

FACTORS AFFECTING THE ADAPTATION OF AUTOMATED VEHICLES

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Abstract: *Autonomous vehicle (AV) systems will be an important technology and essential for future transportation. This study applied the Unified Theory of Acceptance and Use of Technology (UTAUT) model to study the factors influencing a user's behavioral intention to use AVs. Then, a survey questionnaire was designed to collect 250 responses from AV users, and for analysis, two software programs were used: AMOS and SPSS. The result of the study shows that social influence, facilitating condition, Electronic-Word of Mouth (E-WOM), and E-Referral positively affect behavioral intentions toward the automated vehicle. Moreover, these findings contribute to UTAUT by adding new factors to the new context.*

Keywords: *UTAUT, Automated vehicle, E-WOM, E-Referral Facilitating condition, and Social influence.*



INTRODUCTION

The most vital application in the intelligent transportation framework field is vehicle automation. This innovation incorporates numerous inventive features, such as adaptive cruise control and Global Positioning Systems (GPS) into modern automobiles, and these components have moved the driving controls to machines from human drivers (Petit & Shladover, 2014). The utilization of intelligent transportation frameworks supports drivers and limits some driving-related monotonous assignments. In particular, interstate driving has become more secure on account of the improvement of the Cruise Control (CC), Adaptive CC (ACC), and, recently, the Cooperative ACC (CACC), where both longitudinal actuators, throttle, and brake pedals, are controlled utilizing a pre-characterized hole with the first vehicle (Milanés et Al., 2013).

Autonomous vehicles (AV) use detection and correspondence advancements to explore securely and proficiently with the least human mediation. Autonomous vehicle innovation advancement is driving commercialization. Volvo, BMW, and other vehicle producers intend to satisfy self-sufficient driving capacities in numerous vehicle models by 2040 (McKinsey Center for Future Mobility 2019). Bansal and Kockelman (2017) argued that existing examinations foresee that by 2045, AVs (explicitly Level 5 computerization without human intercession) might be taken on by 24.8–87.2% of the business.

The advancement in AV adoption will bring abundant aid to both individuals and society by improving traffic safety and fuel efficiency and avoiding Corban emissions completely (Fagnant & Kockelman, 2015). Primarily, AVs can minimize up to 90% of collisions by lessening driver faults (Cohen & Hopkins, 2019). Also, AVs are fundamental for working on the climate and tackling congestion; they can save 7–15% of fuel utilization by framing detachments, decreasing vehicle proprietorship and parking spots, and upgrading road size (Yuen et al., 2020). In addition (Wang et al., 2019) argued that AVs entail fewer human sources of info, empowering clients to perform more useful exercises during their movements. Moreover, older and handicapped people can also benefit from AVs and use them for mobility (Fagnant & Kockelman, 2015).

Not only can this cutting-edge innovation massively affect the versatility and portability of transportation frameworks, but it is additionally accepted to convey the possibility of transforming people's lives. For instance, AVs can change the existence of old people and individuals with inabilities who can't drive today (Harper et al., 2016). Also, when combined with vehicle connectivity technology, AVs are expected to reduce traffic congestion significantly and, as a result, energy consumption and energy dissipation (Chandra & Camal, 2016). In any case, genuine concerns remain concerning the guidelines, credit, protection, and security of this innovation (NHTSA, 2013). Similarly, as with other emerging advances in technology, the consumer adaptation behavior of AVs is relied upon to be under a specific degree of fluctuation. All in all, individuals will have an alternate affectability to various AV manifestations. A few clients who are more worried about driving well-being might be keen on this innovation due to the exceptionally expected security benefits (Kockelman et al., 2016).

Various researches have been led to investigate the intentions of the client to utilize autonomous vehicles AVs. A new report by Yuen et al. (2020) investigated factors influencing AV adaptation based on TAM and IDT blend. Hudson, Orviska, and Hunady (2019), considered a demographic factor in AV adaptation research. A few specialists have investigated that age, sex, and the degree of instruction impact the acceptance of AVs. Hulse et al. (2018)

investigated that, men and more youthful individuals are quicker to utilize AVs in contrast with ladies and more old age individuals. Man, Xiong, Chang, and Chan (2020) additionally directed examination of AVs variation and considered components like service quality, compatibility, perceived safety risk, and perceived privacy risk. Haboucha Ishaq and Shiftan (2017) investigated that underlying AV adopters will presumably be more youthful, more educated, and invest more time driving, in light of an examination of the acknowledgment of AVs in Israel and North America.

