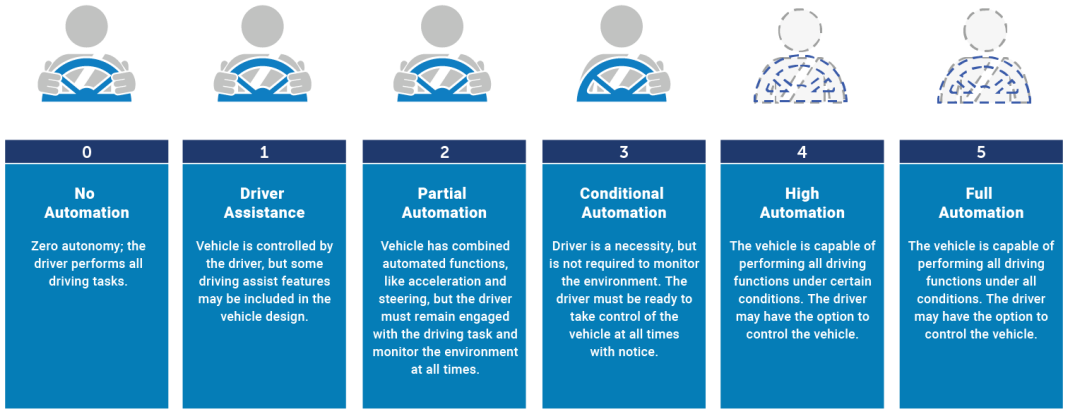

Figure 1. Automation level of autonomous vehicles (NHTSA, 2018).

Five levels of autonomous driving are defined by the Society of Automobile Engineers (SAE) and Figure 1 shows these 5 levels. Level 0 doesn't have any automation and driver needs full time performance in this level. Although licensed driver is required for Level0, Level 1 and Level 2 , licensed driver is not required for Level 3, Level 4 and Level 5 .

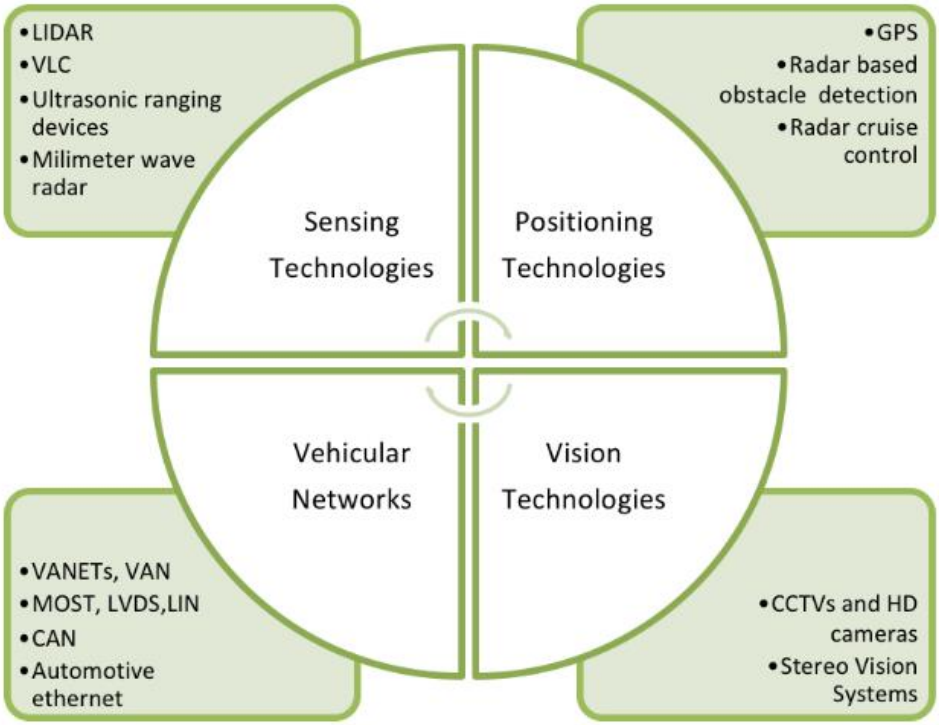

Figure 2. Technologies equipped in autonomous vehicles (De La Torre, Rad & Choo, 2018)

Figure 2 shows technologies of autonomous vehicle and their equipment. While sensing environment, positioning technologies provide position information, vehicular networks provide vehicle-o-everything(V2X) communication and vision technologies ensure real time environment data and image.

