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Exploring the Factors Affecting Shared Biking Perception: Insights from Türkiye

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ABSTRACT

Understanding consumer perception regarding shared biking services requires the analysis of psychological factors underlying the late diffusion of shared biking services. In this regard, by scrutinizing these underlying factors, we aim to uncover insights that can inform the development of targeted business strategies that better align with users' preferences and needs, thereby overcoming barriers to adoption and facilitating the wider dissemination of shared biking systems. Findings show that as consumers perceive shared biking services as useful and hedonic, their attitudes become more favorable. Importantly, highlighting the mediating role of compatibility, this study emphasizes the congruence among shared biking services, consumers' lifestyles, and their traveling habits. Findings also suggest that perceived complexity has a negative impact on shared biking attitudes. Interestingly, no significant relationship was found between perceived risk and shared biking attitude. The findings provide further support for innovation diffusion and theory of reasoned action. The suggested theoretical framework integrates variables related to both barriers and drivers, thus guiding future studies on the sharing economy. The study also provides insights that contribute to the development of service design and marketing strategies that respond better to users' needs, and also, facilitate the spread of these mobility systems.

Keywords: Shared biking services, Shared biking adoption, Psychological factors, Structural Equation Modeling.

JEL Classification Codes: L91, O33

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INTRODUCTION

With the rise of the shared economy, there has been a sharp shift from the "ownership" model to the "shareholder" status in all aspects of the global economy, particularly in transportation and mobility (Politis et al., 2020). Shared mobility is a representative example of the sharing economy, which refers to the shared use of bicycles, motorcycles, cars, or other means of transport and contributes to a range of social, environmental, and cost-related benefits (Lou et al., 2021). We focus on shared biking as a form of micro-mobility, encompassing lightweight vehicles operating at speeds below 25 km/h. Although micro-mobility decreased significantly with the pandemic, it made a strong recovery once the effects of the COVID-19 pandemic subsided (McKinsey, 2020). It is now considered less risky than other shared modes of transportation, and almost 70 percent of customers are reported to be willing to use micro-mobility for their daily transport needs (McKinsey, 2021) due to benefits such as reducing congestion, pollution, and transportation costs (Standing et al., 2021). Currently, bike sharing ranks as one of the fastest-growing transportation innovations in many cities worldwide and is transforming consumer mobility behavior (Nikitas, 2019). China has the most bikes in the world, followed by France (Mete, Cil & Özceylan, 2018). It can also be seen that revenue from bike sharing is expected to show an annual growth rate of 11.48%, resulting in a projected market volume of US$12.29 bn by 2026 (Statista, 2022).

In the past decade, the sharing economy has matured and grown significantly, especially in emerging markets (Basukie, Wang & Li, 2020; Maalouf, Abi Aad & El Masri, 2021; Hussain et al., 2023). The accumulation of knowledge within this field has proven to be of utmost importance in navigating the unique challenges and presents valuable opportunities for further development and exploration, particularly in the context of emerging markets, where the sharing economy continues to evolve rapidly (Chen & Wang 2019; Rojanakit, de Oliveira & Dulleck, 2022). Also, the pursuit of expertise in this domain holds immense potential for unlocking additional value and driving innovation in these emerging markets (Li & Schoenherr, 2023; Hussain et al., 2023).

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Türkiye, as an emerging market, has promoted sustainable transport through pedestrianization projects, safe bike lanes, bike-sharing systems, and integrating these with public transport systems. Seventeen out of 81 cities successfully maintain the bike-sharing system in Türkiye (WRI Türkiye, 2018) and the country expanded its bike lane network to 1,643 km (1020 miles) in 2023 (MEF, 2023). Most bike-sharing models in Türkiye adopt a mobile technology-based docked service model, allowing users to pick up and return their bikes at docking stations (Eren & Uz, 2020). Despite the increasing number of bike-sharing services, paths, and lanes in Türkiye, the use of bicycles in metropolitan cities could not exceed 1-2% (TCPNMP, 2021). There is still limited user penetration, with only 6.6% in 2022 in Türkiye as compared with other countries, India at 12.1%, and China at 31.6% (Statista, 2022) providing a unique research field characterized by a transition phase, during which consumers are likely to experience either hesitation or anticipation over new solutions. There may be several reasons for the different diffusion of innovative sharing services. Therefore, understanding consumer perception regarding shared biking services requires the analysis of psychological factors underlying the late diffusion of shared biking services. This approach alone has the potential to develop new business strategies that better respond to users' needs and facilitate the spread of these mobility systems.