Shabanpour et al. (2018) set up a best-worst scaling model dependent on a new expressed inclination study on the acceptance of autonomous vehicles. In their examination, people were given a solitary AV profile and requested to pick the best and most noticeably terrible features. Results from this model found that individuals were profoundly touchy to the price tag and risk in case of a mishap and the conceivable arrangement of selective paths for AVs. Shabanpour, Shamshiripour, and Mohammadian (2018) introduced an innovation diffusion model dependent on a new overview of AV reception and found that training, age, travel examples, and mentalities were exceptionally persuasive in individuals' Autonomous vehicle adoption thing choices. Talebian and Mishra (2018) applied the theory of innovation of diffusion and specialist-based demonstration to gauge the long-haul reception of AVs. Their discoveries recommend that consumer judgments regarding automation and the eagerness to pay for rising vehicle advances are dynamic and that the people with geographic nearness and comparative socio-segment profiles will in general form social ties that outcome in uniformities in autonomous vehicle acceptance patterns.

Araújo et al. (2021) led an exploration of spa tourism based on Unified Theory of Acceptance and Use of Technology (UTAUT) and further prescribed contemplating working with facilitating conditions in another scenario. Yuen et al. (2020) investigated the component behind the Chinese cab drivers while adopting electric vehicles and suggested contemplating the effect of social influence on behavioral intention. Yuen et al. (2020) investigated, factors impacting autonomous vehicle adoption based on the utilization of the innovation diffusion model and in the future, prescribed to apply another model, for example, the UTAUT. Wu et al. (2019) and Wu, Liao, Wang, and Chen (2019) directed an investigation on the job of ecological worry in the public acknowledgment of autonomous electric vehicles in China and further prescribed to contemplate different variables to understand behavioral intention thoroughly. Based on the above directions, this study will identify factors affecting the adoption of autonomous vehicles based on UTAUT. Autonomous vehicle adoption is in the development stage in Pakistan; this study is an initial endeavor to help in the identification of behavioral intentions towards autonomous vehicle adoption.

LITERATURE REVIEW

Theoretical Underpinning

The shifting examination contexts dependent on innovation, client type, area, reception time, and undertaking performed brought about many contending theories and models. For instance, the Technology Acceptance Model (TAM), Diffusion of Innovation (DoI), Theory of Planned Behaviour (TPB), and Task Technology Fit (TTF) Theory were mostly deployed to examine

the assortment of adoption and diffusion-related issues (Dwivedi et al., 2007; Dwivedi & Weerakkody, 2007; Kapoor et al., 2014; Hwang & Grant, 2011). Social Influence from the Theory of Reasoned Action (TRA), Facilitating Conditions, and Social Influence from the Theory of Planned Behavior (TPB), Performance Expectancy, Effort Expectancy from Technology Acceptance Model (TAM), Performance Expectancy, Effort Expectancy and Social Influence from Technology Acceptance Model2 (TAM2), Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions from Innovation Diffusion Theory (IDT), Performance Expectancy from Social Cognitive Theory (SCT), Performance Expectancy from Motivational Model (MM), Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions from Model of PC Utilization (MPCU) and the Performance Expectancy, Social Influence and Facilitating Conditions from Combined TAM-TPB (C-TMA-TPB) (Amrouni, Arshah, & Kadi, 2019). Because of a thorough audit of eight predominant technology reception models, (Venkatesh et al., 2003) established a unified theory of acceptance and use of technology (UTAUT) in the organizational framework emphasizing the utilitarian value (extrinsic motivation) of organizational users after the elimination of similar/redundant constructs.

