Research in Transportation Business & Management 64 (2026) 101520

Contents lists available at ScienceDirect

Research in Transportation Business & Management

journal homepage: www.elsevier.com/locate/rtbm

To own or share e-scooters? Factors in ownership and sharing of e-scooters

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ARTICLE INFO

Keywords:
Green innovations
E-scooter
Shared micromobility
Innovation adoption

ABSTRACT

This paper aims to determine how consumer innovativeness, susceptibility to interpersonal influence, personal norms, and innovation attribute perceptions affect the consumer decision to use, share, and own an e-scooter. The decision to use encompasses traveling using an e-scooter, sharing means using an e-scooter on a demand basis, and owning means buying an e-scooter for personal use. Consequently, this paper contributes to understanding novel mobility modes that aim to decrease the environmental problems in transport. It also develops knowledge about green innovations that could be perceived as causing more environmental problems than their traditional counterparts. A survey was conducted in Sweden with 1002 participants, who were non-users, owners, and sharers of e-scooters. Structural equation modelling showed that susceptibility to interpersonal influence and perceived safety attributes of e-scooters consistently positively influence decisions to use and own. This paper increases the understanding of factors influencing e-scooter use, sharing, and ownership, which is valuable for e-scooter businesses and service providers, transport agencies, and policy-makers.

1. Introduction

Electrification and digitalization have introduced new possibilities to help cities address environmental sustainability across different sectors. One of the possibilities generated through these developments is e-scooters, particularly their shared form. *E*-scooters have been around for a while, but they achieved their market breakthrough in 2017 when their sharing was introduced in the US (Orozco-Fontalvo, Llerena, & Cantillo, 2022).

E-scooter sharing works by placing the microvehicles in different parts of an urban area. User access is done by installing a provider's app on a smartphone. A user can then pick up the microvehicle from a location suggested by the GPS or scan an e-scooter nearby. Users usually pay a flat rate and then pay additional rates based on the duration of the trip; however, providers have started to provide subscriptions to promote broader adoption and to lower costs for existing users (Chen, 2021; Orozco-Fontalvo et al., 2022).

E-scooters are part of the rapidly developing micromobility phenomenon, which aims to reduce urban carbon emissions by replacing short-distance car trips without huge changes in the built environment. The introduction of e-scooters can affect a city in different ways in terms of congestion, accessibility, and air quality, among others. Previous estimates have shown that while shared e-scooters produce higher greenhouse gas emissions compared to shared bikes and e-bikes, trips with shared e-scooters account for less carbon emission than an average car commute (Hollingsworth, Copeland, & Johnson, 2019). However, more recent environmental impact assessments of private and shared e-scooters have demonstrated a significant reduction in their lifecycle carbon emission due to improvements in the technologies surrounding them (ITF, 2020, 2024). In fact, private e-scooters have a lower lifecycle greenhouse gas emission compared to shared e-bikes (ITF, 2024) and shared e-scooters have a comparable impact to those of buses and metros (ITF, 2020).

Regarding transport mode substitution, there are differences in what and when private and shared e-scooters are used. On the one hand, private e-scooters are used for long trips and seen as alternatives to cars (Dürhammer, Juschten, Schilder, & Hössinger, 2025). On the other hand, some studies have revealed that instead of replacing private cars

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https://doi.org/10.1016/j.rtbm.2025.101520
Received 13 May 2025; Received in revised form 30 July 2025; Accepted 29 September 2025
Available online 6 October 2025

(as some e-scooter providers have argued), shared e-scooters are used for trips usually taken by foot, bike, public transport, and other forms of shared mobility (Lee, Chow, Yoon, & He, 2021; Orozco-Fontalvo et al., 2022). Because of these differences, research regarding what drives consumers to own and use shared e-scooters can be beneficial since it can help understand and implement new transport technologies, not only e-scooters, in order to decrease the environmental problems of transportation in towns and cities. In this research, we specifically address the question: *What motivates consumers to use e-scooters and what factors influence them to own an e-scooter or use a shared one?*

Research in consumer psychology, transportation, and travel behavior, particularly research focusing on shared transportation modes and electric vehicles (e.g., Axsen & Sovacool, 2019; Nordlund & Garvill, 2003; Schuitema, Anable, Skippon, & Kinnear, 2013), including cars, e-bikes, and e-scooters, has provided various directions on where to focus on getting a deeper understanding of the factors that could motivate consumers to adopt e-scooters. On one hand, because e-scooters, like e-bikes, are viewed as innovations, consumer innovativeness and its correlates are deemed relevant for the study of the microvehicles (Flores & Jansson, 2021). On the other hand, environmental psychology has pointed to the importance of norms in the diffusion of green products (Noppers, Keizer, Bockarjova, & Steg, 2015; Nordlund & Garvill, 2003). In transport literature, research has emphasized e-scooter-related attributes such as price, speed, and safety that are important for consumer adoption (Fil & Dirsehan, 2024; Gössling, 2020; Lee et al., 2021).

In line with the literature, we aim to determine how consumer innovativeness, susceptibility to interpersonal influence (SII), personal norms, and innovation attribute perception, such as the perceived instrumental, hedonic, and environmental benefits of e-scooters, affect the decision of consumers to use, specifically, to share or own a novel and rapidly growing green mobility option, the e-scooter. In this paper, the decision to use encompasses traveling using an e-scooter for various purposes, sharing means using an e-scooter on a demand basis using an app, and owning means buying an e-scooter for personal use.