Technology trust is another important background knowledge about this study. There are 2 major psychosocial model for the using technological acceptance such as Theory of Planned Behavior (TPB) and Technology Acceptance Model (TAM). TAM has been applied to evaluate acceptance of technology including in vehicles (Chen & Chen, 2011). The TAM supposes that perceived ease of use and perceived usefulness foresee intentions to use the system.

Trust of AVs technology can be examined with trust of automation. Autonomous vehicles are operated based on sensing, decision making, actuating by automation. Trust is key in mediating the relationship between automation and humans, operating in a similar way to trust between humans (Sheridan, 2002). Trust is a main concept in human-automation interaction. Improper calibration of trust for the automated system might induce to overreliance and underreliance of automation (Parasuraman & Riley, 1997) and reducing performance and less adoption can be result of that. Improper calibration of trust for the automated system might induce to overreliance and underreliance of automation (Parasuraman & Riley, 1997) and reducing performance and less adaptation can be result of that. Three critical factors which are performance, process and purpose are identified in trusting an automated

system (Lee & See, 2004). Trust on automation increases as comprehended reliability of automation increases (Ross, Szalma, Hancock, Barnett & Taylor, 2008). Trust decreases with error on automation (Lee & Moray, 1992), but providing reasons of why the error consisted (observing the process; (Lee & See, 2004)) can increase trust and reliance spite of the errors (Dikmen & Burns, 2017), (Dzindolet, Peterson, Pomranky, Pierce & Beck, 2003).

4. Methodology

Adaptation of new technology is quite hard for the developing countries such as Turkey. Before this adaptation, analyzing the perspective of users according to this new technology is necessary. The main purpose of this survey is analyze the general view of the public towards AVs, analysis of the confidence of the drivers in autonomous vehicles and the analysis of the confidence of P-P in autonomous vehicles. At the same time, the prediction of the AV technology's future for the infrastructure of Turkey was asked (for 2023 and 2030). Future estimation and trust analysis can be compare for the accurate result.

This survey was designed as 5 parts with "Google Forms" and includes 36 questions. Data collection was performed on between 9 August and 22 August 2018 for different age groups, educational backgrounds and professions from 107 participants in Turkey. All data was considered (107) without any loss. First part includes information about autonomous vehicle, their levels and assumption (Level 5 -autonomous- was considered). Participants-related data were collected in this part. The aim of second part was to measure the knowledge of the participant about autonomous vehicle and to get information about their general perspective. Some basic general (for both driver and P-P) trust measurement questions were located here. In third part, interaction between autonomous vehicle, driver (the person who drives his own or rental vehicle) and perspective of national autonomous vehicle was analyzed. In the fourth part of the survey, the interaction between autonomous vehicle and P-P was investigated. In the last part, ideas of participants about the future use of autonomous vehicle technology were analyzed.

Demographic aspect	Classification Criteria	Number of response	Response Percentage (%)
Gender	Male	89	83,2
	Female	18	16,8
Age group	15-20	15	14,0
	21-25	57	53,3
	26-30	17	15,9
	31-35	11	10,3
	36-40	4	3,7
	40+	3	2,85,6
Profession	Student	44	41,1
	Educator	6	5,6
	Academician	9	8,4
	Engineer/technician	26	24,3
	Officer	5	4,7
	Private sector(other)	13	12,2
	Housewife	1	0,9
	Unemployed	3	2,8
Educational Background	Elementary school	2	1,9
	High school	11	10,3
	Bachelor degree	64	59,9
	Master degree	24	22,4
	PhD	6	5,6
Region	Istanbul	47	43,9
	Ankara	12	11,2
	Izmir	2	1,9
	Bursa	7	6,5
	Marmara region	13	12,2
	Black Sea region	4	3,7
	Central Anatolia region	8	7,5
	Aegean region	4	3,7
	East Anatolia region	3	2,8
	Southeastern Anatolia Region	1	0,9
	Mediterranean region	6	5,6

