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RESEARCH ARTICLE

Examining Women's Intention to Use E-Scooters with Technology Acceptance Model: Istanbul Case

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Abstract

The means of meeting people's needs are changing day by day. For example, the need for transportation has been provided by various vehicles until today and user satisfaction has always been taken into account. However, with the development of technology and the change in the way of meeting human needs, the level of acceptance and use of products by consumers has also changed. Scooters developed to provide ease of transportation can also be seen as a part of this change. Within the scope of the study, it was investigated at what level female participants used e-scooter technology to meet their transportation needs and at what level they accepted this technology. The factors affecting women's adoption of e-scooters are discussed in the context of the Technology Acceptance Model (TAM). The relationship between the perceived security factor within the scope of the study and the behavioral intention to use the e-scooter could not be measured. However, there are direct and indirect relationships between social impact, perceived ease of use, perceived usefulness and environmental sensitivity, and behavioral intention. As a result, inferences were made regarding the factors affecting the use of e-scooter by women.

Keywords: *Micromobility, e-Scooter, Technology Acceptance Model, Behavioral Intent.*

Öz

İnsanların ihtiyaçlarını karşılama araçları gün geçtikçe değişmektedir. Örneğin ulaşım ihtiyacı günümüze kadar çeşitli taşıtlarla sağlanmış ve her zaman kullanıcı memnuniyeti göz önünde bulundurulmuştur. Fakat teknolojinin gelişmesi ve insan ihtiyaçlarının karşılanma biçiminin değişmesiyle birlikte üretilen ürünlerin tüketiciler tarafından kabul edilme ve kullanılma düzeyleri de değişim göstermiştir. Ulaşımın kolaylığını sağlamak için geliştirilen skuterler de bu değişimin bir parçası olarak görülebilir. Çalışma kapsamında kadın katılımcıların e-skuter teknolojisini ulaşım ihtiyaçlarını karşılamak için hangi düzeyde kullandıkları ve bu teknolojiyi hangi seviyede kabul ettikleri araştırılmıştır. Kadınların e-skuterleri benimsemesini etkileyen faktörler Teknoloji Kabul Modeli (TAM) bağlamında ele alınmıştır. Çalışma kapsamında algılanan güvenlik faktörünün e-skuter kullanımına dönük davranışsal niyet faktörüyle ilişkisi ölçülememiştir. Fakat sosyal etki, algılanan kullanım kolaylığı, algılanan fayda ve çevresel duyarlılık faktörleri ile davranışsal niyet arasında doğrudan ve dolaylı ilişkiler bulunmuştur. Çalışma sonucunda kadınların e-skuteri kullanmasında etki olan faktörler hakkında çıkarımlar yapılarak konuyla ilgili gelecek çalışmalara ve düzenlemelere dönük çeşitli önerilerde bulunulmuştur.

Anahtar Kelimeler: *Mikromobilite, e-Skuter, Teknoloji Kabul Modeli, Davranışsal Niyet.*

Introduction

Large-city sustainability problems can be articulated as traffic planning, new ways of thinking, and increased demands on the urban environment. Smart city solutions can contribute to solving many of these urban problems. One of the ways to solve these problems is the development of micromobility and sharing services (Popova & Zagulova, 2022). Micromobility is considered to be a relatively new and innovative mode of transportation that can reduce the number of private vehicle journeys (especially first and last mile journeys). Among the benefits of micromobility are the improvement of urban ecology, the promotion of a healthier lifestyle due to lower emissions from private vehicles, and the enhancement of quality of life through the provision of more mobile, flexible, cost-effective, and easily accessible modes of transportation (Abduljabbar et al. 2021; Shaheen et al., 2020). Among the vehicles that can provide these advantages, e-scooters are the first that come to mind. Shared vehicles, such as e-scooters, have replaced automobile travel and begun to provide more mobility alternatives. Therefore, it has the potential to boost the sustainability of urban transportation by enhancing public transportation accessibility. The majority of published research on e-scooter travel focuses on urban cities and collects data exclusively at specific times (Buehler et al., 2021). In this paper, the province of Istanbul is examined in terms of e-scooter usage.

This paper examines the acceptance level of e-scooters among women using the Technology Acceptance Model (TAM) created by Davis in 1989 (Davis, 1989). The TAM, which consists of the main factors of perceived usefulness, perceived ease of use, attitude and intention to use, demonstrates that these factors are effective in using a new technology. The leading factor that determines the use of the technology is the intention to use it. In the model presented in the research, certain components from literature and other models were added to the model and the model was expanded in addition to the factors of perceived ease of use, perceived usefulness, and behavioral intention. These factors added to the model are perceived security, social impact and environmental sensitivity. These variables were used to analyze women's intentions to use e-scooters. Numerous studies in the literature have claimed that factors are effective for e-scooter and technology acceptance (Buehler et al., 2021; Ho & Wu, 2021; Dias, Arsenio & Ribeiro, 2021; Javadinasr, 2022; Kopplin et al., 2021).