E-referral and Behavioral Intention

According to the New York Times, 65 percent of new business comes from referrals; indicating that most customers have gained through referrals and not an advertisement (Referral Marketing, 2015). Nielsen (2012) reported that consumers are four times more likely to purchase a product and/or service when referred by a friend, family member, or colleague and not through a salesperson or advert. Hence, a steady stream of referrals can attract profitable customers, and improve customer loyalty (Van-den, 2010). In the context of autonomous vehicles Talebian and Mishra (2018), The individual's willingness to pay for automation is also dynamic and changes as a result of peer-to-peer communication. This means that communication with a satisfied adopter can not only convince a potential adopter that the barriers that he/she perceives are not real (or perhaps not as important as he/she thinks) but also it is worth spending more money on AVs. Similarly, in the AV context, Yuen et al. (2020) exhibited that referrals from identified sources such as friends, family, and colleagues are more influential in the adoption of autonomous vehicles. Indeed, the perceptions of people who are important to an individual have a salient influence on whether consumers engage in a particular intention or not. So, eReferral might be more effective in the context of AV since the sender or source is known and trusted by the receiver. Further, strong-tie information sources are perceived as more credible than weak-tie information sources (Rogers, 1983). However, Abubakar et al. (2016) argue that eReferral failed to influence purchase intention. The conflict in the literature provides additional space for more exploration. Thus, the following hypothesis is proposed:

H1: Electronic Referral has a positive effect on purchase intention.

E-WOM and behavioral intention

Due to recent advancements in smartphone technology and widespread internet access, consumers are now more likely to share their opinions and recommendations about new products through various electronic media platforms such as social media, blogs, and direct communication with their peers (Gupta and Harris, 2010; Huete-Alcocer, 2017; Hwang, 2008; Hwang et al., 2013). Dubey, Sharma, Mishra, Cats, and Bansal (2022) found that word-of-mouth (WOM) on social media had a significant impact on the adoption of autonomous vehicles in the digital era. The study conducted by Liu, Rouse, and Belanger (2019) emphasizes the importance of consumer approval for the implementation of autonomous vehicles (AVs). In the context of AVs, people are more vulnerable to robot faults compared to human errors. Negative word-of-mouth resulting from these faults undermines customer confidence and, consequently, the acceptance of AVs. Reza, Jalilvand, and Samiei (2012) showed in their study that, online release significantly affects other consumers' purchasing behavior. Communication can cause e-WOM particularly important for automotive manufacturers. Via the Internet cell phone that is now becoming increasingly popular, customers read online recommendations for the product in their interest directly at the place of purchase, which could have a strong impact on their purchasing decisions. In addition, Jalilvand and Samiei (2012) conducted a study in the automobile industry and the result showed that eWOM is positively related to purchase intention in the automobile industry. With the development of electronic media emerging as a strong and reliable source of information (Shukla, 2011), the influence of interpersonal interactions (eWOM) on buying decisions has significantly increased (López & Sicilia, 2014). Online reviews act as strong informants and recommenders and significantly influence the purchase intention and actual purchase (Park et al., 2007). While referring to the eWOM given on various social media channels, it is not only the quality but also the quantity of eWOM that influences the purchase decision of consumers (Lin et al., 2013)

H2. Electronic WOM has a positive effect on purchase intention.

Social Influence and Behavioral Intention

Social impact is characterized as the number of other people who accept the client ought to embrace the new framework of technology (Venkatesh et al., 2003; Hwang, 2016; Malaquias & Hwang, 2016, Malaquias et al., 2017; Hwang et al., 2016; Hwang, 2012; Hwang et al., 2016). In the realm of autonomous vehicles, social influence refers to the prestige associated with owning an AV. It evaluates a customer's conviction on the significance of others' opinions in determining whether to utilize an AV Zhou et al. (2021). According to Kettles and Van Belle (2019), the adoption of AVs may be influenced by the social context, as they are considered the latest technology that offers customers identification and social status. The endorsements of celebrities can influence users, and they are more inclined to perceive AVs as valuable if they receive positive endorsements and are enthusiastic about using them. However, Singha et al. (2023) exhibited that social influence does not significantly affect AV adoption. Chaouali et al. (2016) showed that social influence impacts the mentality of each person regarding the utilization of new creative items through innovation and technology. In a recent research

investigation, Yang et al. (2021) stated that, in the setting of e-wallets, loved ones significantly influence individual outlook to utilize things presented through innovation.

H3: Social influence will positively influence purchase intention.