Table 1. Demographic profile of participants

Table 1. shows demographic information of 107 participants with 89 number of respondents, where 83,2% response was male and 18 number of responses corresponding to 16,8% percentage were female. According to the data, age group between 21 and is majority with 53,3% while the 40+ age group is minority with 2.8% participation. 36-40 age group of respondents follows the minority with 3,7%. 15-20, 26-30 and 31-35 age groups of respondents are close each other with 14+, 15,9% and 10,3%. Majority of the respondents were students after 41,1% engineers and 24,3% technician. Educator, academician, officer, housewife and unemployed of respondents are less than quarter of all respondents and the respondents who are working on private sector are 12,2% with 13 participants. 87.7% of respondents have minimum bachelor's degree with 59,8%, master's degree with 24,9+ and PhD degree with 5,6 percent. 2 of respondents have elementary school certificate with 1.9% while 10,3% of respondents graduated from high school. City and region of respondents are important for analyzing data due to trust of cities and regions. Majority of the respondents are from Istanbul with 43,9% while Marmara Region with 12,2% and Ankara as 11,2%. The minority of respondents from Southeastern Region as 0.9%. Data of regions and cities occupies an important place on comparison of trust in Avs. As mentioned at the beginning, this study considers 2 different class as drivers and P-P. 50,5% of respondents are driver while 49.5% of respondents are P-P.

There are 2 assumptions to describe "driver" and "pedestrian/passenger" classes. Assumption1: Driver was assumed as the driver who drive his/her own or rental or

borrowed vehicle nearly every day (minimum 4 hours/week). Assumption2: Pedestrian/passenger (P-P) class who travels as passenger in personal vehicle, in car sharing service, in car riding service, by public transportation or pedestrian who travels on foot. Basically, the person who doesn't have his/her own or rental vehicle.

Driver aspect	Classification Criteria	Number of response	Response Percentage (%)
Number of vehicle ownership	0	12	22,6
	1	31	58,5
	2	6	11,3
	2+	4	7,6
Vehicle usage time [hour/day]	0-1	25	47,2
	1-2	14	26,4
	2-3	7	13,2
	3-4	3	5,7
	4+	4	7,6
Driving experience [year]	0-2	16	30,2
	2-4	11	20,8
	4-6	11	20,8
	6-10	8	15,1
	10+	7	13,2

Table 2. Driver aspect data

Driver aspect data according to number of vehicle ownership, daily vehicle usage and driving experience is shown in Figure Z.C. The number of vehicle ownership data shows that, many of the respondents have one vehicle and it constitutes the majority with 58,5% while 22,6% of respondents don't have their own vehicle; probably they use rental vehicle or their family vehicle (For instance, in one family there is vehicle and attendance use one of his/her father vehicle). 11,3% of participants have two vehicles while 7,6% of attenders have more than two. Around one half of the attendances use their vehicle one or less than an hour. Between three and four hours; or more than four hours vehicle usage times are close to each other with 5,7% and 7,6% while 13,2% of participants drive their vehicle between two and three hours. Majority of driving experience is two years or fewer with 30,2% while minority is more than ten years with 13,2%. Nevertheless, response percentage between two and four years, between four and six years are same as 20,8% and 15,1% of participants have experience of six to ten years of driving.

Pedestrian/Passenger Aspect	Classification Criteria	Number of response	Response Percentage (%)
Time spent in public transportation [hour/day]	0-1	25	46,3
	1-2	20	37,0
	2-3	7	13,0
	3-4	1	1,9
	4+	1	1,9
Walking time(purpose of travel) [hour/day]	0-1	38	70,4
	1-2	15	27,8
	2-3	1	1,9

Table 3. Pedestrian/passenger aspect data

Table 3. shows P-P aspect data according to daily time spent in public transportation (PuT) and daily walking time purpose of travel. Majority of respondents with 46,3% spend 0-1 hour with PuT while minority of respondents with 3,8% spend their 3 or more hours with PuT. While 13% of respondents devote 2-3 hours, 37% travel between 1 and 2 hours by PuT. Both time spend in PuT and walking time complement each other as mode choice model. If the person who wants to travel from A to B by PuT, other mode of transportation must be on foot to reach from departure to PuT stop or from PuT to destination. Possible to say that; due to public transportation usage, the majority of respondents spend their 0-1 hour on foot.