By including accepted and used factors from various fields, this paper clarifies how relevant personal, environmental, and innovation-related factors are in e-scooter use and ownership and adds to the limited knowledge regarding consumer motivation to use e-scooters and other green innovations in general. In comparison to studies that focused on adoption and behavioral intentions around shared micromobility (e.g., Flores, 2024) and the adoption of e-scooters (Fil & Dirsehan, 2024), the current paper includes not only adoption in terms of using, but also owning and sharing e-scooters, adding important nuance to mobility choices. Consequently, the results contribute to the identification of future research and policy directions on which aspects of consumer psychology and novel green products to focus on when promoting green innovations.

1.1. Green innovation adoption

The increasing interest and relevance of green innovations have prompted the growth in studies that tackle green innovation adoption. In this section, we review existing research in this area, particularly focusing on literature that identifies factors that can affect consumer decisions to adopt pro-environmental products. Indeed, consumers face interrelated and sometimes conflicting factors every time they decide to behave pro-environmentally (Dangelico, Nonino, & Pompei, 2021; Ozaki, 2011). Therefore, it is relevant to provide an overview of what could be significant in adopting green innovations, especially in personal transport. In our review, we focus on the literature about innovation adoption (e.g., Clark & Goldsmith, 2006; Dangelico et al., 2021; Flores, 2024), environmental psychology (e.g., Bamberg, Hunecke, & Blöbaum, 2007; Jansson, Nordlund, & Westin, 2017), and perceptions of innovations (e.g., Noppers et al., 2015; Ostlund, 1974).

Based on this review and the proposed model of Flores (2024) regarding the relationship between innovativeness and motivations and the decision to use and behavioral intentions for shared e-bikes and e-scooters, we propose a model for our study, illustrated in Fig. 1. We use consumer innovativeness, susceptibility to interpersonal influence, personal norms, and innovation attribute perceptions as the four overarching factors for our empirical research. Consumer innovativeness, interpersonal influence, and personal norms encompass personal-level characteristics relevant to innovation adoption. Innovation attribute perceptions cover important aspects when adopting green innovations and choosing a transport mode. By taking these four factors together, we can better understand green innovation adoption, particularly the decision to use and own an e-scooter.

1.2. Consumer innovativeness

Consumers adopt innovations at different rates. Some consumers are quick to try innovations and communicate the benefits of these novel products to their social environment. Others, on the other hand, are slower to try and rely on the opinions of their social environment to decide. According to Clark and Goldsmith (2006), consumer innovativeness is a person's propensity to adopt novelties faster than their social environment.

The diffusion of innovations theory proposes that everyone possesses a certain level of innovativeness, i.e., being innovative is a trait of every individual (Rogers, 2003). Scholars and practitioners view this innate innovativeness or global innovativeness as an important antecedent of early adoption (Clark & Goldsmith, 2006). Individuals who are innovative are more likely to be risk-takers and able to cope with uncertainties (Im, Bayus, & Mason, 2003). Indeed, innovativeness, as measured by someone's affinity for new ideas, can mediate the relationship between attitude towards the environment and faster adoption of green behavior (Englis & Phillips, 2013). However, another study about green purchase behavior has not provided support that consumer innovativeness can increase the propensity, satisfaction, and willingness to pay for green products (Dangelico et al., 2021).

In the context of shared micromobility, Flores (2024) has found that individuals who are more willing to adopt new products that are environmentally friendly are more likely to try shared e-bikes and e-scooters. However, it does not predict whether they will keep using them or recommend them. While the relationship between innate innovativeness and innovation adoption is unclear, and results across and within domains are mixed (Im et al., 2003, p. 2), many researchers have continued to focus on innovativeness as an innate attribute because it offers the possibility to draw conclusions on a general level (Englis & Phillips, 2013). Many previous consumer innovativeness studies also assume that innovativeness is a stable personal trait; hence, external measures can be

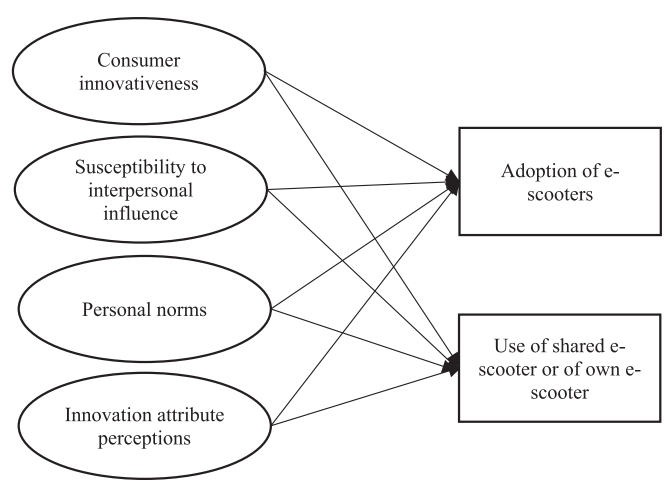

Fig. 1. Overview of the factors included in this research and their relationship with the adoption and ownership of e-scooters.

applied to enhance the positive influence of such attributes (Heidenreich, Spieth, & Petschnig, 2017). These external measures can include, but are not limited to policies and regulations, infrastructure, communication, and marketing strategies (Heidenreich et al., 2017). From this, it can be inferred that, from a business point of view, exerting marketing efforts that increase motivation from consumers to adopt innovations can contribute to the positive effect of innate consumer innovativeness' positive effect.