Facilitating Condition and Behavioral Intention

Facilitating conditions have been characterized as how much an individual accepts that they have the vital hierarchical and specialized foundation to utilize a particular innovation or technology (Venkatesh et al., 2003). In the context of shared autonomous vehicles, Yuen, Huyen, Wang, and Qi (2020) argued that facilitating conditions affect behavioral intentions to use the shared autonomous vehicles through perceived behavioral control and providing online training, test drives, and advertising can help to improve the enabling factors and establish favorable conditions for customers to access and comprehend SAVs readily. Similarly, Singha et al. (2023) showed that facilitating conditions and intentions to adopt AV are positively related, and purchase subsidies can enhance the adoption of AV. In other contexts, facilitating conditions and AV adoption showed a significant relationship. Peñarroja et al. (2019) affirmed that in this computerized period, facilitating conditions positively affect the information-sharing behavior of utilizing technology. These findings ensured that consumers are likely to participate in virtual communities when facilitating conditions exist. Specifically, in the context of spas, many studies have demonstrated the importance of facilitating conditions for choosing a spa during a trip. However, Klaysung (2016), for instance, highlighted parking space availability and the absence of traffic jams as important spa selection criteria for tourists in Thailand.

H4: The facilitating condition has a positive effect on purchase intention

METHODOLOGY

Research Design and Method

A structured questionnaire-based survey was conducted to assess the theoretical model. The questionnaire holds two parts. The first part was used to collect respondents' demographic information, and it included five questions on gender, age, education, and brand or company vehicle they are using. Demographic variables were measured using closed-ended questions. The second part was used to survey respondents' intention on the adoption of automated vehicles. The non-probability sampling strategy was used. This sampling strategy is useful when the population is unknown or unable to be recognized in the targeted population (Smith, 2012). Purposive sampling is a non-probability sampling method in which units are selected with consideration for a specific reason. In purposive sampling, the researcher purposefully selects the respondents because they meet clear inclusion and exclusion requirements for participation in the sample (Daniel, 2011). Purposive sampling is an incredibly useful method for the early stages of a study when participants have no familiarity with the case being studied (Sibona & Walczak, 2012).

So, purposive sampling was used to collect data from the Pakistani respondents in car parks and a hard questionnaire was given to the respondent in car parks. In this study, quantitative techniques were used, as it is recommended by (Cooper & Guinan, 2006), who argues that the greatest suitable technique is the quantitative method if the end goal to investigate the association between the factor for which the researcher is applying speculations, models, and theories and keeping these in mind. For testing theory, the quantitative method is most suitable, and also for finding the relationship between variables quantitative design is best (Creswell 2013).

The scales used to quantify all factors are incorporated into this examination. The questionnaire survey comprised two principal parts. The Likert scale was expressed to examine in what way the respondents strongly agree with a specific statement (Uma & Roger, 2003). The purpose of this 5-point Likert scale is the respondents with extra choices and well choices or the variability in their attitudes and feelings, as well as to capture (Hinkin, 1995). The five-point Likert scale offers the respondents considerably more basic alternatives from where they can, without much of a stretch, go for their grouping. The planned survey questionnaire was used for this study.

The questionnaire was distributed among the targeted respondents, and then the researcher collected the questionnaire back. Burns and Bush (2004) approved this way of collecting data. More than that, the unit of analysis was individuals. The study aimed to recognize the impact of factors affecting the adaptation of automated vehicles based on UTAUT. The individual level of investigation was considered because it gives adequate cases to measure and examine each factor of the investigation.

Measurements

E-referral was measured with four items, and e-wom was measured with six items, which were adopted from the study of Jalilvand and Samiei (2012). Social Influence was measured with four items and was adopted (Venkatesh et al., 2003). Four items were adopted from the study of Venkatesh et al. (2012) for facilitating conditions, and behavioral intentions were measured with three items adopted from the study of Shukla (2011).

Table 1. Demographics

		Freq	percent	Valib perc	Cumul perc
Gender	Male	169	67.6	67.6	67.6
	Female	81	32.4	32.4	100
	Total	250	100	100	
Age	20-30	98	39.2	39.2	39.2
	31-40	106	42.4	42.4	81.6
	41-50	32	12.8	12.8	94.4
	50 above	14	5.6	5.6	100
	Total	250	100	100	
Education	Bachelor	69	27.6	27.6	27.6
	MS/MPhil	163	65.2	65.2	92.8
	Doctorate	18	7.2	7.2	100
	Total	250	100	100	
Brand	Toyota	118	47.2	47.2	47.2
	Honda	85	34.0	34.0	81.2
	Suzuki	17	6.8	6.8	88.0
	Kia	13	5.2	5.2	93.2
	Hyundai	17	6.8	6.8	100
	Total	250	100	100	