5. Results

As mentioned, survey has 5 different parts. First part which is about participants' data was evaluated in methodology section as demographic aspects, driver aspects and P-P aspects. Second part of survey include general perspective of attenders in AV s. Third part includes result of interaction between AVs and driver while fourth part contains interaction between AVs and P-P and the last part involves ideas of participants about the future use of autonomous vehicle technology on 2023 and 2030 perspectives. During analysis the results, classification criteria is described as disagree, not decided and agree with coefficient 1,2 and 3.

General perspective about autonomous vehicles	Classification Criteria	Number of response	Response Percentage (%)	Mean	Standard Deviation
I know basics and/or system of autonomous vehicle technology	Disagree	11	10,3	2,5047	0,67
	Not decided	31	29		
	Agree	65	60,7		
The presence of autonomous vehicles in the traffic is not disturb me.	Disagree	7	6,5	2,6729	0,59
	Not decided	21	19,7		
	Agree	79	73,8		
I can sleep while autonomous vehicle is operating.	Disagree	37	34,6	1,9626	0,81
	Not decided	37	34,6		
	Agree	33	30,8		
Autonomous shuttle service is acceptable for my child(home to school)	Disagree	33	30,8	1,9907	0,78
	Not decided	42	39,3		
	Agree	32	29,9		
Deliver service with autonomous cargo vehicle is acceptable	Disagree	13	12,1	2,5888	0,70
	Not decided	18	16,8		
	Agree	76	71		
Have you ever seen autonomous vehicle (below the Level3)	No	73	68,2		
	Yes	34	31,8		
Have you ever travelled by autonomous vehicle (below the Level3)	No	102	95,3		
	Yes	5	4,7		

Table 4. General perspective about autonomous vehicles

Before the analyzing of the trust in autonomous vehicle; knowledge of participants should be considered, see in Table 4. While 31,8% of attenders saw autonomous vehicle which is below Level three before, just 5% of them travelled with them. While 68,2% of respondents have seen autonomous vehicle which is below the Level three, just 5% of attendances travelled by autonomous vehicle. The majority of respondents know basic and/or system of autonomous vehicle with 2,5047 mean. Just 10,3% don't have enough knowledge about AVs. Presence of autonomous vehicle in the traffic is not disturb many of attenders with 73,8%. 2,6729 shows that, operation of autonomous vehicle on road don't problem for both driver and pedestrian/passenger side. Respondents are abstainer about sleeping in autonomous vehicle while AV is operating with 1,9626 mean. Same result also exists for autonomous shuttle service with 1,9907 mean. Result of these both questions clearly shows that the reason for the abstention of the two questions is the same as each other. Participants in both questions consider the safety of life, while themselves or a relative in the vehicle. In fact, autonomous vehicles in general can create trust; however, there is no confidence in their use. Low level service such as deliver is acceptable with autonomous vehicle and 2,5888 mean proves that.

Driver perspective about Autonomous vehicles	Classification Criteria	Number of response	Response Percentage (%)	Mean	Standard Deviation
If I come across with autonomous vehicle, drive on same lane with it.	Disagree	21	9,6	2,4393	0,80
	Not decided	18	16,9		
	Agree	68	63,5		
In case of same brand: I prefer autonomous vehicle instead of normal one	Disagree	14	13,1	2,5327	0,71
	Not decided	22	20,6		
	Agree	71	66,3		
I prefer the brand that produces only autonomous vehicle compare to other brands	Disagree	10	9,3	2,5888	0,66
	Not decided	24	22,4		
	Agree	73	68,3		
I prefer domestic autonomous vehicle as against other autonomous vehicle manufacturer	Disagree	20	18,7	2,3738	0,78
	Not decided	27	25,2		
	Agree	60	56,1		

Table 5. Driver perspective about autonomous vehicles

Result of driver perspective about AVs is shown in Table 5. 63,5% of participants can drive on same line with AVs while 9,6% of attenders do not prefer that. 2,4393 mean shows that, there is driver trust in autonomous vehicle. 66,3% of respondents prefer autonomous vehicle instead of normal one in case of same brand. The majority of participants prefer the brand for autonomous vehicle which produces only AVs. 2,5888 mean can prove it. Just 56,1% of respondents prefer domestic autonomous vehicle while 25,2% of them are abstainer and this result is not what expected. Consequently 63,5% of drivers trust autonomous vehicle and its technology and in case of availability, 63,3 % of drivers prefer autonomous vehicle in future.