In the existing literature on bike-sharing behavior, several studies have investigated individual psychological factors and their relationships with actual use, shift, and intention behaviors (Wei, Mo & Liu, 2018; Ma et al., 2018; Gao et al., 2019; Ma, Cao & Wang, 2019; Ji et al., 2021; Xue et al., 2022). However, none of these studies have explored these psychological factors while simultaneously considering perceived benefits and perceived risks in an emerging market context, akin to a benefit-cost concept as proposed by Wang et al. (2019). Furthermore, the mediating role of the compatibility factor, recognized as a driver of innovation adoption (Lou & Li, 2017) and as an important sociocultural indicator (Rogers, 1983), has not been thoroughly investigated. Compatibility, in this context, pertains to the degree to which an innovation aligns with the individual and social values, prior experiences, and requirements of potential adopters (Tornatzky & Klein, 1982; Kim, Mirusmonov & Lee, 2010).

In this way, the study gives insights into the complex interplay of variables that influence individuals' intentions to use bike-sharing services by giving insights about the user's overall evaluation of what is received (perceived benefits or gains) in terms of perceived usefulness and hedonic value and what is given (perceived sacrifices or costs) in terms of complexity and risks. With the mediating role of compatibility here, our study emphasized how well the concept of shared biking aligns with the psychological factors and preferences of potential users.

In line with these, we formulated our research questions as follows:

RQ1) Do the perceived usefulness and hedonic value affect the behavioral perception toward the use of bike-sharing services?

RQ2) How do delivery risk perception and perceived complexities affect the behavioral perception toward using bike-sharing services?

RQ3) Do attitudes affect the intention to use bike-sharing services?

RQ4) Does compatibility have a mediating role between bike-sharing attitude and intention?

The remainder of this paper is organized as follows. We first present the literature on bike-sharing systems and then provide the theoretical framework for the hypothesis development. In the methodology part, we explain our data collection procedures, sampling, and measures. Subsequently, we elaborate on the results of the analysis in the findings. In conclusion, we underscore the managerial and theoretical implications by addressing future research avenues and limitations.

THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Bike Sharing Services Literature

A burgeoning body of studies investigated influencing factors of bike-sharing adoption. Some researchers addressed the benefits of bike sharing (convenience, environmental, economic, and health benefits) (e.g. Franckle et al., 2020; Tao & Zhou, 2021; Teixeira, Silva & e Sá, 2021; Chen, 2022) while the others emphasized the role of perceived emotional, functional, and security values (e.g. Franckle et al., 2020; Wahab et al., 2020; Kim et al., 2020; Zhang et al., 2021). Other factors acting as determinants of attitudes and intentions for bike-sharing use include special promotions and public transport subsidies, service quality, and commuting distance (Ma et al., 2020a; Shen, Zhang & Zhao, 2018); the perceived risk and safety issues (e.g. Gao et al., 2019; Wahab et al., 2020; Rahimi et al., 2021); performance,

effort expectancy, and price value (Chopdar, Lytras & Visvizi, 2022). Previous studies show that demographic (e.g. population and climate) and infrastructural factors are also important in the adoption of bike sharing systems (El-Assi, Salah Mahmoud & Nurul Habib, 2017; Shen et al., 2018; Böcker et al., 2020; Eren & Uz, 2020; Ma et al., 2020b; Bergantino, Intini & Tangari et al., 2021; Guo et al., 2022; Jiao, Lee & Choi, 2022;Ye et al., 2022). Apart from these, psychosocial factors (e.g. Qin et al., 2018; Huang et al., 2020; Wang et al., 2021; Lin & Lin, 2022; Li, Krishna Sinniah & Li, 2022; Irawan, Bastarianto & Priyanto, 2022), subjective well-being (Ma et al., 2018), consciousness (Halvadia et al., 2022), and personality traits (e.g. Ge et al., 2020) all have effects on bike-sharing behavior.

Delving into the realm of psychological factors in particular, the literature offers some studies conducted in emerging markets. For instance, Cheng, OuYang & Liu (2019) uncovered factors that affect bike-sharing services' continuance intentions by considering the mediating effect of perceived usefulness, perceived risks, and perceived ease of use between user confirmation and intention. Likewise, Gao, Li & Guo (2019) revealed that perceived usefulness, facilitating conditions, and perceived risks were significant determinants influencing the adoption of bike-sharing systems. On the other hand, perceived ease of use and social influence did not exhibit significant positive impacts on users' behavioral intention to use bike-sharing systems. Similarly, Wahab et al. (2020) indicated that while safety, comfort, and enjoyment were the decisive determinants of bike-sharing acceptance, availability and costs had no significant impact. Wang, Douglas & Hazen (2021) showed that some attributes (i.e., complexity and observability) influenced switching intention through perceived risk, while other attributes (i.e., relative advantage and compatibility) directly influenced switching intention. Lately, Chopdar, Lytras & Visvizi (2022) revealed that performance expectancy, effort expectancy, facilitating conditions, hedonic motivation, and price value are the salient variables that affect users' intentions to participate in bike sharing.