Based on findings about the positive effect of consumer innovativeness on the adoption of green innovations, we hypothesize that consumer innovativeness has a positive impact on the decision to adopt e-scooters. We also hypothesize that, because ownership is riskier due to the initial costs involved in buying an innovation and innovative consumers tend to be risk-takers, consumer innovativeness positively affects the decision to own an e-scooter rather than using the shared services. Formally, we hypothesize the following:

H1a: Consumer innovativeness positively affects the decision to adopt e-scooters.

H1b: Consumer innovativeness positively affects the decision to own e-scooters rather than to use shared e-scooters.

1.3. Susceptibility to interpersonal influence

Susceptibility to interpersonal influence is the extent to which an individual seeks other people's opinions about different choices of brands and products (Bearden, Netemeyer, & Teel, 1989; Manning, Bearden, & Madden, 1995). Research regarding the effect of SII has shown that part of the population is more inclined to seek confirmation and support among other people for their choices of, for example, new products and making a purchase (Khare, 2014; Mourali, Laroche, & Pons, 2005; Netemeyer, Bearden, & Teel, 1992).

SII increases the propensity of a consumer to purchase products that improve their social environment's evaluation of them and avoid those that can cause negative perceptions (Netemeyer et al., 1992). Mourali et al. (2005) presented that SII can be grouped into three facets – utilitarian, value expressive, and informational. The utilitarian aspect is concerned with the goal of compliance to achieve rewards and avoid punishments. The value expressive facet operates to attain self-expression, self-identity and group belongingness. Finally, SII based on informational aspect is based on the degree of accepting information from others as credible.

In a social behavior study among college students, it has been found that smoking behavior is related to the degree of susceptibility to the interpersonal influence of a person (Kropp, Lavack, & Holden, 1999). The more susceptible a person is to interpersonal influence, the lower the tendency of the person to smoke, as smoking can be considered unacceptable social behavior. In a study regarding the effect of SII on ecological buying behavior among Indian consumers, results revealed that there was a relationship between SII and consumers' tendency to behave pro-environmentally (Khare, 2014).

Although there are mixed perceptions of e-scooters, we argue that SII has a positive impact on the decision to adopt them, as they are promoted as a green transport innovation. Furthermore, a study of the impact of social perception of e-scooters found that it significantly and positively affects the perceived usefulness of the microvehicle (Arı & Yılmaz, 2024), and indeed, when perceived utility is high, there is a higher tendency to choose owning a product than using a sharing option (Lamberton & Rose, 2012). Given these arguments, we propose the following:

H2a: Susceptibility to interpersonal influence positively affects the decision to adopt e-scooters.

H2b: Susceptibility to interpersonal positively affects the decision to own e-scooters rather than to use shared e-scooters.

1.4. Personal norms

According to Ozaki (2011), activating norms is important in promoting sustainable behavior. Personal norms manifest themselves as feelings of personal moral responsibility, a feeling of living in line with one's values, and acting non-pro-environmentally gives a bad conscience. Personal norms are found to be significant in predicting the intention to use public transport, according to a study in Germany (Bamberg et al., 2007). Indeed, the study demonstrated how personal norm is a direct positive predictor of behavioral intention.

Two different studies in Sweden have also shown the importance of personal norms in the adoption of green transport innovation. In one study, personal norms positively influenced the intention to switch to alternative forms of vehicles, such as hybrid cars and e-cars (Nordlund, Jansson, & Westin, 2016). In another study about the adoption of electric and flexfuel vehicles, it showed that personal norms have a significant positive impact on the adoption of these vehicles (Jansson et al., 2017).

Aligned with these findings, we hypothesize that personal norms play a significant positive role in the decision to adopt e-scooters because, like other forms of electric or alternative vehicles, they are argued to have a positive impact on the environment. Furthermore, we argue that personal norms increase the likelihood of choosing to own an e-scooter rather than using a shared one because the use of one's own e-scooter minimizes doubts regarding its environmental impact. The environmental impact of shared e-scooters is highly debatable, given the issues surrounding their use and regulations. Therefore, formally, we hypothesize the following:

H3a: Personal norms positively affect the decision to adopt e-scooters.

H3b: Personal norms positively affect the decision to own e-scooters rather than to use shared e-scooters.

1.5. Innovation attributes

Following the findings of previous studies, we grouped the attribute perceptions of e-scooters in terms of their instrumental, hedonic, and environmental benefits. Ostlund (1974) demonstrated how consumer perceptions of innovation attributes significantly influence innovation adoption. The author showed that perceptions could better predict adoption than consumer characteristics. On the other hand, a more recent synthesis by Axsen and Sovacool (2019) showed how nuanced and complex the effect of user perceptions is in the adoption of electric and shared vehicles. In pro-environmental behaviors, consumers may refrain from adopting green products because of the perceived drawbacks in functionality, comfort, and other substantial product attributes (Steg, Perlaviciute, van der Werff, & Lurvink, 2014).