Conceptual Framework

Technology Acceptance Model

The Technology Acceptance Model (TAM) was used in the research to discover the factors that led to participants adopting the use of e-scooters. TAM is based on Ajzen's (1985) Theory of Reasoned Action to predict acceptance for individuals using new technology (Ajzen, 1985; Davis, 1989). TAM relies on certain factors to understand user perceptions. Perceived ease of use (PEU), perceived usefulness (PU), attitude (A) and behavioral intention (BI) are key TAM factors that explain the use of new technology. To better explain and understand the TAM, some variables have been added to the model and TAM 2 and TAM 3 models have been revealed through research done over time (Surendran, 2012). In TAM 2, social impact, cognitive processes and experience factors were added to the model (Venkatesh & Davis, 2000). In TAM 3, on the other hand, variables affecting only perceived usefulness were deemed insufficient, and TAM 3 was developed by adding variables affecting perceived ease of use to the model (Venkatesh & Bala, 2008). Figure 1 displays the TAM's original model.

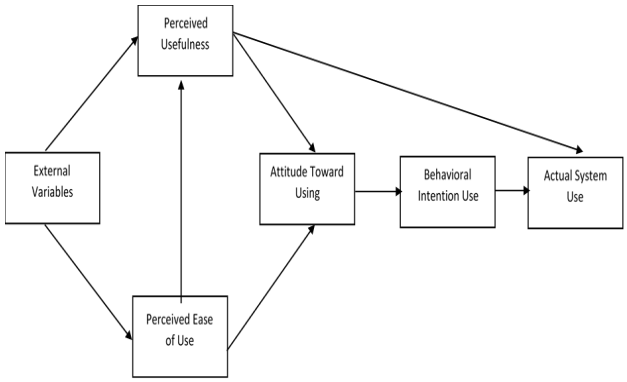

Figure 1. Technology Acceptance Model (Davis et al., 1989).

Davis (1989) proposed TAM to predict consumer behaviour while adopting technology. The two main factors that determine attitude in the model have perceived usefulness and perceived ease of use. Perceived usefulness is defined as the extent to which users who embrace the technology in question benefit, whereas perceived ease of use is defined as the extent to which people believe it will be easy to adopt a specific technology (Chang & Chen, 2021). The TAM is acknowledged as one of the most widely used models (Sun et al., 2020). One of the most useful aspects of TAM is its capacity to successfully extend the model structure by adding additional external variables that may be relevant in different contexts (Ghazizadeh et al., 2012).

E-scooter

Micromobility and a sustainable mode of transportation are required to tackle the problems arising from urban transportation, such as air and noise pollution, lack of urban space and parking costs (Huang, 2021). These problems create negative consequences in terms of air quality, sustainability and liveability of cities (Bivina et al., 2016). Micro-mobility can be accomplished using a variety of modes of transportation, including bicycles, electric bicycles (e-bikes), scooters, and electric scooters (e-scooters). Shared micromobility systems, such as bike and e-scooter sharing, are rapidly becoming important components of urban transportation infrastructure (for example car2go, Zipcar, emmy, CityScoot, Spin, Martı etc.). Shared micromobility has advantages such as health, the climate, less automobile use, and fewer greenhouse gas emissions (Shaheenand Cohen, 2019; Shaheen et al., 2020). Additionally, shared micro-mobility eliminates the costs and burdens of private car ownership, such as maintenance fees, refuelling expenses, and insurance payments (Mitchell et al., 2010).

E-scooter sharing systems were first introduced in the United States in 2017 (Dias et al., 2021). In many countries, e-scooters have started to be used and become widespread. Indians, for instance, favour scooters because of their small design, ease of maintenance, affordability, and easy loan repayment. Motor scooters are seen by the public as a status symbol. The e-scooter market's objective is to maintain market share by satisfying consumer needs and expectations. Only a few scooter types were formerly offered in the country, but today India is the second-largest scooter manufacturer in the world. In terms of sales and production of scooters, it is third behind China and Japan (Natarajan, 2020). Scooters are viewed as a popular form of personal transportation, in part due to their low cost of acquisition, simplicity of operation, and ease of parking and storage (Dheenadhayalan & Shanmuga Priya, 2021).

Literature Review

Scooters have been addressed in numerous research in the literature. For instance, it looked into several factors related to e-scooter adoption in Tiruchirappalli, India, to expand the use of electric vehicles. This study discovered that the high cost of using e-scooters is primarily responsible for the non-adoption of e-scooters. It was suggested in the study that e-scooter incentive benefits marketing could boost demand for purchases (Singh et al., 2021). In research to evaluate the adoption, use, and perceptions of new mobility services, including shared electric scooters, it was discovered that most people in major metropolitan areas have primarily positive perceptions of shared electric scooters. According to research, women and people with low incomes are more likely to benefit from the provision of these services. Women and men use shared electric scooters equally when compared to bike-sharing services, according to research (Clewlow, 2019).

