User Acceptance of Autonomous Public Transport Systems: Extended UTAUT2 Model

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Abstract

The purpose of this study is to investigate the factors affecting the acceptance and use of autonomous public transport systems (APTS) by potential users. To achieve this, an integrated and expanded user acceptance model is introduced to explain the factors affecting behavioral intention to use APTS. A total of 316 surveys were conducted from 275 participants online and 41 participants by face-to-face interviews. With data acquired from public transportation (PT) users in Istanbul, the unified theory of acceptance and use of technology 2 (UTAUT2) model is modified and performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, habit, trust and safety, perceived usefulness, perceived risk, and behavioral intention constructs are utilized in the model. Age, gender, and frequency of PT usage are included in the model to examine the moderating effect on the constructs while the model is tested with structural equation modeling (SEM). The proposed model explains 72% of the variances in this study, which proves that the model has stronger predictive power compared with the previous technology acceptance model (TAM) and UTAUT model. Performance expectancy, social influence, habit, and trust and safety constructs are concluded to have significant positive effects on behavioral intention. Public usage and acceptance are necessary for the complete

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utilization of APTS. The findings of this study can guide decision makers in the PT industry by helping them understand the factors affecting the use and acceptance of autonomous public transport systems.

Keywords: *Unified theory of acceptance and use of technology, technology acceptance, autonomous vehicle, user acceptance, public transportation*

Introduction

Public transportation (PT) is one of the leading transportation modes in human mobility (APTA 2019; Statista 2019; UITP 2018). When destinations are not in a walkable range, passengers largely rely on public transport (Lam, Leung, and Chu 2016). Therefore, public transportation has a crucial role in urban mobility since it eases traffic congestion and runs more efficiently compared to other transportation modes. There are various types of PT utilized by transportation agencies in urban areas. Buses, trains, vans, taxis, tramways, ferries, and funiculars are among different examples of PT vehicles. These transportation modes have advantages and disadvantages, different capacities, and flexibilities. Nonetheless, none of the PT vehicles can show a high rate of flexibility and efficiency alone. In that sense, autonomous public transport systems (APTS) should provide the advantages of traditional PT and eliminate the disadvantages in order to be accepted and used by passengers (Lam, Leung, and Chu 2016).

Autonomous vehicles (AVs) sense their surrounding environment and navigate and drive themselves without needing any human interference (Nasir and Ozcelik 2017; Zhang et al. 2019). Compared to conventional fully manually controlled vehicles, AVs have numerous advantages. The National Highway Traffic Safety Administration (NHTSA) concluded that more than 90% of accidents are related to human errors (NHTSA 2008). The utlization of AVs can eliminate these human error–induced accidents. Furthermore, AVs are expected to reduce road congestion and fuel emissions through more efficient driving and relatively better routing (Fagnant and Kockelman 2015; Suresh and Manivannan 2014). AVs also save users for driving tasks and enable them to do productive non-driving activities (Clark and Feng 2017; Merat et al. 2012). In addition, when AV users are freed from having to control the vehicle and find a parking place, they can enjoy the travel experience with other activities. These are already among the competitive advantages of autonomous public transport (Pakusch and Bossauer 2017).

There is still a huge difference in the perception of automated driving technologies. Some users are willing to use this technology, while others are strongly against it (Kyriakidis, Happee, and De Winter 2015). However, interest in automated transportation systems has increased rapidly in recent years (Madigan et al. 2016). Vehicle manufacturers have conducted serious studies and plan to invest in driverless vehicle technology, which will ultimately change the future of human mobility. Ford and Toyota launched ventures mainly focused on AV technologies and plan to invest $4 billion and $2.8 billion, respectively, in their R&D studies, while Audi allotted $16 billion for autonomous and electric vehicle research (Winkler et al. 2019). In more than 130 cities, there are preparations for AV technology from policy making to pilot projects, mainly concentrated in the United States, Asia, and Europe (Bloomberg 2020). For example, various US states including California, Michigan, and Florida have approved laws enabling AV use in their transportation systems (Weiner and Smith 2019). On the other hand, it is widely accepted that AVs will not be the mainstream transportation mode globally in the short-run (Benenson et al. 2008; Godoy et al. 2015). The technology has not reached the desired level and it is expected to take some time for it to fully develop.

Even if the advantages of AVs in terms of energy efficiency, environmental impact, and increasing mobility are obvious, the technology will not reach a high usage rate until a wide range of user acceptance is achieved. Despite the increasing interest in self-driving vehicles, user concerns over the technology persist (Howard and Dai 2014). Some studies indicate that intentions to accept AVs are still low and users aren't fully ready to adopt this technology in their daily lives (Abraham et al. 2016; Menon et al. 2016; Schoettle and Sivak 2014). All these concerns vary among groups differing by culture, country, or gender (Schoettle and Sivak 2014). Although user acceptance of AVs is low and will take some time, AVs will inevitably become an important part of mobility.

Previous studies have shown that several factors affect the use and acceptance of public transportation vehicles, including weather conditions, lightning, comfort, and travel time (Delle Site, Filippi, and Giustiniani 2011). Some factors cannot be controlled by PT providers, such as employment levels and income rates (Gomez-Ibanez 1996; Taylor et al. 2003; Thompson and Brown 2006), while others such as pricing, service quality, marketing, and convenience can be controlled by PT providers (Syed and Khan 2001; Taylor and Fink 2003). Various studies have focused on attitudes toward PT and how they affect usage (Murray, Walton, and Thomas 2010), while others have analyzed acceptance and usage of new technologies such as APTS and studied the factors that explain user acceptance of these technologies with various models (Delle Site, Filippi, and Giustiniani 2011; Madigan et al. 2016; Xu et al. 2018).

The utilization of AV technology in public transportaton would benefit different parties of the PT domain. Passenger benefits would include lower accident rates and less travel time, while transportation agencies and companies would avoid driver-related problems when using driverless vehicles. Moreover, automation in PT would enable service providers to use smaller vehicles (Tirachini and Antoniou 2020). These advantages offered by APTS to both transportation agencies and passengers would make PT modes such as bus, metro, and minibus more attractive and very likely increase usage of PT systems (Pakusch and Bossauer 2017).

Although driverless public transport occupies only a small portion of current research and development, fully autonomous buses and trains are already used in PT. In Switzerland, autonomous buses have been operated since 2016 (EPFL 2016), while in Lyon, France (Sustainable Bus 2019) and Michigan, USA (Mcity 2018), autonomous shuttles have been used in public transportation. Driverless rail-bound trains have also been used in various cities, including the Frankfurt Airport Skyline railway shuttles since 1994 (INNOVIA-APM 2019) and driverless subways in Vancouver since 1986 (SkyTrain 2019) and in Singapore since 2003 (MRT 2018; Pakusch and Bossauer 2017). The M5 line of Istanbul, which has been in operation between Üsküdar and Çekmeköy since 2018, has the highest capacity in Europe and the third highest capacity in the world according to the International Public Transport Association (UITP) (Metro Istanbul 2018). However, all these examples operate on a small scale and can be considered as pilot studies. User acceptance is crucial to integrating APTS into traditional public transport as an efficient and effective alternative, and is of great importance for public institutions investing in autonomous systems. Therefore, it is suggested that user acceptance is a prerequisite to allowing new vehicle technologies to achieve predicted benefit levels (Najm et al. 2006).