By taking into account the multifaceted nature of users' perceptions and preferences about shared biking systems, we offer valuable insights into the holistic decision-making processes of potential adopters and contribute to a more informed approach to promoting the effective adoption of shared biking systems in emerging markets.

Theories and Hypothesis Development

Innovation is defined as an idea, service, or object that is perceived as new by an individual (Rogers, 2003). As shared biking services are still in their infancy in emerging countries, they are considered forms of innovative services that need wider consumer penetration. Thus, we examine the factors influencing consumers' decisions to use shared biking services through the theoretical lenses of Innovation Diffusion Theory (IDT), with the proposed conceptual framework shown in Figure 1. IDT theory has been used in public biking system adoption studies (e.g. Therrien et al., 2014; Wang, Douglas & Hazen, 2021). This theory helps to understand the acceptance and spread of innovation of new products or services (Rogers, 2003). According to the IDT theory, acceptance of innovation is based on individuals' knowledge and experiences with innovative services (Talke & Heidenreich, 2014). Knowledge or experience related to functions or attributes of innovation may influence consumers' decisions. Herein, as the attributes of innovation, we investigate the effects of usefulness, compatibility, and complexity. Perceived usefulness is defined as the external motive in the decision to use the system regarding efficiency and benefits (Kim & Kim, 2020). For usefulness, it is important to identify in which ways the innovation is perceived as better or more advantageous than existing options (Hashem & Tann, 2007). In the literature, several researchers investigated the perceived usefulness of shared biking services, referring to benefits such as time efficiency and convenience (e.g. Kim & Kim, 2020; Irawan et al., 2022; Li & Lin, 2022). Some studies found that perceived usefulness had a positive effect on satisfaction, attitude, and continuance intention (Chen & Lu, 2016; Cheng et al., 2019), but others found that it did not affect perceived value and trust (e.g. Kim & Kim, 2020). We suggest that perceived usefulness has a positive effect on consumers' attitudes, as bike-sharing services contribute to commuting performance by reducing the time needed and mitigating traffic congestion. Herein, with the hypothesis below, we argue that consumers may have stronger attitudes toward shared biking services as they perceive shared biking systems to be more advantageous.

H1: Perceived bike-sharing usefulness positively affects attitude toward bike sharing.

In addition to perceived usefulness, hedonic value may emerge from feelings towards a service and the resulting affection (Boksberger & Melsen, 2011). Fun

and enjoyment as intrinsic motivation elements may create positive attitudes, and individuals may be more willing to exert higher levels of effort for use (Gumussoy, 2016). Hedonic values such as enjoyment and fun were found to be influential in bike-sharing intention and adoption (Wahab et al., 2020; Kim & Kim, 2020; Zhang et al., 2021; Chopdar, Lytras & Visvizi, 2022). Ma et al. (2018) found that consumers' fun and hedonic values lead to more favorable trust attitudes toward shared biking service systems. We assume that when consumers perceive shared biking as a source of fun, excitement, and enjoyment, they develop more favorable attitudes. Based on these arguments, we posit the hypothesis below:

H2: Perceived hedonic value positively affects attitude toward bike sharing.

Complexity is the degree to which the individual perceives any form of innovation as difficult to understand and use (Rogers, 1995). In the literature, both perceived ease of use and complexity are used to define the difficulty level of shared biking services. In these systems, complexity derives from factors including registration, payment, or lending/ return phases. The first phase of the bike-sharing system is registration, which starts with the use of a mobile application and/or a credit card at the stations. Users who have a member card apply for the card on the parking unit sensor and enter their password. If accepted, the bike becomes unlocked and ready for use. Also, non-members may perform rental transactions with an active credit card or Public Transport Card (PTC), subject to a certain amount of returnable deposit. Bike management panels, smart lock visuals, and card use can be perceived as complex. As the main features and registration processes have yet to be discovered or understood, they may be considered complex. In line with the previous literature (e.g. Cheng et al., 2019; Chen & Lu, 2016), consumers who perceive the use of such systems to be complex are likely to be more resistant and are expected to have an unfavorable attitude toward shared biking services. Thus, the following hypothesis is proposed:

H3: Perceived complexity of bike sharing systems has a negative effect on attitude toward bike sharing.