In his study of 100 female participants who acquired e-scooters, Natarajan (2020) discovered substantial disparities in scooter use according to age, education level, monthly income, and occupation. The price, power, maintenance, resale value, after-sales service, brake durability, wheel size, length, weight, and comfortable driving characteristics of the scooters were shown to be effective on the participants' satisfaction levels in

the study. Aside from these features, there were no satisfaction variations in scooter design, mileage, spare parts availability, e-start, storage capacity, seating comfort, and lamp design. Data were obtained from 100 female scooter purchasers in a study studying the elements influencing women's e-scooter purchasing decisions. The study concluded that current items and trends influence purchasing decisions, as does the originality of the product to be purchased. However, suggestions for scooter companies to improve their advertising activities were provided (Dheenadhayalan & Shanmuga Priya, 2021).

A survey of 1,256 university employees was conducted to determine the pros and cons of using e-scooters. It was discovered that 36% of participants use e-scooters, and 40% intend to do so outside of campus in the future. E-scooters are often regarded as a more convenient mode of transportation, particularly in hot weather and when compared to walking. However, concerns regarding road safety and hurdles to getting appropriate working equipment were discovered, particularly among women (Sanders et al., 2020). Bielinski and Wazna (2020) tried to distinguish between e-bike and e-scooter sharing system users and the characteristics of their travel behaviours. It was discovered that e-bikes are primarily used for first and last-mile transportation, as well as direct commuting to various attractions, whereas e-scooters are primarily used for pleasure outings. According to research, e-scooter users were on average younger than e-bike users. It was discovered that the participants had the biggest issues in terms of cost and safety. It has been noticed that women use scooters and bicycles at a lower rate than men.

In Indonesia, a study was conducted to investigate the visual perception of female scooter users for scooter designs. It has been discovered that scooter designs are considered as good quality, comfortable to drive, usable by family members, fun to drive, relaxing, and promoting self-confidence while riding (Lukita et al., 2020). Before and after the launch of the e-scooter campus, attitudes and preferences of e-scooter users and non-users were compared in a study. E-scooter use on campus has been observed to be more prevalent among younger drivers, particularly undergraduate students. According to research, the driving intention claimed before the system's launch is more than the actual number of users. The major reasons for utilizing e-scooters on campus, similar to city research, were determined to be travel speed and driving enjoyment. Approximately 30% of respondents said they use e-scooters to get to parking lots or access public transportation. Perceptions of e-scooter system suitability, cost, safety, parking, driver behaviour, and usage were positive among individuals who did not use e-scooters after the system started (Buehler et al., 2021).

According to Dias, Arsenio, and Ribeiro (2021), the e-scooter sharing system can assist cities in addressing environmental issues such as reducing air pollution, reducing inequality in access to transportation, promoting cost savings, and enhancing mobility resilience. Popova and Zagulova (2022) determined the most influential aspects of consumer behavior regarding the utilization of e-scooter-sharing services. In addition to "intention to use", "anxiety", "attitude to use", "effort expectation" and "social impact", new variables including "uncertainty", "e-scooter design", "experience", "perceived security", "infrastructure quality" and "physical activity incentive" are examined in the research. The main finding of the study is that the variables of attitude toward sharing, anxiety, and internal ambiguity have direct or indirect effects on the intention to use an e-scooter.

Methodology

Research Model and Hypotheses

A structural model was presented as part of this study to gauge women's intention to use e-scooters. The study model includes the behavioral intention, perceived ease of use, and perceived usefulness components that are also part of the technology acceptance model. Perceived Security, Social Impact, and Environmental Sensitivity components, which are believed to have

substantial effects in the literature, were also added to the model to boost its predictive potential, making the study model in question six factors in total. Figure 2 provides the research model.

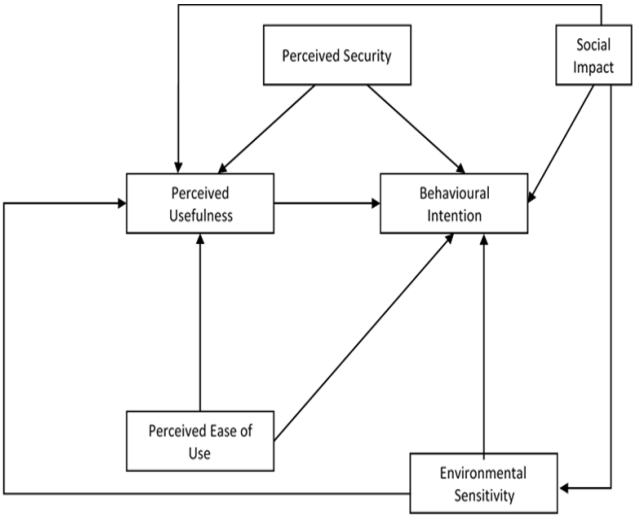

Figure 2. Research Model

The following are the factor definitions and hypothesis in the research model shown in Figure 2.