Turkey's economy has been growing quickly along with an increased demand for public transportation, which is expected to continue increasing (UITP 2017). Istanbul, the largest city in Turkey, experiences more common PT usage compared to other cities and a higher portion of its population prefers PT (Celik et al. 2013). More than 15 million trips are made daily by PT users; 18% of these trips are in railway systems, 4% in maritime transports, while road transportation (buses, minibusses, bus rapid transits, etc.) shares 77% of the total trips (IETT 2019). Users of Istanbul PT systems were the target group for this study. A well-designed model for explaining passenger acceptance of APTS in Istanbul is expected to represent the overall attitude in Turkey and be valid for other metropoles worldwide. The results of this study are also expected to contribute to the implementation of APTS in Istanbul in the near future.

The aim of this study was to introduce an integrated and expanded user acceptance model to explain the factors affecting behavioral intention to use APTS. With the data acquired from the survey conducted of PT users in Istanbul, the unified theory of acceptance and use of technology (Venkatesh, Thong, and Xu 2012) model was modified and performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), hedonic motivation (HM), price value (PV), habit (HT), trust and safety (TS), perceived usefulness (PU), perceived risk (PR), and behavioral intention (BI) constructs were used. Age, gender, and frequency of PT usage were included in the model to examine the moderating effect on the constructs while the model was tested with structural equation modeling (SEM).

Research Gaps and Literature

It is widely accepted that AV technology will enhance safety and improve efficiency of the overall transportation system by increasing its portion in the system. Numerous publications have focused on vehicle automation technology, while studies examining the factors affecting the behavioral intention to use this new technology are more limited. However, to realize the mentioned advantages of AVs, the public must actually use the technology. With the developments in AV technology, the number of studies on the acceptance of driverless vehicles has increased in recent years (Abraham et al. 2016; Choi and Ji 2015; König and Neumayr 2017; Krueger, Rashidi, and Rose 2016; Kyriakidis, Happee, and De Winter 2015; Madigan et al. 2016; Zhang et al. 2019; Zmud, Sener, and Wagner 2016). These studies mainly focus on analyzing the driving factors involved in accepting AVs, while studies investigating the behavioral intentions to use APTS are rarely seen in the literature (Delle Site et al. 2011; Madigan et al. 2016; Madigan et al. 2017). Considering that in the near future AV technology will likely be utilized in PT as well as private vehicles, focusing on these behavioral intentions is a timely topic.

Researchers have developed a number of models that explain user preferences toward new technologies. The technology acceptance model (TAM), unified theory of acceptance and use of technology (UTAUT) model, and UTAUT2 are among the most commonly used models. TAM employs two main constructs—perceived usefulness and perceived ease of use—to analyze acceptance through their effect on the behavioral intention to use the technology. Davis (1989) introduced this model to explain human behaviors in computer usage. Venkatesh et al. (2003) incorporated several user acceptance models and proposed the UTAUT model, which is mainly based on TAM. UTAUT has been generally used for technology acceptance studies in information systems (Khalilzadeh, Ozturk, and Bilgihan 2017; Zhou, Lu, and Wang, 2010). Adell (2010) used the UTAUT model in a driving context, but it could not achieve a high level for explained variance in behavioral intention. Therefore it can be concluded that TAM and UTAUT are more suitable for computer acceptance and information technology studies (Shin 2009). The UTAUT2 model has added three constructs (hedonic motivation, habit, and price value) to the UTAUT model. Venkatesh, Thong, and Xu (2012) claimed that the UTAUT2 model gives a higher performance rate than the UTAUT model. UTAUT2 is the most recent version and gives a more comprehensive frame for consumer-oriented studies.

There have been various studies on the acceptance of autonomous vehicle technology utilizing the different technology acceptance models. Adell (2010) used the UTAUT model to investigate a driver support system and accounted for only 22% of variances. Choi and Ji (2015) developed a model based on TAM and trust theory for users' intention to use autonomous vehicles with 67.6% explanatory power. Madigan et al. (2017) employed an adapted version of UTAUT to successfully predict the behavioral intention toward automated transport systems accounting 58.6% variance. Zhang et al. (2019) proposed a TAM-based model to explore the factors affecting user acceptance of automated vehicles with a 61% percent explanatory rate.

In this study, UTAUT2 was integrated with previous models and trust and safety, perceived usefulness, and perceived risk constructs were included. All these constructs were used to examine their effect on behavioral intention. For their moderating effects, age, gender, and frequency of PT usage were also included. The purpose of including the related constructs was to develop a more comprehensive technology acceptance model for APTS usage. By extending the UTAUT2 model, the explanatory power of the proposed model was expected to be higher than previous models.

Theoretical Background

Acceptance Models and Their Variations

For many years, researchers (Davis 1985; Legris, Ingham, and Collerette 2003; Venkatesh et al. 2003) have used human behavior theories to analyze users' desire to adopt technology. In prior studies, the theory of planned behavior (TPB) (Ajzen 1991), TAM (Davis 1985; Davis 1989), and UTAUT (Venkatesh et al. 2003) have been among the most frequently applied models for analyzing user acceptance. While TAM and UTAUT are mainly used to reveal the level of technology acceptance, TPB is generally employed to understand human behaviors (Rahman et al. 2017). These theories explore various constructs that shape behavioral intention and actual behavior to use the technology and finally push users to accept the technology.

The technology acceptance model developed by Davis (1989) is one of the most used models for studying technology acceptance. Based on the theory of reasoned action (TRA) (Fishbein and Ajzen 1975), it examines individual intentions. The main constructs of TAM include attitude toward behavior and perceived usefulness for behavioral intention. The model claims that there is a positive relationship between intention to use technology and perceived usefulness. There is a high probability that users who have a positive perception of a technology’s usefulness will eventually use that technology. Attitude toward behavior is defined as the emotional status of a person toward a certain technology

(Fishbein and Ajzen 1975). TAM asserts that the attitude toward behavior is affected by user thoughts on perceived ease of use and perceived usefulness. There is another version of TAM that does not consider attitude as an effective construct while suggesting that perceived usefulness and perceived ease of use affect behavioral intention in a positive and direct way (Davis 1989). Perceived usefulness mediates the effect of perceived ease of use in both TAM versions.

Venkatesh et al. (2003) proposed UTAUT synthesizing of previous technology acceptance studies to introduce a model predicting technology acceptance in different environments (Andreas 2012). The UTAUT model combined the main constructs of previous models ranging from human behaviors to computer science (Khalilzadeh, Ozturk, and Bilgihan 2017). These previous models included TRA (Fishbein and Ajzen 1975), TAM (Davis 1989), the model of PC utilization (MPCU) (Thompson, Higgins, and Howell 1991), TPB (Ajzen 1991), the motivational model (Davis, Bagozzi, and Warshaw 1992), combined TAM and TPB (Taylor and Todd 1995), social cognitive theory (Compeau, Higgins, and Huff 1999), and innovation diffusion theory (Moore and Benbasat 1991).