Table 1 shows that 250 respondents were approached and that all questionnaires were returned. Most respondents were male, 168 (67.6%) while 81 (32.4%) were female. 98 respondents were between the ages of 20-29, 39.2%. 106 respondents were between the ages of 31 and 40, 42.4% of the total population. 32 were between the ages of 41 and 50, and this was 12.8% of the absolute respondents. 14 respondents were over 50 and 5.6% of the absolute respondents. It additionally addresses the education of the respondents; 69, 27.6% of respondents were four-year bachelor's holders, mostly 163, 65.2% had MS/MPhil degrees, and doctorates also took part in responses, which were 18, 7.2%. In this study, information was gathered from 5 auto companies. Most of the respondents were Toyota users, 118 (47.2%) respondents; Honda users also took part which was 85 (34.0 %); Suzuki users likewise partook, which were 17 (6.8%); KIA users 13 (5.2%) and Hyundai users 17 (6.8%) of the complete population.

RESULTS

Table 2. Descriptive analysis

	N	Min	Max	Mean	S.D	Skewnees	Kurtosis
ER	250	1.11	3.89	2.68	00.73	-0.331	-0.804
EW	250	1.94	4.06	3.13	0.56	-0.389	-0.856
SI	250	0.81	4.06	2.80	0.85	-0.081	-0.818
FC	250	2.00	3.89	3.18	0.53	-0.325	-0.618
BI	250	0.78	3.89	2.77	0.61	-0.853	1.361

Note: SI: Social Influence, EW: E-Wom, ER: E-Referral, BI: Behavioural Intentions, FC: Facilitating Conditions

Table 2 of descriptive statistics shows the Maximum, Minimum, and Mean values, Std. Deviation, Skewness, and Kurtosis. Data normality was first tested; the results of data normality are shown in Table 2. As revealed in Table 2, the standard deviation of all the constructs is below 1, which is well within the appropriate range identified by Bryman (2012). Moreover, Table 2 also indicates that the values of skewness and kurtosis of the variables are in the appropriate range (between +2 and -2 for skewness and between +3 and -3 for kurtosis) as specified by Kline (2015), which demonstrates platykurtic, mesokurtic, and leptokurtic distributions. Consequently, there is no issue with data normality.

Table 3. Reliability of variables

Name of the factors	No. of items	Cronbach Alpha
ER	3	0.901
EW	4	0.852
SI	4	0.960
FC	3	0.786
BI	3	0.860
Total	17	0.868

Note: SI: Social Influence, EW: E-Wom, ER: E-Referral, BI: Behavioural Intentions, FC: Facilitating Conditions

Table 3 shows the reliability analysis of variables. E-referral was measured with 3 items, and its Cronbach Alpha is .901; e-wom was measured with four items, and its Cronbach Alpha is 0.852; social influence was measured with four items, and its Cronbach Alpha is .960; facilitating condition was measured with three items and its Cronbach Alpha is 0.880, behavioral intentions measured with three items and its Cronbach Alpha is 0.860. Finally, the total number of items is seventeen, and its Cronbach Alpha is 0.868.

Table 4. Assessment of validity

	CR	AVE	MSV	MaxR(H)	BI	SI	EW	ER	FC
BI	0.894	0.749	0.470	0.991	0.866				
SI	0.951	0.831	0.088	0.990	0.296	0.911			
EW	0.845	0.585	0.450	0.984	0.671	0.259	0.765		
ER	0.915	0.786	0.040	0.989	0.200	0.178	0.108	0.887	
FC	0.789	0.556	0.145	0.798	0.381	0.166	0.365	0.097	0.746

Note: SI: Social Influence, EW: E-Wom, ER: E-Referral, BI: Behavioural Intentions, FC: Facilitating Conditions

To choose whether the items are loaded on their specific scales or not, Confirmatory Factor Analysis (CFA) and Structural Equation Model (SEM) ought to be directed. In this manner, to look at the significant path coefficients among latent variables, Gerbing and Anderson (1988). Appropriately, the affirmation of CFA was finished. The results in Table 4 established that all values of AVE are in their required range, which ensured that there is no issue of discriminate validity. When the CR is more significant than 0.70, and AVE is greater than 0.5, it is acceptable, as suggested by Fornell and Larcker (1981). The results also show that all the values of MSV are less than AVE, which confirms that there is no issue with discriminant validity.