Transport and market studies have extensively studied transport attributes important in mode choice and adoption (Noppers et al., 2015; Schmalfuß, Mühl, & Krems, 2017; Schuitema et al., 2013). In a study regarding e-vehicle adoption, it has been presented that to increase adoption, consumers' perceptions of e-vehicle value, which include costs of ownership and environmental benefits, should be improved (Kim, Oh, Park, & Joo, 2018). Safety, on the other hand, is considered a significant barrier to bicycle sharing, as the lack of infrastructure and the attitude of car drivers towards cyclists (Fishman, Washington, & Haworth, 2012). Safety is also an issue with the use of e-scooters, as their regulation has been limited and because of the road accidents involving them (Gössling, 2020). Another issue is the relatively high costs involved, particularly in using shared e-scooters (Orozco-Fontalvo et al., 2022).

In this research, we define instrumental attribute perception as how users perceive the convenience, costs, and safety of using e-scooters. We propose that having a positive perception of the instrumental attributes of e-scooters positively affects the decision to adopt the microvehicles. Additionally, aligned with research regarding the advantages of owning over sharing (Lamberton & Rose, 2012), we argue that the attractiveness of owning is dependent on how positively a user evaluates the costs and benefits of e-scooters. Therefore, we propose the following hypotheses:

H4a: Positive perception of the instrumental attributes of e-scooters positively affects the decision to adopt e-scooters.

H4b: Positive perception of the instrumental attributes of e-scooters positively affects the decision to own e-scooters rather than to use shared e-scooters.

Hedonic attribute perception is also important in the diffusion of transport innovations. In this research, we define this as how users perceive the use of e-scooters as fun, enjoyable, and modern. A study has shown that indeed consumer anticipation of positive emotions predicted the intention to adopt e-vehicles and mediated the effect of attitude towards the instrumental characteristics of e-vehicles (Schuitema et al., 2013). A study conducted in Türkiye examined factors that affect e-scooter use, including the perceived pleasure of riding an electric scooter, and showed how hedonic benefits increased user intention and usage of e-scooters (Arı & Yılmaz, 2024). Another study including shared e-scooters in Sweden has also found that the hedonic benefits of these microvehicles positively affect initial adoption and ongoing behavioral intentions (Flores, 2024). Based on these findings, we argue that when individuals have a positive evaluation of the hedonic attributes of e-scooters, they are more likely to adopt e-scooters. Moreover, we hypothesize that the hedonic benefits of using e-scooters are strengthened with ownership as owners do not have to think of the costs related to the distance and time traveled with the e-scooter, as well as the availability of the microvehicle whenever they want to use it for leisure. With these arguments, we hypothesize the following:

H5a: Positive perception of the hedonic attributes of e-scooters positively affects the decision to adopt e-scooters.

H5b: Positive perception of the hedonic attributes of e-scooters positively affects the decision to own e-scooters rather than to use shared e-scooters.

E-scooters could have potential environmental benefits if they replace short-distance trips made by cars. We define environmental attribute perception as how users perceive the use of e-scooters as good for the environment. A study about e-scooter adoption in Türkiye highlights that, despite being significant, environmental motivations were not strong incentives for the use of e-scooters (Fil & Dirsehan, 2024). However, a study of e-scooter users and non-users in Sweden showed that users have a more positive perception of the green attributes of e-scooters than non-users (Flores & Jansson, 2021). The study also demonstrated that the green attribute perception of e-scooters positively influences the decision to adopt them. Congruent with these results, we argue that positive environmental attribute perception of e-scooters has a positive impact on the decision to adopt them. Furthermore, these positive perception increases the tendency to own an e-scooter rather than to use a shared one, simply because of the arguable environmental impact of shared services.

H6a: Positive perception of the environmental attributes of e-scooters positively affects the decision to adopt e-scooters.

H6b: Positive perception of the environmental attributes of e-scooters positively affects the decision to own e-scooters rather than to use shared e-scooters.

2. Method

A panel research company conducted a survey online between February and March 2020 in Sweden. The researchers designed the questionnaire by adopting measures from the literature. To recruit the participants, the panel research company sent an email invitation to panel members living in certain cities in Sweden where shared e-scooters were available at the time. As the aim was to include as many e-scooter owners and shared e-scooter users, the panel was selected based on areas where e-scooters, particularly shared ones, were available to ensure relevance to the subject matter. The overrepresentation of shared e-scooter users reflects the research goal of including as many users and owners as possible. As there were only a few respondents who were owners, it was decided to include more shared e-scooter users. Additionally, only those older than 16 years and with a driver's license were included in the research. Therefore, the panel is not representative of the general Swedish population. In total, 1002 respondents were included in the analysis. Table 1 summarizes the demographic characteristics of the participants grouped into non-user, shared e-scooter users, and owners of e-scooter. Majority of the participants were female and between 35 and 59 years old. Most also had an annual income between SEK 300001–500,000. In the survey, owners of e-scooters indicated that they had also used shared e-scooters.

Shared e-scooters were introduced in Sweden in 2018 (Chen, 2021). The services have since then been available in several large cities in the country. No national regulations regarding e-scooter use were in place in the country at the time of the study; therefore, cities were responsible for controlling their use (Chen, 2021).