The perceived risk may constitute an important factor in the perception of bike-sharing service. Previously, the impacts of perceived risk factors (financial, physical, time, privacy, and psychological risks) on bike sharing adoption and continuance intention were investigated under different aspects (e.g., Cheng et al., 2019; Gao et al., 2019; Kim & Kim, 2020). Perceived risks are found to create resistance to the adoption of bike-sharing systems (Gao et al., 2019). Herein, we argue that, when individuals perceive risks related to information privacy and health safety, they will have less favorable attitudes toward bike-sharing services. Therefore, we propose the following risk-related hypothesis:

H4: Perceived risk has a negative effect on attitude toward bike sharing.

According to Ajzen & Fishbein (1980), the overall evaluations are determined by the beliefs and perceptions regarding the results of behavior. Therefore, we propose that favorable bike-sharing attitudes lead to a higher level of bike-sharing intention, following the premises of The Theory of Reasoned Action (Ajzen & Fishbein, 1980) and the Theory of Planned Behavior (Ajzen, 1985), and grounding on the previous studies on shared biking attitude-intention links (Ji et al., 2021; Li et al., 2022; Irawan et al., 2022; Chen, 2022).

H5: Attitude toward bike sharing has a positive effect on the intention to use bike-sharing systems.

Herein, compatibility refers to the degree to which the innovation is perceived as congruent to the individual's lifestyle, experiences, needs, or values (Lu & Yu-Jen Su, 2009). Despite the importance of congruence, there is very limited research in the field. In terms of transport style compatibility, people may decide to take into consideration several attributes, such as traveling distance and multi-modal traveling options (e.g. Wang et al., 2021). Wang et al. (2021) found that when the public bicycle system is perceived as compatible with the prospective users' lifestyles or traveling habits, they are more likely to switch to public biking from other transportation modes. In line with self-congruence theory and the previous literature, we assume that the link between attitude and intention is affected by the extent to which consumers find their traveling habits and lifestyles congruent with bike-sharing services. Therefore, the following hypothesis is suggested:

H6: Compatibility mediates the relationship between bike sharing attitude and intention.