Behavioral Intention (BI): BI is defined as the level of an individual's intention to exhibit any behavior. According to TAM, BI is directly related to PU and PEU factors (Davis, 1986; Davis et al., 1983; Fishbein & Ajzen, 1975). It is seen as the main determinant of the behavior that will occur in TAM and the Theory of Reasoned Behaviors. In the behavioral intention factor in the study, it is the intention of women to use/adopt e-scooter technology. Five items were included in the BI factor (Davis, 1989; Kopplin et al., 2021).

Perceived Security (PS): It is the level at which one thinks it is safe to use existing technology. In order to measure the PS factor, six items were created within the scope of the research model (Kopplin et al., 2021; Osswald et al., 2012). Two hypotheses have been proposed regarding the PS factor (h1 and h2). In this study, participants' levels of finding their e-scooter vehicles safe were discussed.

h1: Perceived security affects behavioral intention positively.

h2: Perceived security positively affects perceived usefulness.

Perceived Usefulness (PU): It is the level of thinking that an individual will benefit from using the technology in question (Davis, 1989). Perceived usefulness is one of the main determinants of behavioral intention in the context of TAM. According to the model, if people believe that technology is useful, they will use that technology. The h3 hypothesis was proposed because it was believed that PU would influence behavioral intention within the parameters of this research. In the research model, four items were included in the PU factor (Bozkurt et al., 2021; Davis, 1989; Kopplin et al., 2021). The level of participant belief that using an e-scooter would be useful was discussed in this study.

h3: Perceived usefulness positively affects behavioral intention.

Perceived Ease of Use (PEU): It is the level of belief that the person will be able to use the technology in question easily or that he or she will be able to learn to use it without spending too much effort. In short, it is the level of thinking that an individual will use technology without difficulty (Davis, 1989; Gao et al., 2008; Vankatesh & Davis, 1996). Two PEU factor-related hypotheses were presented within the context of the study. The h4 hypothesis was one of these assumptions that was drawn straight from TAM. On the other hand, it was proposed that PEU directly influences behavioral intention in the h5 hypothesis. Within the parameters of the research model, the PEU factor contained eight components. The PEU factor's elements were developed using pertinent studies and models (Kopplin et al., 2021; Ratan et al., 2021). Within the scope of the study, the level of thinking of the participants that they can use the e-scooter easily without difficulty was discussed.

h4: Perceived ease of use positively affects perceived usefulness.

h5: Perceived ease of use positively affects behavioral intention.

Social Impact (SI): It is the level of thinking that a person should use a certain technology by being influenced by the people and events that he or she considers important to him (Venkatesh et al., 2003).

Within the scope of the research, four items were included in the SI factor (Kopplin et al., 2021). Hypotheses have been proposed that SI affects behavioral intention both directly and indirectly (h6, h7 and h8). In the study, this factor was considered as the level of being affected by the people or events around the participants in their behavior of using e-scooter.

h6: Social impact positively affects perceived usefulness.

h7: Social impact positively affects behavioral intention

h8: Social impact positively affects environmental sensitivity.

Environmental Sensitivity (ES): It is the level of thinking that an individual should not harm the environment by using a certain technology. In other words, it is the perception of contributing to reducing the damage done to the environment by using the technology in question. Models and studies in the literature have found that ES has a direct effect on behavioral intention (Dunlap et al., 2002; Lee, 2008). Based on these studies in the research model, four items were included for the ES factor. Two hypotheses were developed for the ES factor (h9 and h10). The participants' level of belief that utilising an e-scooter does not hurt the environment or helps to mitigate damage is explored in this study.

h9: Environmental sensitivity positively affects the perceived usefulness.

h10: Environmental sensitivity positively affects behavioral intention.

Research Process

A questionnaire was designed to validate the research model presented in Figure 2 and to test the hypotheses created for the mentioned factors. Afterwards, the necessary ethics committee approval was obtained for the research to be carried out. After approval, reliability analysis was conducted with a pilot study. The main data were collected with a questionnaire containing the updated items. The collected data were analyzed with the structural equation modelling approach.

Data Collection Tools

To validate the research model put forth within the parameters of the study, a questionnaire was created. In the questionnaire form, there are both 5-point Likert-type items created to measure the variables and demographic questions. Three faculty members with expertise in the TAM and information systems, together with two faculty members with sociological backgrounds, were consulted in the creation of the aforementioned questionnaire. First of all, the questionnaire including 31 items was applied to female participants consisting of 31 people (PS: 6, BI: 5, SI: 4, ES: 4, PEU:8, PU: 4). Following the reliability analyses conducted following the pilot research, the PS factor was eliminated from the model. Two elements from the PEU factor and one from the BI factor were eliminated to achieve reliability. There were 22 total items used in the main study. The reliability findings obtained within the scope of the pilot study are given in Table 1 The Cronbach alpha value was used to do reliability analyses on the research variables ($\alpha > 0{,}7$).