The UTAUT model has four main constructs to explain technology acceptance and use of technology: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al. 2003). Performance expectancy measures the benefits derived from usage of the studied technology. Effort expectancy captures the ease or difficulty related to usage of the technology. Social influence evaluates how usage of a technology by family and close friends affects the user's acceptance of it (Zmud, Sener, and Wagner 2016). Facilitation conditions are defined as the level of a technical infrastructure that supports and eases usage of the technology (Brown and Venkatesh 2005; Venkatesh et al. 2003). According to the UTAUT model, while behavioral intention and facilitation conditions affect technology usage, performance expectancy, effort expectancy, and social influence form the behavioral intention to use the technology. In addition, age, gender, experience, and voluntariness are used for their moderating effect on the UTAUT model (Venkatesh et al. 2003).

Since the decision to accept a technology mainly depends on the user's own expectations and evaluation, it is an outcome of a personal process. Therefore, users' attitudes toward the technology, the effects of utilizing it, and especially his or her experiences of the technology while using it determine acceptance, making acceptance a personal decision (Schade and Baum 2007). However, since this study investigated the use and acceptance of APTS and similar systems that are not in use but will potentially be in the future, it was not possible for participants to experience them. For this reason, the study used the frequency of public transportation usage instead of the experience moderator.

An extension of the UTAUT model, UTAUT2 also has four main factors but includes three extra constructs: hedonic motivation, price value, and habit. The joy and pleasure users feel while using new technology is described as hedonic motivation in UTAUT2. Some scientific studies have shown that hedonic motivation has a significant role in the acceptance and usage of technology (Brown and Venkatesh 2005; Seuwou et al. 2016), although its effect on user acceptance of vehicle automation has rarely been explored (Madigan et al. 2017). However, in technology acceptance studies across various sectors, hedonic motivation has been concluded to be one of the strongest predictors of user acceptance (Venkatesh, Thong, and Xu 2012).

Cost is widely accepted as an important factor affecting the acceptance and usage of technology; therefore pricing should be carefully analyzed by decision makers before implementing the technology. For example, short messaging services (SMS) have gained greater popularity than other applications through low pricing in Hong Kong (Chan et al. 2008). Price value, especially in acceptance of APTS, might be an important construct as users must undertake service expenses. In this study, the price value construct was added to measure perceptions of potential APTS users who currently ride conventional buses but have not yet ridden in a driverless bus (Azad et al. 2019) and to explain behavioral intention.

In UTAUT and similar models, intentionality is a critical mechanism that shapes behavior. Most researchers, even those who do not advocate the model, have argued that it is important to include additional theoretical mechanisms. For technologies used in daily activities, habit is a crucial construct that predicts usage (Kim and Malhotra 2005; Kim, Malhotra, and Narasimhan 2005; Limayem, Hirt, and Cheung 2007). Since PT is used routinely, the habit construct might have a significant part in explaining behavioral intention to use PT technology.

With these additional constructs, the UTAUT2 model outperforms UTAUT in the variance explained in behavioral intention and technology use (Venkatesh, Thong, and Xu 2012). The demographic characteristics of UTAUT, excluding voluntariness, are utilized for their moderating effects in UTAUT2.

UTAUT2 Model Expansion

The theory of reasoned action, theory of planned behavior, and technology acceptance model are widely known and frequently used models. However, the authors accepted UTAUT2 as most effective for this study and believed that with proper modifications, it would better explain acceptance and usage behavior of APTS. Therefore, trust and safety, perceived risk, and perceived usefulness constructs were added to the existing constructs of the UTAUT2 model.

Perceived risk and trust and safety are becoming critical constructs, particularly as they relate to future research on APTS and its technologies. Perceived risk is based on the possibility of a negative incident occurring (Numan 1998). In several studies (Mayer, Davis, and Schoorman 1995; Mitchell 1999), perceived risk stands for perceived uncertainty in a particular situation. Survey researches have coherently claimed that perceived risk is one of the most common causes of not adopting AVs (Menon et al. 2016; Zmud, Sener, and Wagner 2016). Perceived risk is associated with trust and safety, particularly in the decision to use or not use autonomous systems (Numan 1998; Pavlou 2003). The findings of Numan (1998) and Pavlou (2003) confirm the effect of trust on autonomous systems (Choi and Ji 2015). According to Pavlou, trust reduces perceived risk. Considering all these results, perceived risk and trust and safety are important constructs in measuring user acceptance and behavioral intention toward APTS.

A survey in the United Kingdom has shown that rail travel may increase by 10.5% when the fears of PT users are considered and evaluated (Delbosc and Currie 2012). Since autonomous vehicle technologies are new and not easily trusted (Salonen 2018), concerns related to trust and safety are more important for acceptance of APTS than other transportation modes. Therefore, trust and safety of users should be considered in the design, planning, operation, and management of APTS (Atkins 1990). Kumar, Kulkarni, and Parida (2011) state that integrated security and safety should be provided to promote the use of multimodal and intelligent PT.

Performance expectancy is the level of performance that a person thinks he/she attains by utilizing the system. Perceived usefulness in different models (TAM/TAM2 and C-TAM-TPB) pertains to performance expectancy (Venkatesh et al. 2003). Even if constructs and their items vary in previous studies, some authors emphasize the similarities between them. Davis et al. (1989, 1992) emphasize the similarity between usefulness and performance expectancy constructs and because of this similarity, some items under performance expectancy are categorized under perceived usefulness. This was also supported by the results of explanatory factor analysis (EFA) in this study.

These determinants, moderators, and constructs were used to extend UTAUT2. The modified UTAUT2 model was expected to give higher performance in explaining APTS acceptance and potential user behavior.

Method

Study Objectives

Modeling the use and acceptance of APTS and AV technologies is essential to explaining how user adoption of the systems is affected by various constructs. This research aimed to provide an integrated technology acceptance model that analyzed the factors of APTS usage and acceptance. In the literature, TAM, UTAUT, and UTAUT2 models are suggested for explaining user acceptance of new systems in terms of eventual use and behavioral intention (Rahman et al. 2017). Although these models introduce a theoretical framework for technology acceptance studies, they are limited in modeling the use and acceptance of APTS. In this study, behavioral intention was used only as a measure of acceptance. This research examined the factors proposed in other models and their relationships with each other in the context of APTS use and acceptance.

Instruments

The research model (Figure 1) consists of 11 named variables: performance expectancy, perceived usefulness, habit, social influence, price value, facilitating conditions, hedonic motivation, effort expectancy, trust and safety, behavioral intention, and perceived risk. These constructs were measured by at least three scale items. Some of these items were adapted from previous related researches, while others were introduced as new measurement items. The latent variables were measured on a five-point Likert scale with multiple items. In each item, "1” corresponds to strongly disagree and “5” corresponds to strongly agree. Appendix A contains the full questionnaire answered by the participants with the respective literature.