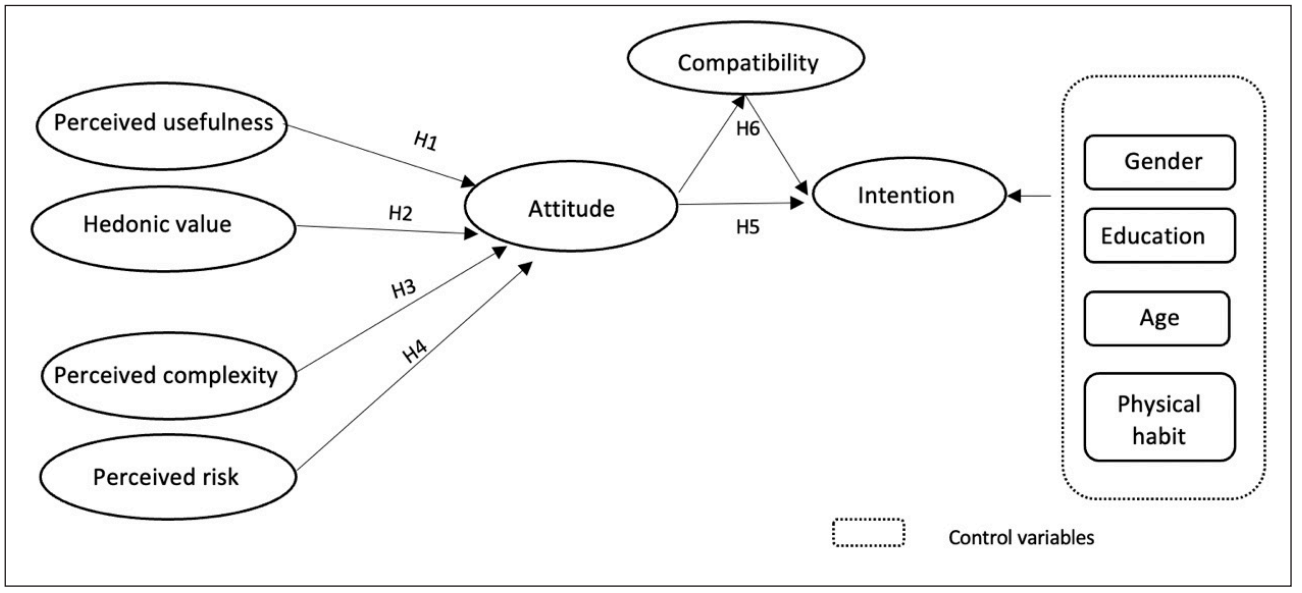

Figure 1: Proposed Conceptual Framework

METHODOLOGY

Web-based questionnaires were employed through multiple online platforms. The data collection approach used in this study is an online convenience sampling technique due to its facilitating role in reaching a larger population and its straightforwardness (Taherdoost, 2016). The questionnaire was divided into three sections. In the first section, to achieve construct validity, we explained the purpose of the research and defined shared biking. We also informed the participants about the confidentiality of the responses. The second section conveyed demographic information on age, gender, education, and physical habits. The final section of the survey included the measurement items in Table I. The adopted items were professionally translated into Turkish, and a pilot study was conducted to check the comprehensibility of the items. A total of 330 responses were received between 2021 and 2022 through online surveys. To test for common method bias, we conducted Harman's one-factor test. The one-factor test resulted in a single factor accounting for 38.498 % of the variance, significantly lower than the recommended threshold of 50 %.

Consumers' adoption and utilization decisions for innovative services were found to be strongly influenced by knowledge or experience related to the functions or attributes of innovation (Hwang, Huang & Wu, 2016). Therefore, in this paper, we investigated the effects of usefulness, compatibility, and complexity as attributes of innovation. Similarly, we investigated hedonic value including fun, entertaining, and exciting content, as a major driver of behavioral intention (Jahn & Kunz, 2012). Finally, we measured perceived risks as people's uncertainty about using a new service, which strongly impacts their willingness to adopt it. This includes worries about potential injuries and privacy concerns. We utilized the scales of perceived usefulness (Cheng et al., 2019), perceived complexity (Wang et al., 2021), hedonic value (De Vries & Carlson, 2014), perceived risk (Cheng et al., 2019), compatibility (Wang, 2021), and physical activity (Peeters et al., 2015). We also used the attitude and intention scales of Cheng et al. (2019). For measuring all, we used a five-point Likert scale from "Strongly disagree" (1) to "Strongly agree" (5). For the data analysis, we conducted Structural Equation Modelling (SEM), which has been frequently utilized to explain and predict the interactions in multivariate data sets and has been proven to be a useful technique for examining the link between latent and observable variables (Hair et al., 2011; Grotzinger et al., 2019).

Sample

The participants' profiles and sample statistics are summarized in Table II. A total of 330 acceptable responses were obtained. Over 60% of the participants were female. The sample comprised participants from five age groups with a dominant share of younger people (between 18 and 25 years). Additionally, the majority have higher education (59.7% have at least bachelor's degrees).

Table I. Constructs, Measurement Items, and Sources

Construct	Measure	Items	Source
Perceived Usefulness (USFL)	USFL1	Using bike-sharing systems would enable me to get to my destination more quickly.	Cheng et al. (2019)
	USFL2	Using bike-sharing systems would improve my commute performance.	
	USFL3	Using bike-sharing systems can mitigate traffic congestion.	
	USFL4	Using bike-sharing systems can reduce greenhouse gas emissions and energy consumption.	
Perceived Complexity (CPLX)	CPLX1	I think that the process of borrowing and returning public bicycles is complex.	Wang et al. (2021)
	CPLX2	The lack of public bicycle stations makes the rental process complex.	
	CPLX3	I think the registration process is complex.	
Hedonic Value (HDN)	HDN1	The use of a shared bike is fun.	De Vries & Carlson (2014)
	HDN2	The use of the shared bike is exciting.	
	HDN3	The use of the shared bike is pleasant.	
Perceived Risk (RISK)	RISK1	I am concerned that my personal information will be shared or sold to others when I enter the bike-sharing systems platform.	Cheng et al. (2019)
	RISK2	I am concerned that the bike-sharing systems platform collects too much personal information about me.	
	RISK3	I am concerned that riding is not a safe way to trip.	
	RISK4	I am concerned that bad air conditions will influence my physical health when using bike-sharing systems.	
Compatibility (CMPA)	CMPA1	The public bicycle will fit well with how I travel.	Wang et al. (2021)
	CMPA2	The public bicycle will fit well with my lifestyle.	
Attitude (ATT)	ATT1	Using bike-sharing systems would be a good idea.	Cheng et al. (2019)
	ATT2	Using bike-sharing systems would be a wise idea.	
	ATT3	I like the idea of using bike-sharing systems.	
	ATT4	Using bike-sharing systems would be a pleasant experience.	
Intention (INT)	INT1	I plan to use bike-sharing systems.	Cheng et al. (2019)
	INT2	I intend to use bike-sharing systems.	
	INT3	I predict that I will use bike-sharing systems as long as I have access to it.	
Physical Activity (PHYH)	PHYH1	Doing some kind of physical activity is a habit for me.	Peeters et al. (2015)
	PHYH2	In the last 2 years, I have been involved in regular physical activity at one time or another.	
	PHYH3	I have always done some kind of physical activity.	