Table 1. Pilot Study Reliability Findings

Factor	Cronbach alfa	Number of Items
PEU	0.763	6
PU	0,593	4
ES	0.780	4
SI	0.794	4
BI	0.918	4
All items	0.919	22

The PU factor was included in the main study even though it did not produce a value of > 0.7 in the Cronbach's alpha values in Table 1 because the reliability value was not very low and the reliability value of all items was high.

Population and Sample

Women residing in Istanbul who are older than 16 make up the study's population. The simple random sampling approach, one of the random sampling methods, was used to select the sample group from which the data were obtained. Each sample unit has an equal chance of being chosen

when using the simple random sampling approach (Büyüköztürk et al., 2021). 379 female participants from different districts of Istanbul comprise the study's sample.

Ethics Approval

Permission was obtained from the Ankara Hacı Bayram Veli University Ethics Committee for the implementation of the developed questionnaire (document no. 149101 dated 16.12.2022). In addition, the pilot and main study data in the study were collected within the scope of the research with the Tender Registration Number 2022-590647, titled "The Future of Micro Electric Vehicles", which was completed with the cooperation of the Ministry of Environment, Urbanization and Climate Change and Ankara Hacı Bayram Veli University.

Data Analysis and Findings

A total of 379 women participated in the study. Before starting the analysis process, the outlier process was carried out. Normality procedures were provided by removing 17 participants who gave the same answer to more than 20 items in the questionnaire responses. On the other hand, the blank data of six participants were filled by providing the relevant item mean. Descriptive statistics, reliability analyses, and exploratory factor analyses performed using IBM SPSS Statistics 22 software. Structural model evaluation was done in the SmartPLS 4 program.

Demographic Data

The data from a total of 362 female participants were included in the analytical process. The participant's demographic data is shown in Table 2.

Table 2. Participants' Demographic Data

	Participants	**N**	**%**
Participant characteristic	Pedestrian	270	74,6
	Small business	27	7,5
	Taxi driver	1	0,3
	Minibus driver	1	0,3
	Private vehicle user	26	7,2
	Security guard	4	1,1
	Scooter user	33	9,1
Education level	Primary education	60	16,6
	High school	161	44,5
	Bachelor	126	34,8
	Postgraduate	15	4,1
Profession	Employee	77	21,3
	Public	33	9,1
	Retired	8	2,2
	Housewife	45	12,4
	Small business	22	6,1
	Businesswoman	3	0,8
	Freelancer	16	4,4
	Student	136	37,6
	Unemployed	16	4,4
	Driver	1	0,3
	Other	5	1,4
Monthly income	Under 5550 TL	139	38,4
	5550 – 7500 TL	63	17,4
	7500 – 10000 TL	58	16,0
	15000 – 20000 TL	52	14,4
	20000 – 25000 TL	11	3,0
	Over 25000 TL	5	1,4
Age	Min.	Max.	Average
	16	80	29,86

According to the participants' demographic data, 74% of them go about their everyday lives on foot, whereas there is only one individual employed as a minibus and taxi driver, respectively. This is a result of the participants being all female. 9.1% of participants report using scooters on a regular basis. In terms of education, the majority of participants (N=161) had completed high school. The postgraduate level has the fewest participants (N=15). 37.6% of participants are students, according to the distribution of occupations however, there is only one participant who works as a driver. According to the monthly income distribution, the majority of participants (N=139) earn less than 5550 TL per month, whereas 1.4% of participants earn more than 25000 TL per month. The participants exhibit a distribution of ages between 16 and 80, with the youngest being in this range. Figure 3 displays the participant district distributions.

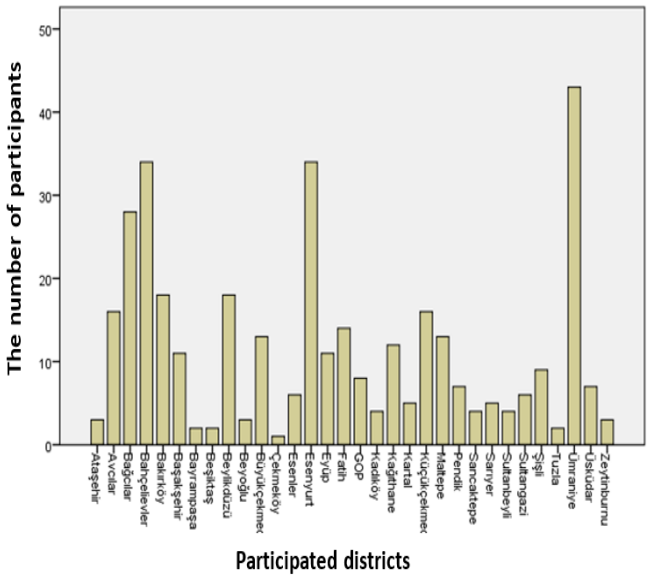

Figure 3. Distribution of Participants by Districts

Looking at Figure 3, the districts with the highest number of participants are Ümraniye, Esenyurt and Bahçelievler. The least number of participants live in Çekmeköy, Tuzla, Beşiktaş and Bayrampaşa districts.