2.1. Measures

The measures in this study were adopted from innovation, environmental psychology, and transport literature. Respondents rated the measures using a 7-point Likert-type scale (from 1 = Strongly disagree, to 7 = Strongly agree). The consumer innovativeness measures were adopted from the innovativeness scale developed by Hurt, Joseph, and Cook (1977). Susceptibility to interpersonal influence measures were based on the items outlined by Bearden et al. (1989) in their research on how interpersonal influence affects product and brand acquisition. The personal norm measures were adopted from Jansson, Marell, and Nordlund (2011), which looked at the adoption of eco-innovations in the personal transport sector. Finally, the constructs for innovation attribute perception were from various consumer behavior and transport literature, outlining the factors important in transport choice decision-making and transport alternatives to e-scooters (Gössling, 2020; Schmalfuß et al., 2017).

Table 1
Demographic characteristics of participants.

Characteristics	Non-user (*n* = 301)	Shared user (*n* = 582)	Owner (*n* = 119)
Male	38 %	48 %	51 %
Female	62 %	51 %	47 %
Other / Prefer not to answer	1 %	1 %	2 %
Age			
16–24	2 %	14 %	16 %
25–34	16 %	34 %	43 %
35–59	72 %	50 %	40 %
> 60	9 %	2 %	1 %
Income (in SEK)			
< 300,000	20 %	17 %	20 %
300,001–500,000	25 %	21 %	24 %
500,001–700,000	17 %	22 %	16 %
700,001–900,000	15 %	15 %	20 %
> 900,001	10 %	11 %	5 %
Do not know / Prefer not to answer	14 %	14 %	15 %

3. Results

3.1. Descriptives

Before testing of the hypotheses, we analyzed the reliability of the scales using JASP version 0.19.1. The variables' reliabilities were measured using Cronbach's alpha and found acceptable (> 0.70) (Hair, 2014). We also checked the normality of the data distribution using the values of skewness and kurtosis. The factors' skewness and kurtosis were all within the recommended +2/−2 range (Hair, 2014). Afterward, to check for issues of multicollinearity, the correlation and variance inflation factor (VIF) were measured. All VIF values were below the threshold value of 10 (O'brien, 2007). In addition, a confirmatory factor analysis was conducted to test the hypothesized measurement model. The CFA showed that an item in Susceptibility to interpersonal influence, "If I have little experience with a product, I often ask my friends about the product" had a low loading on the construct (> 0.30), which led to its removal from the analysis. Furthermore, the instrumental attribute perceptions were broken into three groups, which are convenience, safety, and price. Convenience included questions related to speed, comfort, and flexibility offered by e-scooters. Safety referred to items about safety in use and traffic safety, and finally, price was about the perceived price of e-scooters as a daily means of transport. The results of the analyses are found in Appendix Table 1 for skewness and kurtosis, Tables 2 and 3 for correlations and VIF, and Table 4 for the factor loadings, composite reliability, and AVE. Afterward, we applied structural equation modelling in JASP to test the relationships between the factors and the adoption and use of shared or ownership of e-scooters. Finally, we compared the level of consumer innovativeness, susceptibility to interpersonal influence, personal norms, and perception of the innovation attributes between groups, i.e., non-adopters vs. adopters, and owners and sharers.

3.2. Hypothesis testing

Two structural equation models were tested in this paper. The first model tested how the decision to use an e-scooter is influenced by innovativeness and interpersonal factors, personal norms, and innovation attribute perceptions. The second model measured how the same set of factors influences the decision to share or own an e-scooter.

The results of the first structural equation modelling indicate an acceptable model fit ($\chi 2$ (df) = 1018.513(182); $\chi 2$/df = 5.596; SRMR = 0.075; NFI = 0.917; CFI = 0.930; and RMSEA = 0.068). Surprisingly, the results show that innovativeness did not have a significant effect on the decision to adopt e-scooters ($\beta = 0.021$; $p = .205$), failing to support the first hypothesis. This is also true for personal norms ($\beta = -0.008$; $p = .572$), convenience perception ($\beta = -0.025$; $p = .640$), greenness perception ($\beta = -0.009$; $p = .529$), and price perception ($\beta = -0.012$; $p = .122$). On ther other hand, susceptibility to interpersonal influence ($\beta = 0.061$; $p < .001$), hedonic perception ($\beta = 0.093$; $p = .022$) and safety perception ($\beta = 0.037$; $p = .007$) positively influenced the decision to adopt e-scooters, indicating that the hypotheses related to these factors are applicable. The model's coefficient of determination (r^2) = 15.6 %.

The results of the second structural equation modelling also indicate an acceptable model fit ($\chi 2$ (df) = 684.588(182); $\chi 2$/df = 3.761; SRMR = 0.071; NFI = 0.918; CFI = 0.938; and RMSEA = 0.063). The results show that, once again, innovativeness did not have a significant effect on the decision to use a shared e-scooter or own one ($\beta = -0.020$; $p = .315$). Additionally, personal norms ($\beta = -0.001$; $p = .922$), convenience perception ($\beta = 0.077$; $p = .311$), hedonic perception ($\beta = -0.066$; $p = .245$), and greenness perception ($\beta = -0.013$; $p = .362$) also did not have any significant impact on the decision to use. In contrast, susceptibility to interpersonal influence ($\beta = 0.056$; $p < .001$) and safety perception ($\beta = 0.041$; $p = .005$) positively influenced the decision to own an e-scooter. Finally, price perception also had a significant positive effect on e-scooter ownership decision ($\beta = 0.027$; $p < .001$). The model's coefficient of determination (r^2) = 13.1 %. Table 2 summarizes the results of the hypotheses and their significance levels.