Table II. Sample Characteristics

		Frequency	Percent
Gender	Female	215	65.2
	Male	115	34.8
	Total	330	100
Age	18-25	152	46.1
	26-35	46	13.9
	36-45	35	10.6
	46-55	57	17.3
	55+	40	12.1
	Total	330	100
Education	Middle school	2	0.6
	High school	107	32.4
	Associate degree	24	7.3
	Bachelor's degree	147	44.5
	Master's degree	29	8.8
	Doctorate	21	6.4
	Total	330	100

DATA ANALYSIS AND RESULTS

Confirmatory Factor Analysis

To test the data-model fit, we employed a confirmatory factor analysis. We found that the normed chi-squared value was x2/df= 1.809 (df=180, p= 0.000) and the root mean square error of approximation (RMSEA) was 0.05. We also obtained good fitness levels for the comparative fit index (CFI)= 0.975, the goodness of fit index (GFI)= 0.916, the normed fit index (NFI)= 0.946, Tucker-Lewis Index (TLI)= 0.968, and adjusted goodness of fit index (AGFI)= 0.882.

We deleted two items from the perceived risk construct, one from perceived complexity and one from usefulness due to low factor loadings. The remaining factor loadings of all items were above 0.645. All the average variance extracted (AVE) values of the constructs exceeded the 0.5 threshold level. We also conducted the Fornell & Larcker (1981) test to determine whether the constructs were distinct from each other. The square roots of AVE values were greater than the constructs' correlation coefficients and greater than the construct's shared variance with other constructs (MSV and ASV values). Thus, convergent and discriminant validity were ensured. Additionally, to assess convergent validity, critical ratio values (Crs), in other words, t-values were found to be greater than 1.96 and significant at the 0.05 level (Carr & Pearson, 1999). Composite reliability (CR) measures the internal consistency and homogeneity of the scale items (Churchill, 1979). Herein, all constructs exceeded the recommended level of 0.60 (Hair et al., 1998) (Table III).

Table III. Validity and Reliability

	CR	AVE	MSV	MaxR	PHYH	USFL	HDN	CPLX	CMPA	ATT	INT	RISK
PHYH	0.931	0.818	0.176	0.941	**0.905**							
USFL	0.820	0.607	0.375	0.856	0.313	**0.779**						
HDN	0.929	0.814	0.686	0.937	0.288	0.512	**0.902**					
CPLX	0.734	0.580	0.378	0.743	0.005	-0.037	-0.078	**0.762**				
CMPA	0.857	0.751	0.508	0.882	0.419	0.515	0.492	-0.026	**0.866**			
ATT	0.922	0.747	0.686	0.924	0.367	0.612	0.828	-0.140	0.641	**0.864**		
INT	0.931	0.819	0.573	0.956	0.343	0.521	0.570	-0.021	0.713	0.757	**0.905**	
RISK	0.878	0.783	0.378	0.880	-0.001	0.017	-0.120	0.615	-0.022	-0.066	0.004	**0.885**

PHYH: Physical habit, USFL: Perceived usefulness, HDN: Hedonic value, CPLX: Complexity, CMPA: Compatibility, ATT: Attitude, INT: Intention, RISK: Perceived risk, CR: Composite reliability, AVE: Average variance extracted

Path Analysis

Through structural equation modeling, we ran a path analysis with AMOS 28. The research model had good fit index values with the normed chi-square value of 2.097 (df= 107, p= 0.000). While the Goodness-of-fit index (GFI) was found to be 0.925, the adjusted goodness-of-fit (AGFI) was 0.893. The RMSEA was 0.058, the Comparative fit index (CFI) was 0.974; NFI = 0.951, and TLI= 0.967 all indicating a desirable fit.