E-scooter Usage

Information regarding the participants' use of e-scooters and why they use them was obtained. In addition, data was gathered on how frequently and for how long the participants used e-scooters. Table 3 contains data on e-scooter usage.

Table 3. E-scooter Usage Information of Participants

	E-scooter Usage	N	%
Do you use e-scooter?	Yes	134	37
	No	228	63
Purpose of using e-scooter	Transportation to work/school	48	13,3
	Daily tour	69	19,1
	Social activity	59	16,3
	Curiosity	34	9,4
	Reducing transportation cost	17	4,7
	Reducing time spent in traffic	36	9,9
	Other	2	0,6
Frequency of using e-scooter	Every day	9	2,5
	Several times a week	52	14,4
	Several times a month	44	12,2
	Very rare	29	8,0
E-scooter operating distance	Short (1-2) km	79	21,8
	Middle (2-5) km	49	13,5
	Long (More than 5 km)	6	1,7

When Table 3 is examined, it is seen that 37% of the participants use e-scooters. In terms of e-scooter usage purposes, most of the participants use e-scooters for daily trips (N=69), social activities (N=59) and for transportation to work/school, while only 17 people use it to reduce transportation costs. While 12.2% of the participants who use e-scooters state that they use it several times a month, the rate of those who use it every day is 2.5%. Participants generally stated that they prefer to use e-scooters for short-distance transportation (N=79).

Exploratory Factor Analysis

The factor structures of the collected data were handled by exploratory factor analysis (Stevens, 2012). Since the items in the questionnaire used in the data collection process are related to each other, the Maximum Likelihood method and Direct Oblimum rotation were preferred (Field, 2013). In Table 4, the exploratory factor analysis's findings are displayed.

Table 4. Factor Analysis Results

Factors	Item code	New item code	Factor loading				
			1	2	3	4	5
BI	BI4	BI4	.871				
	BI3	BI3	.864				
	BI1	BI1	.837				
	BI5	BI5	.713				
	SI2	BI6	.648				
PU	PU3	PU3		.786			
	PU2	PU2		.689			
	PU4	PU4		.559			
	PU1	PU1		.532			
SI	SI3	SI3			.748		
	SI4	SI4			.715		
	SI1	SI1			.652		
PEU	PEU2	PEU2				.873	
	PEU3	PEU3				.848	
ES	ES3	ES3					.767
	ES2	ES2					.753
	ES4	ES4					.659

When Table 4 was evaluated, 5 significant factor structures were obtained as a result of the exploratory factor analysis. Items that did not comply with the items included in the variables were discarded. Items ES1, PEU1, PEU4, PEU5 and PEU8 have been discarded. Since the expression in the SI2 item corresponds to the BI variable, it was decided to be named BI5 in BI and evaluated. In the last case, the dataset consisted of 5 factors and 17 items.

Research Model

Outliers that would disrupt the structure of the data set were removed, and the missing values were averaged and repopulated. It was observed that the data did not provide a normal distribution by checking whether they were normally distributed. Since the data structure does not show a normal distribution, the presented research model was evaluated with component-based structural equation modelling, which is the partial least squares method (Alkış & Fındık Coşkunçay, 2021; Chin, 1998). The assessments of the measurement model and structural model were used to try and validate the research model. First, a measurement model evaluation was made. Confirmatory factor analysis was used for the measurement model. Accordingly, convergent validiy and discriminant validity were examined. The convergent validity of the model is given in Table 5.

Table 5. Convergent Validity

Factor	Item code	Factor loading	Composite Reliability	Average of Communality Values (AVE)
Perceived Usefulness	PU1	.695	.793	%50
	PU2	.748		
	PU3	.721		
	PU4	.629		
Perceived Ease of Use	PEU2	.923	.918	%85
	PEU3	.918		
Behavioral Intention	BI1	.870	.919	%70
	BI3	.892		
	BI4	.905		
	BI5	.757		
	BI6	.769		
Social Impact	SI1	.731	.796	%57
	SI3	.812		
	SI4	.670		
Environmental Sensitivity	ES2	.632	.800	%58
	ES3	.878		
	ES4	.746		

Convergent validity was evaluated based on the factor loadings, combined reliability values and AVE values. Factor loading values are expected to be 0.7 and above. As can be seen in Table 5, all factor loads have sufficient load values except PU1, PU4, SI4, and ES2. These variables are included in the measurement model since their values are not significantly smaller than the expected value. Values for the AVE must be higher than 0.5. As seen in Table 5, the variables have sufficient AVE values. In addition, the combined reliability values of the variables must be 0.7 and above. All of the composite reliability of the variables in the research model has a value above 0.7 (Hair et al., 2006). These results demonstrate that the measuring model has convergent validity. Figure 4 presents the measuring model.