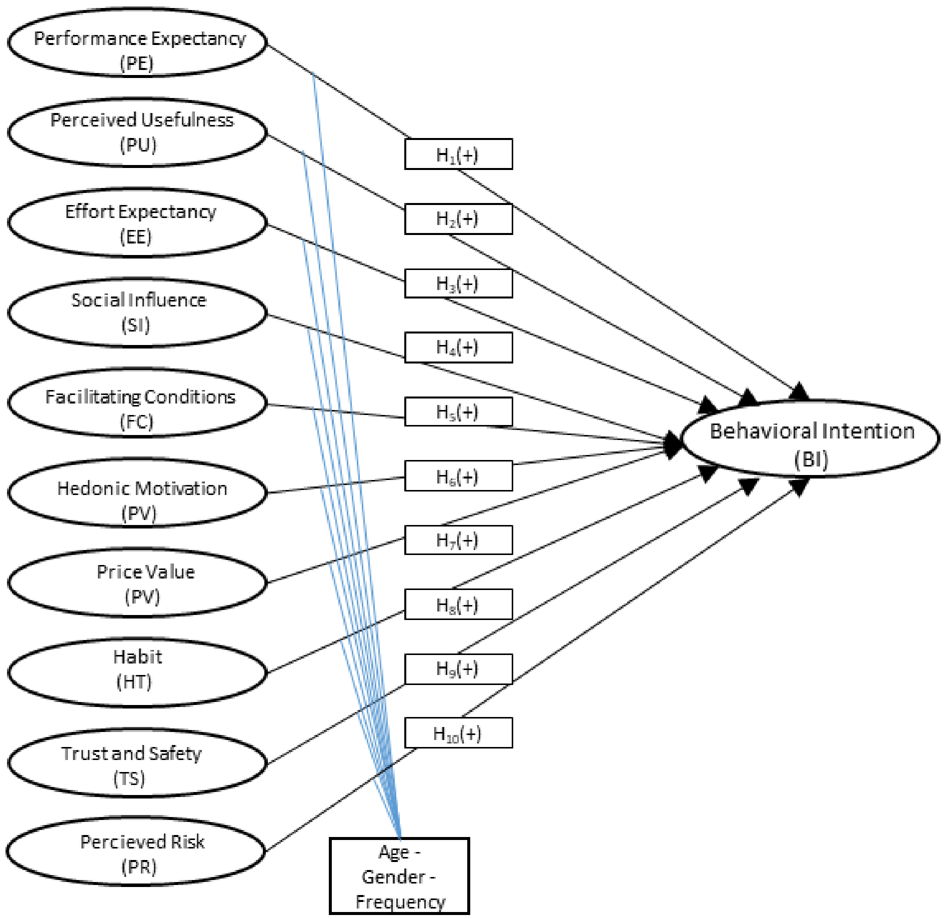

FIGURE 1. *The research model*

In the research model, the influence of constructs on behavioral intention was tested by the hypotheses H_i. The hypotheses claimed that related constructs had a positive and significant influence on behavioral intention (BI) to use APTS.

Participants and Procedures

Within the scope of this study, both online surveys conducted on Google Forms and paper-based surveys were used for data collection. Online answers were obtained from 275 participants and 41 questionnaires were obtained through face-to-face interviews, for a total of 316 participants. The aim of this study was to reach PT users, especially in Istanbul.

There is no missing value in the dataset, although unengaged responses were detected resulting in the removal of 13 cases. Thus, the study was conducted with data obtained from 303 participants. Table 1 gives the descriptive statistics for the obtained data.

TABLE 1. *Descriptive Statistics*

Variable	Level	N	(%)	Variable	Level	N	(%)
Gender	Female	123	40.59	Personal Income* (monthly)	< $333	108	35.64
	Male	180	59.41		$333 - $833	113	37.29
Age	18-24	82	27.06		$833- $1,333	63	20.79
	25-34	159	52.48		$1,333 - $1,833	11	3.63
	35+	62	20.46		$1,833 - $2,833	4	1.32
Frequency	A few times in a week	200	66.01		$2,833 - $3,333	1	0.33
	A few times in a month	55	18.15		$3,333 <	3	0.99
	A few times in a year	48	15.84	Working Status	Public employee	98	32.34
Marital Status	Married	118	38.94		Private sector employee	71	23.43
	Single	185	61.06		Self-employed	17	5.61
Having Child	Yes	118	38.94		Part-time	8	2.64
	No	185	61.06		Retired	5	1.65
Education	PhD	28	9.24		Housewife	7	2.31
	Master	59	19.47		Student	73	24.09
	Undergraduate	154	50.83		Unemployed	19	6.27
	Two-year degree	21	6.93		Others	5	1.65
	High school	37	12.21	Transportation Type	Metrobus	60	19.80
	Elementary school	4	1.32		Metro	62	20.46
Transportation Spending* (monthly)	< $12	126	41.58		Tramway	20	6.60
	$12 - $17	74	24.42		Bus	91	30.03
	$17 - $23	36	11.88		Shuttle	62	20.46
	$23- $33	22	7.26		Non-use	8	2.64
	$33 <	45	14.85				

** Indicative Exchange Rates Announced at 15:30 on 02/10/2020 by the Central Bank of Turkey Dollars-Turkish Liras: TL 6.00*

For statistical analysis, SPSS 22.0 software was used, and for SEM analysis, Gaskin's plugins and Statistics Tools Package Excel worksheet were utilized together with AMOS 24.0 (Gaskin 2016a; Gaskin 2016b). The results were analyzed in three stages. First, EFA was performed to test whether the items were loaded to the correct factors. Second, confirmatory factor analysis (CFA) was used to test the measurement model's reliability, convergent validity, and discriminant validity. Finally, the hypotheses of this model were tested with path analysis in the structural model. To test the hypotheses, the covariance-based structural equation model (CB-SEM), which is a technique to analyze the relationships between observed and latent variables, was utilized (Hair et al. 2010).

Results

Assumptions Check

Before beginning the analysis, the SEM assumptions had to be checked: missing values, outliers, and normality were checked for all variables. No missing values or outliers were detected in the dataset. The normality check revealed that the normal distribution of the data was achieved and skewness and kurtosis values did not exceed the tolerance range between -2 and +2 (George and Mallery 2011).

Multicollinearity between the variables is undesirable. After running multivariate regression, we had a variable inflation factor (VIF) for each independent variable. The VIF values of constructs, except for trust and safety (3.118), were below the desired level of <3 (O'Brien 2007). Also, the tolerance value of the trust and safety construct was higher than 0.2. Therefore, it was concluded there were no multicollinearity issues.

After the assumptions check, EFA was performed because the proposed model was an integrated and expanded version of UTAUT2 (Venkatesh, Thong, and Xu 2012). To ensure that the constructs in the proposed model were distinct, EFA was conducted using principle component analyses and oblimin rotation (Costello and Osborne 2005).

The results of the Kaiser-Meyer-Olkin (KMO) test were high with a value of 0.927, indicating that sampling adequacy was achieved, and Bartlett's test results were also significant. As a result of EFA analysis, the variables were loaded on 11 factors and explained 77.11% of the total variance.