3.3. Group differences

Based on the comparison between adopters and non-adopters of e-scooters, *t*-test results reveal significant differences across all the factors included in the study the between the two groups, which means that adopters have higher levels of innovativeness, susceptibility to interpersonal influence, and personal norms than non-adopters, and they have stronger perception of the benefits of e-scooter adoption to them and environment than those who do not use e-scooters: Consumer innovativeness ($t = -4.509$, df = 1000, $p < .001$), susceptibility to interpersonal influence ($t = -8.516$, df = 1000, p < .001), personal norms ($t = -5.762$, df = 1000, p < .001), convenience attribute perception ($t = -5.891$, df = 1000, p < .001), safety attribute perception ($t = -9.328$, df = 1000, p < .001), hedonic attribute perception ($t = -7.458$, df = 1000, p < .001), and environmental attribute perception ($t = -5.578$, df = 1000, p < .001). This is also the case for price perception, which was analyzed using the Welch *t*-test because it violated the equal variance assumption ($t = -2.2937$, df = 1000, $p < .05$).

Between shared e-scooter users and e-scooter owners, there are

Table 2
Summary of hypothesis results.

Hypothesis	Results	Significance level
H1a: Consumer innovativeness positively affects the decision to adopt e-scooters.	Rejected	n/a
H1b: Consumer innovativeness positively affects the decision to own e-scooters rather than to use shared e-scooters.	Rejected	n/a
H2a: Susceptibility to interpersonal influence positively affects the decision to adopt e-scooters.	Supported	p < .001
H2b: Susceptibility to interpersonal positively affects the decision to own e-scooters rather than to use shared e-scooters.	Supported	p < .001
H3a: Personal norms positively affect the decision to adopt e-scooters.	Rejected	n/a
H3b: Personal norms positively affect the decision to own e-scooters rather than to use shared e-scooters.	Rejected	n/a
H4a*: Positive perception of the convenience attributes of e-scooters positively affects the decision to adopt e-scooters.	Rejected	n/a
H4a**: Positive perception of the price of e-scooters positively affects the decision to adopt e-scooters.	Rejected	n/a
Ha***:Positive perception of the safety attributes of e-scooters positively affects the decision to adopt e-scooters.	Supported	p < .05
H4b*: Positive perception of the convenience attributes of e-scooters positively affects the decision to adopt e-scooters.	Rejected	n/a
H4b**: Positive perception of the price of e-scooters positively affects the decision to adopt e-scooters.	Supported	p < .001
H4b***: Positive perception of the safety attributes of e-scooters positively affects the decision to adopt e-scooters.	Supported	p < .05
H5a: Positive perception of the hedonic attributes of e-scooters positively affects the decision to adopt e-scooters.	Supported	p < .05
H5b: Positive perception of the hedonic attributes of e-scooters positively affects the decision to own e-scooters rather than to use shared e-scooters.	Rejected	n/a
H6a: Positive perception of the environmental attributes of e-scooters positively affects the decision to adopt e-scooters.	Rejected	n/a
H6b: Positive perception of the environmental attributes of e-scooters positively affects the decision to own e-scooters rather than to use shared e-scooters.	Rejected	n/a

*, **, *** Based on CFA results, instrumental attribute perceptions were divided into three groups, which are convenience, safety, and price.

significant differences in the degree of susceptibility to interpersonal influence ($t = -7.420$, df = 699, p < .001), personal norms ($t = -4.833$, df = 699, p < .001), convenience attribute perception ($t = -2.671$, df = 699, p < .05), and price perception ($t = -6.096$, df = 699, p < .001), with owners scoring higher in these factors. They also differ in the safety attribute perception ($t = -7.923$, df = 181.508, p < .001) analyzed using the Welch t-test, with owners seeing e-scooter use as safer than shared e-scooter users. However, there are no significant differences in terms of consumer innovativeness ($t = -1.589$, df = 699, $p = .113$), hedonic attribute perception ($t = -1.593$, df = 699, $p = .112$), and environmental attribute perception ($t = -1.735$, df = 699, $p = .083$).

4. Discussion

In this paper, we show how various factors are related to the decision to use, share, and own an e-scooter. Among the factors outlined in studies regarding green innovations, we identify several factors that are significantly related to e-scooter use. We also demonstrate whether there are significant differences between some personal characteristics of users and non-users and shared e-scooter users and owners, and their perceptions of the different attributes of e-scooters.