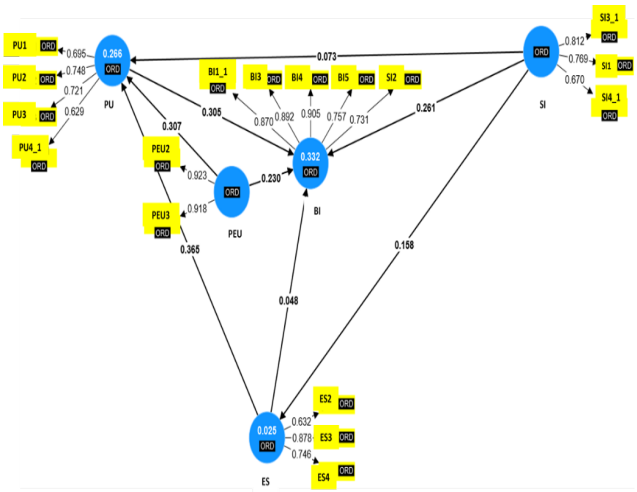

Figure 4. Measurement Model

According to Fornell and Larcker (1981), the square root of the AVE values of the variables is required to ensure the discriminant validity, which is bigger than the correlation value of all other structures. Discriminant validity is demonstrated in Table 6. When the matrix is examined, it is seen that the diagonal values are larger than the other relationship values.

Table 6. Discriminant Validity

	PU	PEU	BI	SI	ES
PU	0.700				
PEU	0.348	0.921			
BI	0.452	0.385	0.834		
SI	0.184	0.174	0.364	0.753	
ES	0.400	0.076	0.229	0.158	0.759

After the measurement model was revealed, the structural model was evaluated. While evaluating the structural model, the trace coefficient and the validity of the proposed hypotheses were tested. The bootstrapping method was used to evaluate the 362 sample data set (Alkış & Fındık Coşkunçay, 2021). The path coefficients between the structures are presented in the structural model in Figure 5.

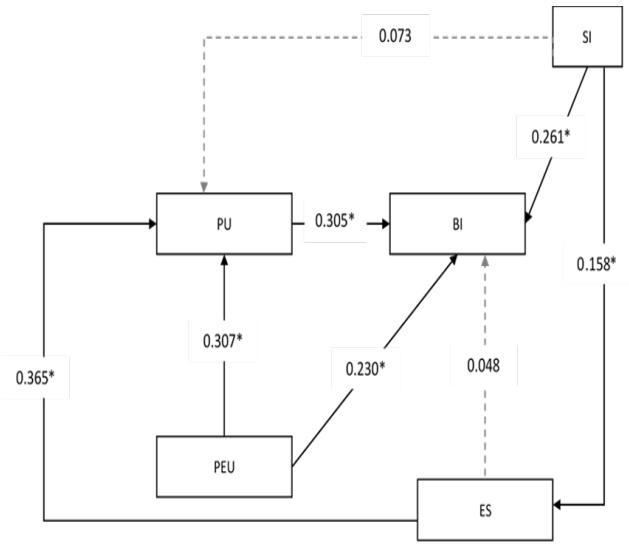

*Figure 5. Structural Model (*p<0.05)*

The evaluation outcomes of the initial study hypotheses are shown in Table 7 as a consequence of the structural model evaluation.

Table 7. Results of the Research Model Hypotheses

Hypothesis	Relations	T-value	β	Final Result
h1	PS –> BI	–	–	could not be measured
h2	PS –> PU	–	–	could not be measured
h3	PU –> BI	4.685	0,305*	Accepted
h4	PEU –> PU	5.821	0,307*	Accepted
h5	PEU –> BI	3.694	0,230*	Accepted
h6	SI –> PU	1.326	0,073	Rejected
h7	SI –> BI	5.096	0,261*	Accepted
h8	SI –> ES	2.360	0,158*	Accepted
h9	ES –> PU	6.445	0,365*	Accepted
h10	ES –> BI	0.796	0,048	Rejected

As according to Table 7, the relationship between PS and BI and PU could not be measured as a result of the structural model evaluation. For this reason, no conclusion was drawn about the effect of the PS factor put forward in h1 and h2. On the other hand, no significant relationship was found between SI and PU. Therefore, h6 is rejected. Similarly, h10 was rejected because there was no significant relationship between ES and BI. The relationships suggested in the h3,h4, h5, h7, h8 and h9 hypotheses were found to be significant at the p<0.05 level and these hypotheses were accepted.

Discussion and Conclusion

Within the scope of this study, it was tried to reveal the factors affecting the behavioral intentions of women towards e-scooter technology. Perceived usefulness, perceived ease of use, and behavioral intention factors in the validated model were directly adapted from the original TAM. The research model was extended by adding the factors of perceived security, social impact and environmental sensitivity. However, the hypotheses put forward within the scope of the perceived security factor in line with the studies could not be evaluated because the perceived security factor could not be measured. That is, hypothesis 1 and hypothesis 2 could not be measured. Other hypotheses were tested using the structural equation model.