H1 suggested that the perceived bike-sharing usefulness has a positive effect on attitudes toward bike-sharing. We found a significant relationship between these two variables (β: 0.353; e: 0.067; p: 0.000), and thus H1 was supported. Also, the findings supported hypothesis 2, proposing that perceived hedonic value has a positive effect on attitude toward bike sharing (β: 0.657; e: 0.049; p: 0.000). Moreover, we also found that the perceived complexity of bike-sharing systems has a negative effect on attitude toward bike sharing (β: -0.113; e: 0.054; p: 0.035), and therefore H3 was supported. However, hypothesis 4, stating that perceived risk has a negative effect on attitude toward bike sharing, was not supported (β: 0.075; e: 0.043; p: 0.079).Parallel to the utilized theory, with hypothesis 5, we assumed that attitude toward shared biking has a positive effect on intention toward bike sharing, and this was supported (β: 1.025; e: 0.067; p: 0.000). The results of the path analysis are given in Table IV.

We also inserted control variables into our research model to assess the impact of gender, education, age, and physical activity habits. Among these control variables, we found that gender (p= 0.016) affected the attitude toward shared biking. However, in the further Anova analysis, no significant difference was found between males and females regarding attitude (p=0.345). Additionally, physical activity had a positive effect on attitudes toward shared biking (p=0.022). No significant effect on intention was observed in the control checks.

Mediation Analysis: Direct, Indirect, and Total Effects

With hypothesis 6, we tested whether compatibility had a mediating role in the relationship between attitude and intention toward shared biking. Since the research model suggests a mediating effect with hypothesis 6, we employed the bootstrapping method recommended by Zhao et al. (2010). Through 5000 times of bootstrapping, we reached the 95% bias-corrected confidence interval

Table IV. Results of Path Analysis

	Unstand. Estimate	**Standardized factor loading**	**S.E.**	**t values (C.r.)**	**P**
USFL→ATT	0.353	0.260	0.067	5.244	0.000
HDN →ATT	0.657	0.689	0.049	13.371	0.000
CPLX→ATT	-0.113	-0.122	0.054	-2.106	0.035
RISK →ATT	0.075	0.095	0.043	1.758	0.079
ATT →INT	1.025	0.750	0.067	15.299	0.000

USFL: Perceived usefulness, HDN: Hedonic value, CPLX: Complexity, ATT: Attitude, INT: Intention, RISK: Perceived risk, S.E.: standard error, C.r: critical ratio value, P: significance value

Table V. The direct, Indirect, and Total Effects

Relationship	Direct Effect	Indirect Effect	Confidence Interval		P
			Lower Bound	Upper Bound	
Att->Cmpa->Int	0.709 (0.000)	0.331	0.214	0.472	0.000

CMPA: Compatibility, ATT: Attitude, INT: Intention, P: significance value

and two-tailed significance value of the effect. The results indicated that compatibility partially mediates the relationship between shared biking attitude and intention. Table V presents the direct, indirect, and total effects.

CONCLUSION AND DISCUSSION

Theoretical Implications

From a theoretical perspective, our paper contributes to the literature by analyzing the factors influencing consumer attitudes and intention to use shared biking services. Our study contributes both to the shared biking services literature and to the managerial field dealing with the management and design of shared biking services in emerging markets.

The IDT theory provides a fundamental base for examining the factors for innovative transportation services. By following the premises of IDT theory, we investigated the factors that may influence shared biking attitudes. The perceived complexity of shared biking service systems negatively influences consumer attitudes. As the customers view registering and borrowing / returning as difficult, they develop negative attitudes toward shared biking services. These findings contribute to the existing body of literature on perceived complexity (e.g. Chen & Lu, 2016; Cheng et al., 2019; Wang et al., 2021). The current study expands on these findings by establishing a strong link between shared biking services and technology, which customers may perceive as complex because all service operations are carried out via websites, smartphone applications, and smart lock screens.

Another finding, in line with the prior research (Chen et al., 2014; Cheng et al., 2019; Gao et al., 2019), was that perceived usefulness positively affects attitudes toward bike-sharing services. Benefits related to commuting performance and overcoming traffic congestion appear to be influential in forming positive attitudes toward shared biking. Additionally, perceived hedonic value has a positive effect on attitude. Hedonic values such as fun, excitement, and entertainment contribute to favorable attitudes and thus are significant in adoption and acceptance, as previously discussed in the literature (e.g. Kim et al., 2020; Zhang et al., 2021; Chopdar, Lytras & Visvizi, 2022). Interestingly, we found that perceived risk has no significant effect on shared biking attitude. Although perceived risk was previously found to have a negative impact in some contexts (e.g. Cheng et al., 2019; Song et al., 2021), in Türkiye, we understand that perceived risk concerns are much less influential. In this respect, this study adds to the growing body of literature on the cultural contingency of attitudes towards shared mobility services. It suggests that the impact of perceived risk on shared biking attitudes is not universal but rather context-specific.