Measurement Model

Before starting the tests of the structural model, the measurement model had to be evaluated. Discriminant validity, convergent validity, and internal consistency tests were carried out to develop the measurement model (Barclay, Higgins, and Thompson, 1995). The dataset in SEM satisfied the assumptions. After all the assumptions were met, the measurement model was developed. To provide the model fit, items with weak loadings had to be dropped. According to Chin (1998), items with a loading lower than 0.5 should be removed from the model; therefore four items—PV3, PR1, SI4, and HT4—were dropped from the measurement model. The model fit and validity were achieved by removing these items.

Table 2 shows CFA results. All the loadings were significant at the 0.001 (α) level. The item HM3 has the smallest factor loading value of 0.566. To ensure convergent validity, a minimum factor loading of 0.50 (Hair et al. 2010) is required. All items were observed to have factor loadings larger than 0.50, thus convergent validity of the model was achieved.

TABLE 2. *Convergent Validity and Reliability*

Construct	**Item Code**	**M**	**SD**	**Loading**	**t value**	**Cronbach's Alpha**	**CR**
Performance Expectancy	PE1	3.820	1.133	0.857	9.798	0.761	0.892
	PE2	3.848	1.125	0.934	10.658		
	PE3	3.690	1.173	0.772	-		
Perceived Usefulness	PU1	3.665	1.164	0.810	16.165	0.907	0.896
	PU2	3.832	1.144	0.918	18.866		
	PU3	3.744	1.166	0.820	-		
	PU4	3.734	1.171	0.749	21.913		
Effort Expectancy	EE1	3.826	1.074	0.837	16.557	0.885	0.886
	EE2	3.829	1.091	0.889	17.628		
	EE3	3.896	1.047	0.822	-		
Social Influence	SI1	3.215	1.173	0.693	11.876	0.741	0.785
	SI2	3.899	1.194	0.659	11.185		
	SI3	3.646	1.174	0.864	-		
Facilitating Conditions	FC1	3.114	1.347	0.947	12.204	0.808	0.893
	FC2	3.028	1.381	0.675	9.405		
	FC3	3.525	1.191	0.931	-		
Hedonic Motivation	HM1	3.712	1.263	0.962	14.614	0.895	0.909
	HM2	3.712	1.288	0.980	14.713		
	HM3	3.956	1.115	0.661	-		
Price Value	PV1	3.187	1.401	0.630	9.888	0.727	0.763
	PV2	3.772	1.146	0.924	-		
Habit	HT1	3.383	1.222	0.986	8.586	0.848	0.787
	HT2	2.737	1.313	0.640	11.853		
	HT3	2.665	1.339	0.566	-		
Trust and Safety	TS1	3.481	1.183	0.941	31.296	0.946	0.949
	TS2	3.465	1.207	0.935	30.892		
	TS3	3.513	1.183	0.939	-		
	TS4	3.737	1.241	0.875	25.112		
	TS5	3.509	1.236	0.739	17.108		
Behavioral Intention	BI1	3.782	1.160	0.820	18.821	0.901	0.903
	BI2	3.953	1.133	0.855	20.186		
	BI3	3.541	1.212	0.898	-		
	BI4	4.177	1.063	0.769	14.461		
Percieved Risk	PR2	3.076	1.224	0.807	9.725	0.832	0.834
	PR3	3.016	1.186	0.883	-		

M = Mean, SD = Standard Deviation, Loading = Factor Loading, CR = Composite Reliability

The Cronbach's alpha and composite reliability (CR) tests were used for the reliability analysis of the model. Cronbach's alpha is utilized to validate internal consistency, and its value should be 0.7 or higher (Barclay, Higgins, and Thompson 1995). The minimum Cronbach's alpha value was 0.727 and the minimum CR value was 0.763. The CR values should be higher than 0.7 (Barclay, Higgins, and Thompson

1995). The high CR value, which is a more important indicator for the measurement model's reliability, and the high Cronbach's alpha value proved that the measurement model has high reliability.

The maximum shared variance (MSV) of latent variables in the measurement model should be smaller than the average variance extracted (AVE) (Hairet al. 2010). In this model, all MSVs were smaller than AVEs, indicating no cross-loading among these factors. When the values in Table 2 and Table 3 were examined, it was concluded that the discriminant validity, convergent validity, and reliability tests of the dataset were achieved.

TABLE 3. *Correlation Matrix and Discriminant Validity*

	MSV	Max R(H)	AVE	PE	PU	EE	SI	FC	HM	PV	HT	TS	BI	PR
PE	0.488	0.917	0.734	0.857										
PU	0.542	0.914	0.683	0.661***	0.826									
EE	0.376	0.891	0.722	0.555***	0.567***	0.850								
SI	0.468	0.822	0.553	0.594***	0.599***	0.578***	0.744							
FC	0.290	0.942	0.740	0.539***	0.408***	0.445***	0.488***	0.860						
HM	0.400	0.974	0.774	0.575***	0.619***	0.481***	0.548***	0.383***	0.880					
PV	0.409	0.867	0.626	0.640***	0.568***	0.503***	0.614***	0.467***	0.497***	0.791				
HT	0.481	0.973	0.567	0.583***	0.577***	0.492***	0.593***	0.393***	0.581***	0.603***	0.753			
TS	0.595	0.964	0.791	0.673***	0.736***	0.613***	0.616***	0.413***	0.633***	0.615***	0.656***	0.889		
BI	0.595	0.912	0.700	0.699***	0.658***	0.573***	0.684***	0.486***	0.619***	0.604***	0.694***	0.771***	0.837	
PR	0.240	0.844	0.715	-0.399***	-0.343***	-0.324***	-0.271***	-0.247***	-0.334***	-0.288***	-0.351***	-0.490***	-0.372***	0.846

MSV = Maximum Shared Variance, AVE = Average Variance Extracted
Square root of AVE = Values on diagonal

After achieving acceptable convergent and discriminant validity results, the goodness of fit was examined for the CFA model. When the model fit indices and reference values given in Table 4 were examined, model fit of all fit indices was good: CMIN/DF = 2.218; GFI = 0.838; AGFI = 0.793; CFU = 0.932; NFI = 0.884; TLI = 0.918; RMSEA = 0.064; SRMR = 0.067 except for GFI and NFI (small difference). The Hoelter index showing the number of samples required to test a model is 151; the number of samples in this study is higher than this figure.

TABLE 4. *Model Fit Measures (Recommended Values) (Hair et al. 2010; Zhou, Lu, and Wang 2010)*

Fit Index	CMIN/DF = x^2/df	GFI	AGFI	CFI	NFI	TLI	PNFI	RMSEA	SRMR	PCLOSE	HOELTER 0.05
Recommended	1 < x2/df < 3	>0.90	>0.80	>0.90	>0.90	>0.90	-	<0.08	<0.08	>0.05	-
Model Fit Indices	2.218	0.838	0.793	0.932	0.884	0.918	0.731	0.064	0.067	0	151

X^2/df = ratio of chi-square to degrees of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, CFI = comparative fit index, NFI = normed fit index, NNFI = non-normed fit index, TLI = Tucker Lewis index, PNFI =parsimony fit indices, RMSEA = root mean square error of approximation, SRMR = standardized root mean square residual

Structure Model (Path Analysis)

Relationships between the constructs in the proposed model were hypothesized and shown in the structural model (Figure 2). The path coefficients and their related t-values were calculated by using path analysis (Choi and Ji 2015).