The effect of the perceived usefulness on the behavioral intentions of the participants in the use of e-scooter was evaluated within the scope of hypothesis 3. A significant and positive relationship emerged between perceived usefulness and behavioral intention. Accordingly, hypothesis 3 was accepted. This result is consistent with the original TAM (Davis et al., 1989). Perceived usefulness levels of women towards e-scooter positively affect their behavioral intentions towards e-scooter use. In addition, while this result is similar to the results of studies such as the acceptance of e-scooters (Javadinasr, 2022; Singh et al., 2021), acceptance of e-commerce sites (Doshi, 2018), acceptance of mobile banking services (Raza et al., 2017; Zhang et al., 2018) and mobile application (Alkış & Fındık Coşkunçay, 2021) it differs with some studies (Çelik & Taş; 2021; Özer et al., 2019).

In this research, in the case of using/adopting e-scooter technology, women's perceptions of perceived ease of use are seen as an important effect of their thoughts that the use of e-scooter will be beneficial. Therefore, there is a direct and positive relationship between perceived ease of use and perceived usefulness. Therefore, hypothesis 4 was accepted. In addition, it was observed that the participants' perceptions of ease of use had an impact on their behavioral intentions when using the e-scooter, which was put forward in hypothesis 5. In other words, hypothesis 5 was accepted because perceived ease of use and behavioral intention were found to be significantly correlated. These results are similar to the results of the mobile payment technology acceptance

research by Bozpolat and Seyhan (2020). Additionally, it demonstrates parallelism with the findings of other research on technological acceptability in the literature (Cho & Sagynov, 2015; Doshi, 2018). These results are also similar to the studies in the literature that measure e-scooter usage intention (Buehler et al., 2021; Ho & Wu, 2021; Javadinasr, 2022).

Regarding the social impact hypotheses, hypothesis 6 showed no evidence of a significant correlation between the participant's level of social environment influence and the perceived value of using e-scooters. In other words, there is no meaningful correlation between perceived usefulness and social impact. As a result, hypothesis number six was rejected. But research has shown that social impact significantly and positively affects behavioral intention and environmental sensitivity. In this instance, both hypotheses 7 and 8 were accepted. In other words, by being impacted by their social context, participants may exhibit a behavioral intention to use the e-scooter (hypothesis 7). On the other hand, it is important for the participants to be affected by their social environment in thinking that they will not harm the environment if they use e-scooters (hypothesis 8). This outcome is consistent with some research on the adoption of technology (Çelik & Taş, 2021; Fishbein & Ajzen, 1977; Venkatesh & Davis, 2000). It is also similar to the results of studies on e-scooter technology (Huang, 2021; Javadinasr, 2022; Öztaş et al., 2022; Popova & Zagulova, 2022).

Finally, it has been discovered that there is a strong and positive relation between environmental sensitivity and perceived usefulness when the theories raised concerning the environmental sensitivity component are explored. So, hypothesis 9 was approved. In other words, the participants' perception of the usefulness of using an e-scooter is strongly tied to their level of concern about not harming the environment when using one. The results show that there is no meaningful connection between the behavioral intention factor and environmental sensitivity. It is evident that participants' environmental sensitivity levels have a beneficial impact on their perception of usefulness, which in turn influences their behavioral intention. Though the behavioral intention is indirectly influenced by environmental sensitivity, hypothesis 10 was disregarded because there was no direct and substantial correlation. This finding contrasts with the literature, which suggests that environmental awareness is one of the variables influencing the adoption of e-scooters (Dias et al., 2021; Kopplin et al., 2021). On the other hand, similar to this result, Öztaş et al. (2022) also concluded that environmental sensitivity does not affect the intention to use e-scooters in their research.

As a result, in this study, a total of four factors were discovered, three of which (perceived usefulness, perceived ease of use, and social impact) directly influence behavioral intention towards the usage of an e-scooter, and one element indirectly (environmental sensitivity). The use and acceptance of e-scooters is viewed as essential for individuals when taking into account the price and speed of transportation as well as their contribution to the battle against climate change. Future research is expected to take a different approach in light of the study's findings. The study's findings are anticipated to be helpful in developing the laws, rules, and regulations that will govern the use of e-scooters. On the one hand, the research is unique because it was done with female participants and within the framework of the TAM, but on the other hand, this can also be seen as a restriction. By taking into account these factors and broadening the sample group, future studies will be able to expand on the current one. Additionally, since just the quantitative research method was used for this study, future studies can be improved by incorporating both the mixed method and qualitative questions to better prepare for the factors. This research's exclusive focus on Istanbul is regarded as another shortcoming. By incorporating other demographic factors, the study can be replicated in many cities and areas.

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