Table 5: Confirmatory Factor Analysis

Items	Standardized loadings
SI1	0.86
SI2	0.94
SI3	0.99
SI4	0.85
EW1	0.69
EW2	0.75
EW3	0.61
EW5	0.97
ER1	0.66
ER2	0.97
ER3	0.99
BI1	0.99
BI2	0.97
BI3	0.99
FC1	0.67
FC2	0.78
FC3	0.78

Note: SI: Social Influence, EW: E-Wom, ER: E-Referral, BI: Behavioural Intentions, FC: Facilitating Conditions

The above is the table of loadings in the confirmatory factor analysis. The CFA test was applied to check the model fitness of the present research study. The results were according to our expectations and showed that all the values were within the acceptable range. As Comrey and Lee (1992) suggested, loadings from 0.32 (*Poor*), 0.45 (*Fair*), 0.55 (*Good*), 0.63 (*Very Good*), or 0.71 (*Excellent*). According to Lowry and Gaskin (2014), a suitable fit to the data can be confirmed if all factor loadings are above 0.60 and the χ^2/df value is between 1 and 5.

Table 6. CFA

Initial Fit Indices			Modifications	Final Fit Indices	
	X^2	639.08	Covariance	X^2	152.7
			Covariance's		
	Df	142	e1 ↔ e4	Df	107
	X^2/df	4.501	e5 ↔ e6	X^2/df	1.42
Nested Model	GFI	0.795	Deleted	GFI	0.936
	AGFI	0.726	FC4	AGFI	0.909
	NFI	0.861	EW4	NFI	0.963
	CFI	0.887	EW6	CFI	0.989
	RMSEA	0.110	ER4	RMSEA	0.041

Note: SI: Social Influence, EW: E-Wom, ER: E-Referral, BI: Behavioural Intentions, FC: Facilitating Conditions

The CFA was applied to check the model's fitness. Four items were removed due to low loading. The results indicate that the value of $X^2/df = 1.42$, within the acceptable range, as high as 5.0 (Wheaton et al., 1977). The value of GFI is .936, and AGFI is .909. Both are in the acceptable range, as suggested by Doll et: the value is acceptable if it is above 0.8. According to Ahire et al. (1996), the NFI has been calculated to full fill the first method of finding a model fit. The value of NFI is $0.963 > 0.90$, CFI is $0.989 > 0.90$, and $RMSEA = 0.041 < 1$, which is also in the acceptable range (MacCallum et al., 1996).

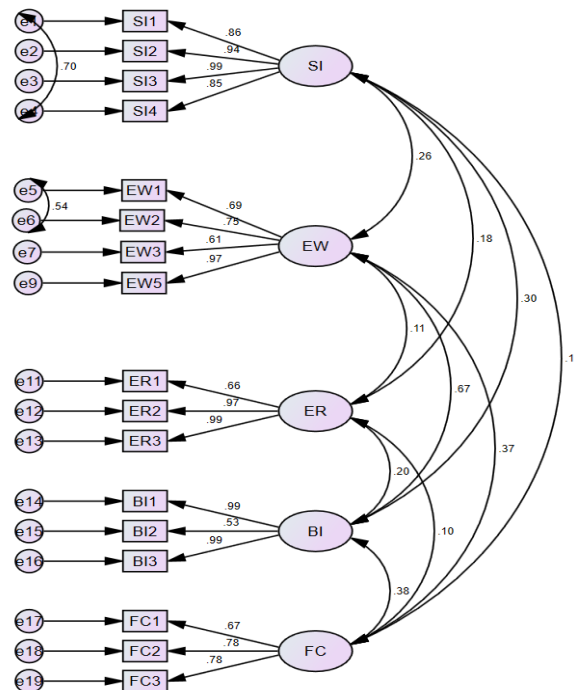


Figure 1. CFA model

Table 7. SEM Hypothesis Testing

Hypotheses	hypotheses	Path	SE	CR	Sig	Status
s	s path	Coefficient				
H1	ER-->BI	0.132	0.065	2.04	0.041	Accepted
H2	EW-->BI	0.706	0.074	9.52	0.000	Accepted
H3	SI-->BI	0.105	0.043	2.42	0.015	Accepted
H4	FC-->BI	0.337	0.097	3.46	0.000	Accepted