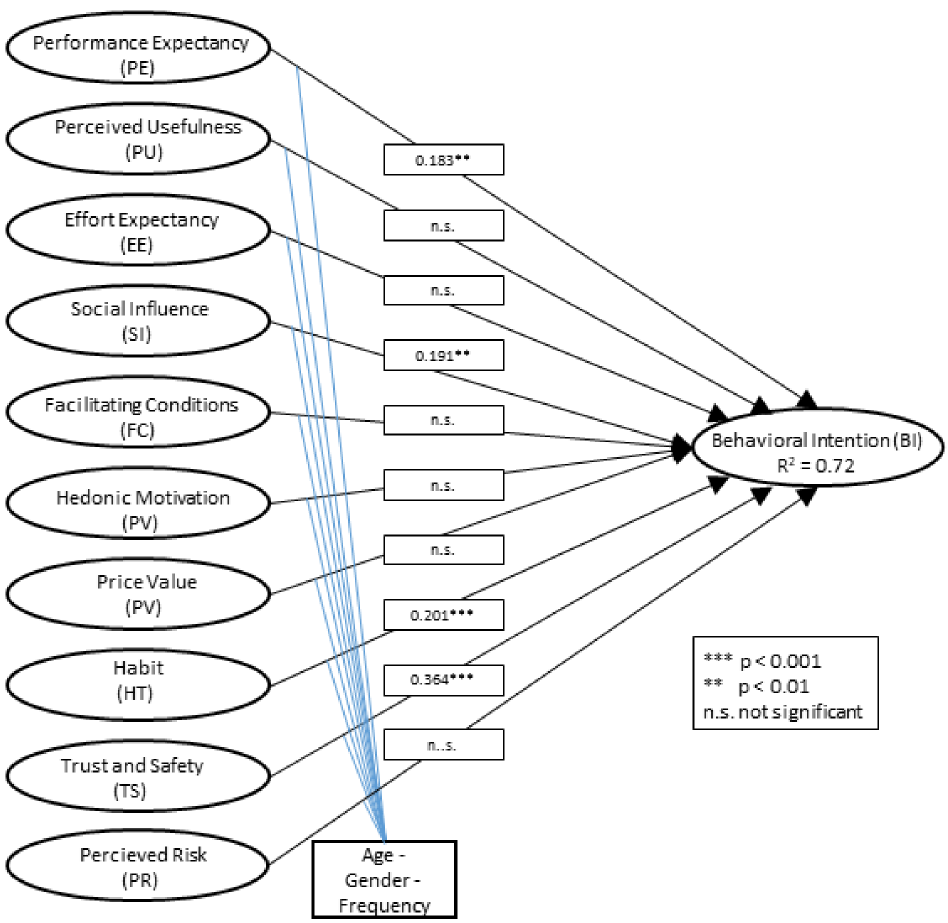

FIGURE 2. *Structural model results*

Table 5 shows the results of the hypotheses tests: H1, H4, H8, and H9 hypotheses are supported and the others (H2, H3, H5, H6, H7, and H10) are not supported. Analysis results revealed significant and positive effects of latent variables—social influence, performance expectancy, habit, and perceived risk—on behavioral intention.

The square multiple correlation (SMC) is a calculated value for the latent constructs of the measurement model. This coefficient, known as R^2 and ranging from 0 to 1, indicates the level of predictive accuracy and descriptive power of a model. The SMC value for behavioral intention was calculated as 0.72, meaning that exogenous variables in the proposed model explain a significant portion of the variance of the endogenous variable.

TABLE 5. *Structural Model Results*

	Hypotheses	Path	Beta	t -value	P	Decision
H_1	Performance expectancy (PE) has a positive and significant influence on behavioral intention (BI) to use APTS.	PE > BI	0.183	3.089	**	Supported
H_2	Perceived usefulness (EU) has a positive and significant influence on behavioral intention (BI) to use APTS.	EU > BI	-0.002	-0.036	0.971	Not Supported
H_3	Effort expectancy (EE) has a positive and significant influence on behavioral intention (BI) to use APTS.	EE > BI	0.009	0.166	0.868	Not Supported
H_4	Social influence (SI) has a positive and significant influence on behavioral intention (BI) to use APTS.	SI > BI	0.191	2.92	**	Supported
H_5	Facilitating conditions (FC) have a positive and significant influence on behavioral intention (BI) to use APTS.	FC > BI	0.059	1.537	0.124	Not Supported
H_6	Hedonic motivation (HM) has a positive and significant influence on behavioral intention (BI) to use APTS.	HM > BI	0.06	1.153	0.249	Not Supported
H_7	Price value (PV) has a positive and significant influence on behavioral intention (BI) to use APTS.	PV > BI	-0.027	-0.442	0.659	Not Supported
H_8	Habit (HT) has a positive and significant influence on behavioral intention (BI) to use APTS.	HT > BI	0.201	3.3	***	Supported
H_9	Trust and safety (TS) have a positive and significant influence on behavioral intention (BI) to use APTS.	TS > BI	0.364	4.961	***	Supported
H_{10}	Perceived risk (PR) has a direct positive impact on behavioral intention (BI) in using APTS.	PR > BI	0.031	0.664	0.507	Not Supported

*Significance of Correlations: † p < 0.100 * p < 0.050 ** p < 0.010 *** p < 0.001*
H_{11} – Age is used as a moderator for the relationships between the constructs.
H_{12} – Frequency is used as a moderator for the relationships between the constructs.
H_{13} – Gender is used as a moderator for the relationships between the constructs.

When the multigroup moderation effects hypotheses are examined with respect to the results in Table 6, the hypotheses H11, H12, and H13 appear to be partially supported. There are two paths (HM, TS) in which the effects on behavioral intention differ significantly by gender. Six out of 10 paths are significantly different among different age groups, while in 7 out of 10 paths there are significant differences between correspondents with different public transportation usage frequencies.