About analysis in pedestrian/passenger perspective there are 2 case; first one autonomous vehicles are majority in traffic and other one is traffic only consist of autonomous vehicle. Result of both cases are really similar except to looking around while passing over.

Pedestrian/Passenger perspective about autonomous vehicles	Classification Criteria	Number of response	Response Percentage (%)	Mean	Standard Deviation
I can cross over easily*	Disagree	21	9,6	2,4393	0,80
	Not decided	18	16,9		
	Agree	68	63,5		
I don't need to look around while crossing over*	Disagree	14	13,1	2,5327	0,71
	Not decided	22	20,6		
	Agree	71	66,3		
I prefer underpass; if exist*	Disagree	10	9,3	2,5888	0,66
	Not decided	24	22,4		
	Agree	73	68,3		
I prefer underpass; if exist**	Disagree	20	18,7	2,4019	0,78
	Not decided	24	22,4		
	Agree	63	58,9		
I can cross over easily**	Disagree	11	10,3	2,5047	0,67
	Not decided	31	29		
	Agree	65	60,7		
I don't need to look around while crossing over**	Disagree	46	43	1,8318	0,81
	Not decided	33	30,8		
	Agree	28	26,2		

Table 6. Pedestrian/passenger perspective about autonomous vehicles

In both case, participants can cross over easily with 2,4953 and 2,5047 mean while if underpass exists, they prefer to use that with 2,4953 and 2,4019 mean. While in case of in a city where traffic only consist of AVs; 26,6% of attenders believe looking around while crossing over is not necessary, in case of AVs majority, 10,3% of participants think same. As a result, 73,5% of participants trust autonomous vehicle and their technologies.

Future perspective was performed with autonomous vehicle availability in whole country, some region, metropolis and operational mode choice such as private AVs and autonomous PuT. Also, vehicle manufacturing market expectation was considered.

Future perspective **[Untill 2023]* **[Untill 2030]*	**Classification Criteria**	**Number of response**	**Response Percentage (%)**	**Mean**	**Standard Deviation**
We will encounter with autonomous vehicle in Turkey (whole country)	Disagree	49	45,8	1,8318	0,85
	Not decided	27	25,2		
	Agree	31	29		
We will encounter with autonomous vehicle in Istanbul/Ankara/Izmir	Disagree	27	25,3	2,2150	0,82
	Not decided	30	28		
	Agree	50	46,7		
Not possible to see autonomous vehicle in East and Anatolia part of Turkey	Disagree	21	19,6	2,3458	0,79
	Not decided	28	26,2		
	Agree	58	54,2		
All vehicles which manufactured will be autonomous	Disagree	62	58	1,6168	0,79
	Not decided	24	22,4		
	Agree	21	19,6		
All personal vehicle will be autonomous	Disagree	61	57	1,6262	0,79
	Not decided	25	23,4		
	Agree	21	19,6		
Public transportation will be autonomous	Disagree	39	36,4	1,9720	0,84
	Not decided	32	29,9		
	Agree	36	33,7		

Table 7. Future perspective

According to future perspective analysis which was performed until 2023, while Istanbul and other metropolis are accepted as major city for the beginning of autonomous vehicles, attenders believe that in East Anatolia and Central Anatolia regions will not be ready for that technology. More than half of participants (54,2%) believe for East Anatolia and Central Anatolia regions cannot handle this process and 26,2% of respondents are abstainer. Due to 2,3458 mean, consequently mostly attenders don't believe integration of this technology in these regions until 2023. With 2,2350 mean, many participants believe that autonomous vehicles can be seen in major cities such as Istanbul, Ankara and Izmir. If we pose the question as 2030 about autonomous operational mode, result looks more pessimistic. As expected, attenders don't believe that all vehicle which manufactured will be autonomous until 2030 with 1,6168 mean. At the same time result also same for private AV operational mode with 1,6262 mean while autonomous public transportation gives prospect with 1,9720 mean.

6. Discussion

While the participants in this study do not have any concern for autonomous vehicles extremely, it is possible to see that the legal gaps seriously concern consumers in the literature. According to the results of the analysis, possible to say that the people who are unconscious about autonomous vehicle technology do not trust it. Therefore, the public needs to be informed about the autonomous vehicle technology. The confidence of the conscious public about this technology will increase with the awareness raising activities. In the media this technology has to be a big place day by day and people earn trust in this manner. Furthermore, autonomous vehicle manufacturers need to develop a very good marketing policy in the future. Confidence

in autonomous vehicles will increase with creative marketing policy and state awareness efforts.