Note: SI: Social Influence, EW: E-Wom, ER: E-Referral, BI: Behavioural Intentions, FC: Facilitating Conditions

Table 7 of the direct path model shows H1: ER positively impacts BI, $\beta = 0.132$, CR = 2.04 with P value $.041 < 0.05$. H2: EW positively impacts BI, $\beta = 0.706$, CR = 9.52 with p value $0.000 < 0.05$. H3: SI has a positive impact on BI, $\beta = 0.105$, CR = 2.42 with p value $0.015 < 0.05$. H4: FC has a positive impact on BI, $\beta = 0.337$, CR = 3.46 with p value $0.000 < 0.05$.

The results are confirmed by $X^2 = 216.3$, $df = 130$, and $X^2/df = 3.56$. GFI = 0.843, AGFI = 0.792 NFI = 0.901, TLI = 0.913 CFI = 0.926, IFI = 0.927 and RMSEA = 0.101. As indicated by Hair et al. (2016), the structural equation model fit measures can be up to the required standards when the value of χ^2/df is between 1-5, NFI, AGFI, TLI GFI, IFI, and CFI values are less than 1 and RMSEA = $0.101 < 1$ which is also in the acceptable range (MacCallum et al., 1996).

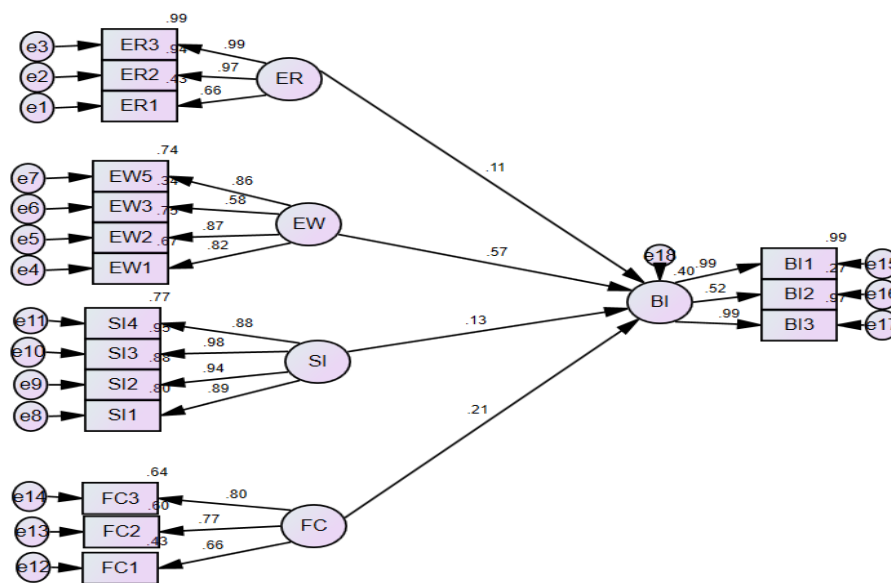


Figure 2. Path Model

DISCUSSION

In this research study, factors affecting the adoption of the automated vehicle have been examined. Factors include e-referral, e-wom, social influence, facilitating condition, and its effect on behavioral intentions. These were four hypotheses in this study. H1. The results showed a positive relationship between e-referrals and behavioral intention toward automated vehicles ($\beta = 0.132$, $p < 0.041$, $CR = 2.04$). The result has been confirmed by the previous findings of Van-den (2010) and Nielsen (2012). The current study provided strong empirical evidence for the relationship between e-referral and behavioral intention toward automated vehicles. In other words, when an individual gets a recommendation online from a trusted and identified source, they are more likely to adopt the AV. However, some of the previous studies failed to show a positive relationship between e-referral and behavioral intentions due to the small sample size, and there were Greeks in the respondents, who are proud of their Western culture and are more individualistic (Abubakar et al., 2016; Fong & Chuang, 2004, p. 281). Similarly, the result of H2 also showed a positive relationship between e-wom and behavioral intention toward automated vehicles ($\beta = 0.706$, $p < 0.000$, $CR = 9.52$). The findings align with previous studies (Subramani & Rajagopalan, 2003; Chatterjee, 2001). The results indicated that ewom is an important factor in influencing consumers to accept AV. Online reviews, blogs, and communities play an important role in the adoption of AV. The association between social influence and behavioral intention is positive ($\beta = 0.105$, $p < 0.015$, $CR = 2.42$). Earlier research by Kettles and Van Belle (2019) in this field supported the results of H3. However, Ahmad, Chaveesuk, and Chaiyasoonthorn (2024) showed an insignificant relationship in the electric vehicle adoption domain. The finding exhibited that suggestions from social groups and celebrities play an important role in adopting AV, and consumers perceived it as a status symbol. H4 showed a positive relationship between facilitating conditions and behavioral intentions ($\beta = 0.337$, $p < 0.000$, $CR = 3.46$). Previous Studies by Zhou et al. (2021) and Peñarroja et al. (2019) supported the results of the current study. The results showed that facilities such as maintenance infrastructure, parking slots, online training, and test drives could lead consumers to adopt AV.