Overall, those who have used an e-scooter valued its characteristics more positively than non-users. Although users also tend to be more innovative, more susceptible to their social environment, and have higher degrees of personal norms, only susceptibility to personal influence is influential in the decision to use e-scooters, while innovativeness and personal norms are not relevant. These findings support research on how interpersonal influence is relevant in the adoption of green innovations (Khare, 2014), but surprisingly, contradict studies showing the significance of being innovative in the adoption of e-scooters (Flores & Jansson, 2021) and personal norms in the adoption of green innovations (Nordlund et al., 2016). From these results, we can infer that first, despite e-scooter users being generally more innovative, this characteristic does not play a significant role when they decide to adopt an e-scooter. Second, even though e-scooter users may behave more based on personal expectations, these norms do not necessarily affect their decision to use an e-scooter when other factors are taken into consideration. This insignificance could be attributed to the mixed perceptions about the greenness of e-scooters. Third, social groups are seen as important factors in the decision to use an e-scooter. These results partially reinforce previous research showing that innovativeness is negatively correlated to interpersonal factors (Clark & Goldsmith, 2006). This means that the adoption of e-scooters hinges more on social acceptance and is dependent on one's social environment and opinions than on individual-level characteristics. This also shows that the social influence should not be neglected when communicating with innovators. Indeed, an innovator's social environment could be a significant motivator for the adoption of innovations, for instance, to signal status or identities to others, as shown in the adoption of electric vehicles (e.g., Schuitema et al., 2013).

It is also surprising that among the innovation attributes of e-scooters, only safety and hedonic attributes are significant in the decision to use them. The other attributes, such as price, convenience, and greenness, are not important. Although the findings are aligned with previous studies that show that environmental motivations are not important incentives to drive the adoption of e-scooters (Fil & Dirsehan, 2024) and hedonic motivations are strong motivators of adoption, they contradict the results that value of economic benefits and convenience in the adoption of e-scooters (Arı & Yılmaz, 2024).

In contrast to users and non-users of e-scooters, owners and sharers of e-scooters differ only in some characteristics and perceptions. Owners are more susceptible to interpersonal influence, have higher degrees of personal norms, perceive e-scooters as more convenient and safer, and have a more positive price evaluation. On the other hand, they do not differ in terms of innovativeness and hedonic and environmental attribute perceptions.

In the decision to own an e-scooter or use a shared e-scooter, only three factors show significant influence: susceptibility to interpersonal influence, price, and safety attribute perceptions. The relevance of susceptibility to interpersonal influence continues to persist, establishing the importance of interpersonal influence in the decision to use and own an e-scooter. Indeed, one of the sources of utility of sharing is social utility or approval from reference groups (Lamberton & Rose, 2012). This could indicate that, for owners, they are most likely surrounded by people who approve of or even use e-scooters. The relevance of price and safety perceptions has also been demonstrated in previous research (Fishman et al., 2012; Orozco-Fontalvo et al., 2022). The findings show that owners perceive the economic benefits of owning e-scooters to be higher when they own as opposed to when they use shared e-scooters, as the cost of using shared e-scooters is highly dependent on the distance traveled and is more expensive than walking and using public transport. Finally, owning reduces the perception of safety risk as owners could have a better sense of control as they own the vehicle and maintain it themselves.

Contrary to the hypotheses, consumer innovativeness and personal norms do not play a significant role. Therefore, innovativeness and personal norms, which have been shown to be often significant in innovation adoption, do not necessarily help in predicting use and ownership, limiting their magnitude in distinguishing who may use and who may buy an e-scooter. Also contrary to the hypotheses, convenience, hedonic, and environmental attribute perception do not have a significant influence when users decide to own an e-scooter. Particularly surprising is the lack of significance of convenience, as ownership of an e-scooter means that users are not dependent on others for the availability of the transport mode. Furthermore, it goes against the perceived risk of scarcity in the sharing economy (Lamberton & Rose, 2012). Nonetheless, because of the risk of theft, owners have to take their e-scooters with them and not leave them simply at a designated parking space. Related to this argument, there is more freedom with shared e-scooters as users can leave the mobility option and not have to think about returning to pick them up. Sharers also do not have the responsibility of maintaining and charging the device, making it more convenient for shared e-scooter users.

In summary, consumer innovativeness, personal norms, and environmental attribute perception are not important in the decision to adopt and the decision to own or use a shared e-scooter. On the other hand, susceptibility to interpersonal influence and safety attribute perceptions are relevant to both decisions, and these factors positively influence the decision to use and to own an e-scooter. We can infer from the findings that users and owners are influenced to adopt e-scooters because of their social environment and the perceived safety of e-scooter use.

4.1. Implications and limitations

The study has covered several factors identified in various fields that are important in the adoption of green innovations. By identifying which of these factors are related to the decision to use, share, and own an e-scooter, a better understanding of this novel product offering has been provided. Businesses providing these innovations (sold/owned or shared) should consider how different personal characteristics influence adoption and use when planning and executing marketing strategies concerning the placement of the services, what factors to communicate, and to whom.

According to the results of this paper, e-scooter businesses and shared service providers should focus on people who are highly susceptible to interpersonal influence. Therefore, even though users and owners are more innovative, it is not only important to tap into the novelty of the vehicles given the limited predictive capacity of consumer innovativeness, contradicting studies suggesting a linear relationship of consumer innovativeness and innovation adoption, but also to show how the use could signal one's identity or image to others. They could look into non-users who could be easily motivated by their social environment to try novel products or experiences. Businesses and providers could also focus on promoting the environmental benefits and addressing the environmental issues of using e-scooters, as they could drive away consumers who are doubtful of the environmental impact of adopting the microvehicles. Finally, businesses and providers could communicate the benefits of using e-scooters as an alternative to cars and as a transport mode for short-distance trips to maximize the environmental benefits of the transport mode. As for policy-makers, they should ensure that the use of e-scooters is safe, as it is one of the most important factors in the diffusion of such technology. This could be done by strictly enforcing the use of bike lanes for e-scooters, or possibly imposing speed limits for these microvehicles. They could also increase acceptance of e-scooters by integrating them into the current public transport system.