Compatibility partially mediates the relationship between attitude and intention to use bike sharing. As self-congruence theory posits (Sirgy et al., 1991), during service acceptance, consumers seek a fit with their self-schema values. To promote self-esteem and maintain self-consistency, people engage in activities or products/services that are consistent with their self-concept, and a higher degree of congruence may lead to more favorable intentions. When service consumers find the service congruent with their lifestyle and travel habits, they are more inclined to use it. This finding supports the previous finding by Wang et al. (2021), stating that compatibility has a significant effect on mode switching. As for the control variables, it is found that physical activity has a positive impact on the intention of the shared biking systems, which gives insights from the Theory of Planned Behavior and Social Cognitive Theory, supporting the idea that engaging in regular physical activity can positively influence one's attitudes towards adopting shared biking (Mars, Ruiz & Arroyo, 2018; Mikiki, Oikonomou & Katartzi, 2021).

Managerial Implications

The findings of this research have important implications for shared service providers in both the private and public transport sectors. This study will provide insights with the potential to contribute to the development of service design and service marketing strategies that respond better to users' needs, and also, facilitate the spread of these mobility systems.

To facilitate the diffusion of shared biking services, cooperation is needed between service providers and public transport policymakers to use marketing channels to promote the usefulness and hedonic value that are generated through shared biking service experiences. Benefits and hedonism-oriented awareness campaigns initiated by public institutions may help to change consumers' perceptions. Especially in big, traffic-congested cities, it is important to emphasize commuting performance and speed. Calling to mind the joyful and fun side of cycling may make a difference since many in Türkiye regard shared biking as a form of entertainment rather than a means of transportation (Uslu et al., 2012).

The degree to which an individual finds the offered service or product to be a match to his or her lifestyle and ideals is referred to as compatibility. In this way, it is significantly tied to potential adopters' socio-cultural values, beliefs, past and current experiences, and needs (Karahanna, Agarwal & Angst, 2006). The partial mediation role of compatibility shows that when consumers perceive shared biking services as compatible with these aspects, they develop the intention to use shared biking services. This finding is crucial since it highlights the role of the individual's assessment of bike-sharing system compatibility. Lifestyle marketing efforts and awareness campaigns initiated by public institutions can influence consumers' compatibility perceptions. With a wider network of shared biking services encompassing terminal hubs in diverse transportation modes, consumers may find the shared biking services more congruent to their existing commuting styles. Municipality-driven effective marketing strategies, such as promoting bike-to-work policies through incentive programs and establishing bike-connected intermodal models in public transportation policies are ways to attract more interest.

Service providers should find new ways for reducing the perceived complexity of the technical aspects of the shared biking systems, particularly registration and borrow/return processes. Moreover, informative campaigns would help to constitute more favorable shared biking attitudes. The borrow and return processes should be explained with infomediaries and communicated through the media. Interfaces for technology in these phases, like bike management panels, visuals for smart locks, and card usage, might be seen as intricate by both existing and prospective users of shared biking services. The complexity concerns can also be diminished through extensive customer services via websites or call centers accessible to the users.

Lastly, understanding the link between physical activity and shared biking attitudes can be beneficial in promoting shared biking. As people engage in physical activity, they will have more favorable attitudes towards shared biking since it is a health-enhancing urban mobility option. Also, promoting shared biking as a physical activity would be helpful to attract attention among those who engage in physical activity. Therefore, policymakers and urban planners can design strategies that encourage the integration of physical activity and shared biking, contributing to healthier and more sustainable cities.

Future Research and Limitations

The limitations of this study provide directions for future research. First, this study was done in an emerging country and the respondents were restricted to those living in Türkiye. Second, as discussed in the introduction and managerial implications of our research, the compatibility element is indeed country and cultural-specific and can be influenced by various factors unique to each location. In this regard, a multi-country comparative study may allow us to explore the differences and similarities in compatibility across different settings which can increase the generalizability of the study. Second, in future research, observations or interviews can be added to the investigation, along with the consideration of other theories and variables that can identify further factors affecting the intention or behavior to use shared biking. Finally, although this study was very focused on the bike-sharing system, not all possible aspects were considered, which leaves opportunities for focus on other relevant concepts in future studies, including actual behavior, personality traits, environmental concerns, and social and cultural differences in bike-sharing adoption.

Data Availability Statement

The data that support the findings of this study are available from SÖ, upon reasonable request.

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