CONCLUSION

Automated vehicles and their features are considered innovative and convenient which offers multiple features to the consumers. These features ensure consumers' safety and security and also feel easy to use while driving. This study is an initial endeavor to identify factors affecting the behavioral intentions toward automated vehicle adaptation based on UTAUT in Pakistan. The results indicated that e-referral, e-wom, social influence, and facilitating conditions have a positive effect on behavioral intentions towards automated vehicles. The results of the study showed that focusing on these factors can lead to positive behavioral intentions. This study was conducted in Pakistan, which is a developing country, where people have low buying power, and automated vehicles are costly for many people. Thus, in the future, researchers should consider other factors such as price value and income. Secondly, this study has not considered the actual use of automated vehicles and also identified awareness as a moderator in the relationship. Lastly, the researcher should conduct this study in other settings.

THEORETICAL AND PRACTICAL IMPLICATION

This study was conducted in the context of the automobile industry and focused on autonomous vehicle adoption. Most consumers are unaware of the benefits of autonomous vehicles, and some do not know how to use them. This study studied four factors: e-referral, e-wom, social influence, and facilitating condition. This study has contributed two more factors to the literature on UTAUT: e-wom and e-referral. Both factors play an essential role in the adoption of automated vehicles, but e-wom was shown to be more effective in this study. The study also tested social influence and facilitating conditions in the AV context in Pakistan. This study contributed to the existing body of knowledge on consumer behavior while adopting new technologies because it has explored the antecedents of behavioral intention towards automated vehicles based on UTAUT. This research study also has implications for managers. The results confirmed the factors which influence behavioral intentions. The manager of the auto industry should consider these factors to build positive consumer behavior and achieve its goal. Managers should use online communication to spread awareness about AV, motivate consumers to do referrals, and share with them about the test drives of AV and the facilities that AV companies are offering in the market. Managers should also engage with consumers through online blogs, pages, and groups and keep sharing content related to AV in order to convince consumers. The manager should hire celebrities and influencers to promote AV adoption in Pakistan.

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Appendix

Social Influence

People who influence my behavior think that I should use an automated vehicle

People who are important to me think I should use an automated vehicle.

In general, society has supported the use of automated vehicles.

Having an automated vehicle is a status symbol in my circle.

Facilitating Condition

The resources necessary to use automated vehicles exist.

I have the knowledge necessary to use automated cars.

Automated vehicle is compatible with other technologies I use.

I can get help from others when I have difficulties using an automated vehicle.

Ewom

I often read other users' online reviews to know what automated vehicle brands make good impressions on others.

To make sure I buy the right brand, I often read other users' online reviews about automated vehicles.

I often consult other users' online reviews to help them choose the right automated vehicle.

I frequently gather information from online users' product reviews before I buy a certain automated vehicle.

If I don't read consumers' online product reviews when I buy an automated vehicle, I worry about my decision.

Consumers' online reviews make me confident in purchasing when I buy an automated vehicle.

E-referral

I often buy automated vehicles referred by my friends, colleagues, and family.

I often buy automated vehicles referred by trusted firms and social network sites.

When I buy an automated vehicle not referred, I worry about my decision.

Online referrals increase my confidence in purchasing an automated vehicle.

Behavior Intentions

I intend to use automated vehicles in the future.

I will always try to use automated vehicles in my daily life.

I predict I will use automated vehicles in the future