TABLE 6. *Multigroup Moderation Effects*

	Age				**Frequency**				**Gender**			
	18-24[a]	**25-34[b]**	**35<[c]**	**Pairwise**	**Week[a]**	**Month[b]**	**Year[c]**	**Pairwise**	**Female**	**Male**	**Δ (Z-score)**	**Interpretation**
PE → BI	0.319†	0.366***	0.008	a† >b***	0.272**	-0.728	0.144	-	0.206†	0.188*	-0.464	No difference
PU → BI	0.007	0.001	-0.403	-	-0.013	2.95	-0.394	-	0.092	-0.124	-1.521	No difference
EE → BI	0.455*	-0.1	-0.295	-	0.055	0.828	-0.613*	-	-0.02	0.076	0.811	No difference
SI → BI	0.547***	-0.019	1.023	-	0.168*	0.664	0.88	-	0.167†	0.158†	-0.079	No difference
FC → BI	0.013	0.128*	0.116	-	0.100†	-2.652	0.019	-	0.109†	0.111†	0.015	No difference
HM → BI	0.057	0.06	-0.157	-	0.157*	1.138	-0.272	-	0.167†	-0.017	-1.42	Positive relationship only significant for Female
PV → BI	-0.365	-0.003	-0.052	-	-0.136	3.732	-0.019	-	-0.148	0.005	0.985	No difference
HT → BI	0.143	0.336**	-0.023	-	0.168*	-3.007	0.448*	a* >c*	0.247*	0.184*	-1.138	No difference
TS → BI	0.026	0.253**	0.724*	b** >c*	0.264**	-2.00	0.578**	a**>c**	0.176	0.476***	2.522**	Positive relationship only significant for Male
PR → BI	0.172	0.038	0.119	-	0.037	-0.235	0.135	-	-0.07	0.073	1.563	No difference

*Significance Indicators: † p < 0.100 * p < 0.050 ** p < 0.010 *** p < 0.001*
Since "Age" and "Frequency" variables have three categories, z-values are not shown in the table. Instead, comparisons of significant categories are expressed in letters in the "Pairwise" column.

Discussion

Conclusions

While a relatively high number of researchers have studied the acceptance of private vehicle automation (Adell 2010; Kyriakidis, Happee, and De Winter 2015; Roberts, Ghazizadeh, and Lee 2012; Schoettle and Sivak 2014), only a few have investigated the behavioral intentions to use APTS. Some studies focused on the attitudes toward autonomous buses (Alessandrini et al. 2014; Madigan et al. 2016; Piao et al. 2016; Madigan et al. 2017; Nordhoff et al. 2017; Portouli et al. 2017; Nordhoff et al. 2018; Salonen 2018; Wintersberger, Frison, and Riener 2018; Dong, DiScenna, and Guerra 2019) and concluded that potential users mostly have a positive perception. The experience of actually riding in an autonomous bus or living in an environment where autonomous buses operate also improved perceptions and user acceptance of APTS (Alessandrini et al. 2016; Eden et al. 2017; Wintersberger, Frison, and Riener 2018).

This research investigated the constructs that affect the acceptance and usage of APTS. The UTAUT2 model was integrated with similar models and trust and safety (TS), perceived usefulness (PU), and perceived risk (PR) constructs were included to examine their effect on behavioral intention (BI). Age, gender, and frequency of PT usage were collected through surveys and their moderating effects were analyzed.

The extended UTAUT2 model explains 72% of variances in this study, proving that the proposed model has high predictive power compared with previous TAM and UTAUT models developed for autonomous vehicle technologies. The explained rates of the variances in studies by Adell (2010) and Madigan et al. (2016) are around 20% percent, while Madigan et al. (2017) and Zhang et al. (2019) reached an explanatory power around 60% percent in their models. Compared to the models developed for computer acceptance and information technology studies, which account for over 70% of the variance (Baptista and Oliveira 2015; Rahman et al. 2017), these figures were quite low and needed improvement. The proposed model in this study outperformed these models.

According to the research results, social influence, performance expectancy, habit, and trust and safety constructs have a positive and significant effect on behavioral intention to use APTS. On the other hand, no evidence was found to support the same relation between behavioral intention and other constructs. Therefore, facilitating conditions, effort expectancy, price value, hedonic motivation, perceived usefulness, and perceived risk do not have a positive and significant effect on behavioral intention to use APTS.

Parallel to the results of this study, Adell (2010) and Rahman et al. (2017) also claimed a significant effect of performance expectancy on behavioral intention. In fact, in the study by Rahman et al. (2017), the strongest predictor of behavioral intention was performance expectancy. Because performance expectancy questions the expectancy of potential APTS users for its performance and future position in public transportation systems, a relation between performance expectancy and behavioral intention was expected.

Similar to the results of the meta-analysis by King and He (2006), the effect of perceived usefulness on behavioral intention was weak in the study by Choi and Ji (2015). Also in this study's model, a significant and positive relation between perceived usefulness and behavioral intention could not be supported. Choi and Ji (2015) claimed that the intention to use autonomous vehicles depends on the usefulness of the technology rather than how easy it is to use. Users might expect APTS to be user-friendly and think that one of the technology's main goals is to make transportation systems easier to use.

In this study, effort expectancy did not reach a required significance level in effecting behavioral intention to use APTS. Similarly, Adell (2010) suggested that in the vehicle automation context there is no significant relationship between effort expectancy and behavioral intention. Public transportation users are passengers who mostly consider the trip experience. They might not be concerned about how the vehicle is driven. In that sense, APTS is no different from conventional PT for passengers. Therefore, they do not consider the effort for APTS usage as a deciding factor (Madigan et al. 2017). Users do consider the effort for IT/mobile technologies more, and there is a significant relationship between effort expectancy and behavioral intention since they require a continuous effort (Carlsson et al. 2006; Venkatesh, Thong, and Xu 2012).

As in previous studies (Schade and Schlag 2003; Madigan et al. 2017), social influence stands as a significant factor effecting behavioral intention to use APTS. This indicates that the opinion of people in a user's social network about a new technology directly affects the user's attitude toward it and therefore his/her intention to accept and use the technology. Madigan et al. (2017) suggested that generating social norms is necessary for the acceptance of automated vehicle technologies in PT systems. These findings support that users tend to use new technologies in their daily lives if they observe them being accepted and used in their social environment. Transportation agencies should therefore focus on this issue and try to spread the prevalence of AV technology so it is accepted by users.

Thorngate (1976) and others have argued the possibility that basic reactions to many situations related to continued technology usage are not primarily determined by user intentions, but rather are the result of habit. Since the transportation needs of people are daily, it is expected that users will link a new technology in transportation to their habits. The important role of habit in influencing technology use is supported in this model. The findings of this study are also compatible with the results of Venkatesh, Thong, and Xu (2012).

The trust and safety construct has the highest impact on behavioral Intention to use APTS. Choi and Ji (2015) stated that the relationship between trust and the risk perceived by users is negative. These results are consistent with those of previous researches in information technologies (Carter and Bélanger 2005; Gefen, Karahanna, and Straub 2003; Lee and See, 2004; Parasuraman, Sheridan, and Wickens 2008; Pavlou 2003). Driverless vehicle technology generates some safety concerns since users are still uncomfortable letting an autonomous system take full responsibility and control of the vehicle. According to Dong et al. (2019), many will use automated public transportation systems as long as a transit employee is onboard. Therefore, one of the most important challenges for mobility providers might not be developing the technology, but rather gaining the trust of users and assuring them about the safety of driverless vehicle technology.

Limitations and Future Research

This study is subject to some limitations. First, the participants were not perfectly controlled, primarily consisting of young people. Most participants were between the ages of 25 and 34. According to the report by Clark (2017), this age group accounts for the largest portion of transit passengers. However, the age distribution of the participants in this study is much more skewed and not balanced. The findings should therefore be carefully analyzed for different age groups. Second, the data collected from the participants represent only one country. Public transit usage characteristics could be different in different countries. Further studies are needed to validate the applicability of the proposed model in different cultures.