References

NHTSA. (2018). Automated Vehicles for Safety. Retrieved from https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety

Begg, D. (2014). A 2050 Vision for London: What are the implications of driverless transport?.

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.

Burns, L. D., Jordan, W. C., & Scarborough, B. A. (2013). Transforming personal mobility. The Earth Institute, 431, 432.

Casley, S. V., Jardim, A. S., & Quartulli, A. M. (2013). A study of public acceptance of autonomous cars. Worcester Polytechnic Institute, Bachelor Thesis.

Chen, C., & Chen, P. (2011). Applying the TAM to travelers' usage intentions of GPS devices. Expert Systems With Applications, 38(5), 6217-6221. doi: 10.1016/j.eswa.2010.11.047

De La Torre, G., Rad, P., & Choo, K. (2018). Driverless vehicle security: Challenges and future research opportunities. Future Generation Computer Systems. doi: 10.1016/j.future.2017.12.041

Dikmen, M., & Burns, C. (2017, October). Trust in autonomous vehicles: The case of Tesla Autopilot and Summon. In Systems, Man, and Cybernetics (SMC), 2017 IEEE International Conference on (pp. 1093-1098). IEEE.

Dzindolet, M., Peterson, S., Pomranky, R., Pierce, L., & Beck, H. (2003). The role of trust in automation reliance. International Journal Of Human-Computer Studies, 58(6), 697-718. doi: 10.1016/s1071-5819(03)00038-7

Kaur, K., & Rampersad, G. (2018). Trust in driverless cars: Investigating key factors influencing the adoption of driverless cars. Journal Of Engineering And Technology Management, 48, 87-96. doi: 10.1016/j.jengtecman.2018.04.006

Kyriakidis, M., Happee, R., & de Winter, J. (2015). Public opinion on automated driving: Results of an international questionnaire among 5000 respondents. Transportation Research Part F: Traffic Psychology And Behaviour, 32, 127-140. doi: 10.1016/j.trf.2015.04.014

Lee, J., & Moray, N. (1992). Trust, control strategies and allocation of function in human-machine systems. Ergonomics, 35(10), 1243-1270. doi: 10.1080/00140139208967392

Lee, J., & See, K. (2004). Trust in Automation: Designing for Appropriate Reliance. Human Factors: The Journal Of The Human Factors And Ergonomics Society, 46(1), 50-80. doi: 10.1518/hfes.46.1.50.30392

Missel, J. (2014). Ipsos MORI Loyalty automotive survey.

Nasir S., Ozcelik S. (2017). Sürücüsüz Araçlara Yönelik Kullanıcı Tutumları, Eurasian Journal of Researches in Social and Economics (EJRSE), 590-603, ISSN:2148-9963

Parasuraman, R., & Riley, V. (1997). Humans and Automation: Use, Misuse, Disuse, Abuse. Human Factors: The Journal Of The Human Factors And Ergonomics Society, 39(2), 230-253. doi: 10.1518/001872097778543886

Ross, J., Szalma, J., Hancock, P., Barnett, J., & Taylor, G. (2008). The Effect of Automation Reliability on User Automation Trust and Reliance in a Search-and-Rescue Scenario. Proceedings Of The Human Factors And Ergonomics Society Annual Meeting, 52(19), 1340-1344. doi: 10.1177/154193120805201908

Schoettle, B., & Sivak, M. (2014). A survey of public opinion about autonomous and self-driving vehicles in the US, the UK, and Australia.

Sheridan, T. (2002). Humans and automation (p. System design and research issues. Human Factors and Ergonomics Society). New York: John Wiley.

Sommer, K. (2013). Continental mobility study 2011. Continental AG http://www. continental-corporation.com/www/download/pressportal_com_en/themes/initiatives/channel_mobility_study_en/ov_mobility_study2013_en/download_channel/pres_mobility_study_en. pdf.

WHO, W. (2015). Global status report on road safety 2015. Geneva, Switzerland: WHO.

Xu, X., & Fan, C. (2018). Autonomous vehicles, risk perceptions and insurance demand: An individual survey in China. Transportation Research Part A: Policy and Practice. doi: 10.1016/j.tra.2018.04.009.