Although e-scooters have been around for some time in Sweden, no existing national regulations for e-scooter use were in place when data were collected (Chen, 2021). With this paper, transport authorities can focus on helping provide the necessary infrastructure and regulations to increase the perceived value of e-scooters, as the findings have shown how important innovation value perceptions are.

Despite the valuable contributions of the paper, it has several limitations. First, the research has been conducted in Sweden, and the participants are not representative of the Swedish general population; therefore, its application and transferability to other groups and countries should be investigated carefully. Second, data gathering was done prior to the outbreak of Covid-19 in Sweden. Numerous studies have been published, incorporating more recent data. Consequently, studies can explore how the pandemic has affected the value perceptions of consumers, especially non-users, and compare the results of this paper with more recent work when used for analysis and theoretical and practical applications. Finally, no distinction between the frequency of use has been considered in the analysis, which could have provided more nuanced results and analysis regarding the decision involved in owning and sharing. Theoretically, future research can explore more factors not included in the research, such as identities and self-image, as well as more evident transport mode choice considerations like cost of ownership and availability. As consumption is conspicuous, highlighting the possible significance of symbolic motivations in the adoption could be fruitful. We also recommend using choice modelling to weigh comparatively the factors that are crucial in the decision to use a shared or own an e-scooter.

CRediT authorship contribution statement

Phil Justice Flores: Writing – original draft, Formal analysis, Data curation. **Johan Jansson:** Writing – review & editing, Writing – original draft, Project administration, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jonas Nilsson:** Writing – review & editing, Writing – original draft, Funding acquisition, Formal analysis, Conceptualization. **Annika Nordlund:** Writing – review & editing, Writing – original draft, Funding acquisition, Formal analysis, Conceptualization. **Kerstin Westin:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization.

Funding

This research was financed by the Swedish Energy Agency under grant #43126–1.

Declaration of competing interest

None.

Acknowledgments

This research was financed by the Swedish Energy Agency under grant #43126-1.

Appendix A

Appendix Table 1: Descriptives.

	Mean	SD	Skewness	Kurtosis
Consumer innovativeness	4.868	1.223	−0.292	0.349
Susceptibility to interpersonal influence	3.607	1.644	−0.073	−0.856
Personal norms	4.340	1.225	−0.231	0.034
Convenience perception	5.007	1.241	−0.717	0.734
Price perception	3.988	1.799	−0.077	−0.893
Safety perception	3.445	1.785	0.205	−1.012
Hedonic perception	5.107	1.471	−0.830	0.311
Environmental perception	4.833	1.540	−0.563	−0.122

Appendix Table 2: Pearson correlation.

	CI	SII	PN	CP	PP	SP	HP	EP
Consumer innovativeness	1.000							
Susceptibility to interpersonal influence	0.225	1.000						
Personal norms	0.383	0.434	1.000					
Convenience perception	0.253	0.022	0.160	1.000				
Price perception	0.133	0.161	0.118	0.312	1.000			
Safety perception	0.156	0.344	0.213	0.442	0.412	1.000		
Hedonic perception	0.195	0.042	0.157	0.743	0.269	0.415	1.000	
Environmental perception	0.224	0.078	0.152	0.552	0.285	0.414	0.618	1.000

Appendix Table 3: Variance inflation factor.

Factors	VIF
Consumer innovativeness	1.115
Susceptibility to interpersonal influence	1.118
Personal norms	1.086
Convenience perception	1.145
Price perception	1.133
Safety perception	1.124
Hedonic perception	1.161
Environmental perception	1.102

Descriptives.

Appendix Table 4: Confirmatory factor analysis.

Constructs	Factor loadings	Composite reliability	AVE
Consumer innovativeness		0.838	0.635
I find it stimulating to be original in my thinking and behavior.	0.755		
I like and am challenged by ambiguities and unsolved problems.	0.822		
I am stimulated by innovations and new ways of thinking.	0.813		
Susceptibility to interpersonal influence		0.797	0.666
It is important that others like the products and brands I buy.	0.845		
I achieve a sense of belonging by purchasing the same products and brands that others purchase.	0.784		
Personal norms		0.836	0.642
It feels right to pay a little more to trip with low carbon emission based on my values.	0.802		
I feel a moral obligation to decrease the negative aspects of my daily trips.	0.872		
Contributing to higher carbon emission due to my daily trips than necessary gives me a bad conscience.	0.722		
Convenience attributes[a]		0.758	0.515
Speed	0.662		
Comfort	0.750		
Flexibility	0.729		
Safety[a]		0.895	0.811
Safety	0.913		
Traffic safety	0.888		
Hedonic[a]		0.863	0.697
Modern	0.747		
Exciting	0.856		
Fun	0.880		
Environmental[a]		0.911	0.725
Environmental	0.854		
Climate-smart	0.914		
Good for climate conscience	0.804		
Feels climate right	0.819		

[a] How do you perceive e-scooter as a daily means of transport in the city in terms of:….

Data availability

Data will be made available on request.

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