Currently, perception of AV technology is limited to self-driving cars. However, different AV types might be developed for PT. Autonomous metros have already been in use for several years. The public's opinion about this technology could vary from one type of AV application to another. Further research examining AV technology could differentiate these types and analyze them separately.

Considering the rapid increase in the investments and developments of AV technologies in recent years, it is expected that AVs will dominate an important part of the transportation system in the near future. Since public transportation is more likely to utilize this technology than private transportation, system operators and transit agencies should understand the driving and inhibiting factors that affect the acceptance and use of APTS, and design systems accordingly before their implementation.

Appendix A. The Survey Instrument

Constructs	Code	Modified items			Source (Modified from)
Performance Expectancy			(Venkatesh et al., 2003)	(Adell, 2010)	(Madigan et al., 2017)
	PE1	I would find the APTS a useful mode of transport	I would find the system useful in my job.	I would find the system useful in my driving	I find the ARTS a useful mode of transport
	PE2	The APTS would be an important part of the existing public transport systems			The ARTS is compatible with other forms of transport I use
	PE3	I can get help from others when I have difficulties using the APTS	A specific person (or group) is available for assistance with system difficulties		I can get help from others when I have difficulties using ARTS
Perceived Usefulness			(Venkatesh & Davis, 2000)	(Davis, 1989)	(Madigan et al., 2017)
	PU1	APTS would be better and more useful for my daily trips than using traditional public transportation	I find the system to be useful in my job	I would find CHART-MASTER useful in my job	
	PU2	APTS would be more efficient and faster than traditional public transportation vehicles	Using the system in my job increases my productivity	Using CHART-MASTER in my job would increase my productivity	Using the ARTS to travel helps me to achieve things that are important to me
	PU3	Using the APTS would help me reach my destination more quickly			Using the ARTS will help me reach my destination more quickly
	PU4	Using the APTS would shorten travel times			
Effort Expectancy			(Venkatesh et al., 2003)	(Adell, 2010)	(Madigan et al., 2017)
	EE1	It would be easy to understand how to use the APTS	I would find the system easy to use	I would find the system easy to use	I find the ARTS easy to use
	EE2	It would not take a long time to learn how to use the APTS	Learning to operate the system is easy for me	Learning to operate the system is easy for me	Learning to use an ARTS is easy for me
	EE3	My interaction with the APTS would be clear and understandable	My interaction with the system would be clear and understandable	My interaction with the system would be clear and understandable	My interaction with the ARTS is clear and understandable
Social Influence			(Venkatesh et al., 2003)	(Madigan et al., 2017)	
	SI1	People who are important to me would think that I should use the APTS	People who are important to me think that I should use the system	People who are important to me think that I should use ARTS	
	SI2	I would probably use the APTS if people who influence my behavior think that I should use the APTS		People who influence my behavior think that I should use ARTS	
	SI3	People whose opinions I value would like me to use the APTS	People who influence my behavior think that I should use the system	People whose opinions I value would like me to use ARTS	
	SI4	Threats by hackers to the security of the APTS concern me			
Facilitating Conditions			(Venkatesh et al., 2003)	(Madigan et al., 2017)	
	FC1	I have the resources necessary to use the APTS	I have the resources necessary to use the system	I have the resources necessary to use ARTS	
	FC2	I have the knowledge necessary to use the APTS	I have the knowledge necessary to use the system	I have the knowledge necessary to use ARTS	
	FC3	The APTS would be compatible with other modes of public transport I use	The system is not compatible with other systems I use	The ARTS is compatible with other forms of transport I use	

Constructs	Code	Modified items			Source (Modified from)
Hedonic Motivation			(Venkatesh et al., 2012)	(Madigan et al., 2017)	
	HM1	Using the APTS would be entertaining	Using mobile Internet is fun	Using ARTS is fun	
	HM2	Using the APTS would be fun	Using mobile Internet is enjoyable	Using ARTS is entertaining	
	HM3	Using the APTS would be comfortable	Using mobile Internet is very entertaining	Using ARTS is enjoyable	
Price Value			(Venkatesh et al., 2003)	(Venkatesh et al., 2012)	(Madigan et al., 2017)
	PV1	The APTS usage would be reasonably priced		Mobile Internet is reasonably priced	
	PV2	The APTS would be a good value for the money		Mobile Internet is a good value for the money	
	PV3	In general, the authority would support the use of APTS	In general, the organization has supported the use of the system		In general the authority would support the use of ARTS

Constructs	Code	Modified items	Source (Modified from)		
Habit			(Venkatesh et al., 2012)		
	HT1	Using the APTS would become a habit for me	The use of mobile Internet has become a habit for me		
	HT2	I would be addicted to using the APTS	I am addicted to using mobile Internet		
	HT3	I would think that I have to use the APTS	I must use mobile Internet		
	HT4	I am willing to pay more for the APTS			
Trust and Safety			(Pavlou, 2003)	(Adell, 2010)	(Choi & Ji, 2015)
	TS1	I think the APTS is dependable	This Web retailer is trustworthy		Autonomous vehicle is dependable
	TS2	I think the APTS is safe	This Web retailer is one that keeps promises and commitments		Autonomous vehicle is reliable
	TS3	Overall, I can trust the APTS	I trust this Web retailer because they keep my best interests in mind		Overall, I can trust autonomous vehicle
	TS4	I think the APTS is safer than traditional public transport			I believe that I can depend and rely on autonomous vehicle
	TS5	I think the APTS would help to reduce traffic accidents		If I use the system, I will decrease my risk of being involved in an accident	
Perceived Risk			(Pavlou, 2003)	(Choi & Ji, 2015)	
	PR1	Using the APTS would lead to a financial loss for me	How would you characterize the decision to buy a product from this Web retailer? (High potential for loss/ High potential for gain)	Autonomous vehicle would lead to a financial loss for me.	
	PR2	The APTS might not perform well and create problems	How would you characterize the decision to transact with this Web retailer? (Very negative situation/Very positive situation)	Autonomous vehicle might not perform well and create problems.	
	PR3	Using the APTS would be risky.	How would you characterize the decision to transact with this Web retailer? (Significant risk/insignificant risk)	Using autonomous vehicle would be risky.	
Behavioral Intention			(Venkatesh et al., 2003)	(Venkatesh et al., 2012)	(Madigan et al., 2017)
	BI1	Assuming that I had access to the APTS, I predict that I would use it	I predict I would use the system in the next <n> months		Assuming that I had access to ARTS, I predict that I would use it in the future
	BI2	If the APTS become available permanently, I plan to use it	I plan to use the system in the next <n> months	I will always try to use mobile Internet in my daily life.	If ARTS become available permanently, I plan to use it
	BI3	I plan to use the APTS frequently in the future		I plan to continue to use mobile Internet frequently	
	BI4	I would intend to try the APTS	I intend to use the system in the next <n> months	I intend to continue using mobile Internet in the future.	I intend to use ARTS again during the demonstration period

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