MATRIK: JURNAL MANAJEMEN, STRATEGI BISNIS, DAN KEWIRAUSAHAAN

Homepage: https://ojs.unud.ac.id/index.php/jmbk/index

Vol. 18 No. 1, Februari (2024), 33-44

P-ISSN: 1978-2853
E-ISSN: 2302-8890

Factors that Influence Shared E-Scooter Usage Intentions on University Campus

Waranpong Boonsiritomachai[1)], Ploy Sud-On[2)]
[1] Kasetsart Business School, Kasetsart University, Bangkok, Thailand
[2] Mahidol University International College, Nakhon Pathom, Thailand
Email: Waranpong.b@ku.th

DOI : https://doi.org/10.24843/MATRIK:JMBK.2024.v18.i01.p03

ABSTRACT

In response to increasing environmental awareness, universities have introduced shared e-scooters for staff and students. However, usage remains low, indicating a disparity. This study investigates factors influencing Kasetsart University (Bangkok, Thailand) students' intentions to use shared e-scooters. A Likert-scale survey gathered data from 424 qualified respondents, and multiple regression analysis identified six factors: social norms, environmental concerns, infrastructure quality, perceived convenience, safety concerns, and cost. Environmental concerns and cost had no significant impact on students' intentions to use e-scooters. This study helps stakeholders, including the student council, e-scooter suppliers, and university administration, understand student demands and formulate suitable policies for on-campus mobility. Boosting e-scooter adoption can also justify the university's investment. However, the study is limited by its exclusive focus on student perspectives. Future research should integrate qualitative methods alongside quantitative approaches for a comprehensive understanding and better policy and service development for e-scooter adoption.

Keyword: intention to use; shared e-scooter; theory of planned behavior

INTRODUCTION

Many university campuses have sprawling, large spaces to accommodate the many faculties and various venues for student activities appropriate for both a stimulating and conducive learning environment as well as rest at the university. It is thus critical to provide a comfortable and efficient commuting experience within the campus. In Thailand, there are numerous modes of commute to get around campus that includes walking, bicycles, motorcycles, cars, and buses. Riding a hired motorcycle is popular among university students because of the convenience as students simply pay, and the motorbike driver will drive and drop them to the front of the lecture building (Puratmaja et al., 2017). Motorcycle use however, pose safety risks, that have resulted in numerous accidents and, in some cases, severe injuries and even death. Furthermore, some hired motorcycle ride operators are reckless and break the law by riding in unsafe manners such as using the mobile phone while riding, carrying more than one passenger, speeding, riding while intoxicated, not wearing helmets, disregarding traffic laws, and operating their vehicles in unfavorable weather conditions (Chumpawadee et al., 2015).

Easy and efficient access to transportation is becoming more important as students have to travel in various buildings or to participate in extracurricular activities across the campus. Universities have also been actively promoting eco-friendly mobility initiatives to reduce the university's carbon footprint. Kasetsart University's Bangkok campus in the largest university campus in Thailand accommodating a sizable student population. Electric scooters (e-scooters) were recently introduced on campus at Kasetsart University. The UI GreenMetric World University Ranking in 2023 ranked Kasetsart University 73rd in the world and the first university in Thailand to make the list. Kasetsart University's eco plan takes into account regional features and the surrounding environment. In terms of on-campus transportation, the university limits the use of cars by promoting car sharing, encouraging the use of bicycles and walking, and more recently investing in e-scooters (Limphaiboon et al., 2022).

The study addresses a crucial research gap in the use of shared e-scooters on university campuses, emphasizing the need for universities to prioritize sustainability in line with the United Nations Sustainable Development Goals (SDGs) (United Nations, 2017). Despite recognizing the environmental benefits of e-scooters, there's a shortage of studies focused on their use within universities. While past research has explored e-scooter behavior in various settings, there's a specific need for investigation tailored to university contexts. For example, Guo & Zhang (2021) conducted a study about the behavior of people using e-scooters in Florida. Chen et al. (2021) studied the role of environmental concern in forming intentions for switching to e-scooters citywide in Taiwan. As universities aim for eco-friendliness, e-scooters present another option for sustainable transportation, supporting SDG 11: Sustainable Cities and Communities by creating inclusive, safe, and resilient urban areas. Integrating e-scooters into campus transportation systems further contributes to SDG 13: Climate Action, addressing climate change. The study also aims to identify factors influencing students' willingness to adopt e-scooters, informing policy development to encourage their use on campuses and indirectly promoting environmental awareness and supporting SDG 3: Good Health and Well-being (United Nations, 2017). Ultimately, the research outcomes are expected to benefit universities and businesses by informing policies that encourage increased e-scooter usage and raising students' awareness of environmental issues and the importance of conservation through eco-friendly transportation.

The Theory of Planned Behavior (TPB) developed by Icek Ajzen is an extension of the Theory of Reasoned Action (TRA) (Ajzen, 1991). For decades, TPB was the primary framework used to study human behavior. This theory is highly influential in understanding user decisions and advancing human behavior research. This theory supports researchers in understanding the complex dynamics of human intentions and actual behavior. An individual will perform the behavior only if there is a plan to perform the behavior. This action comes from intention. This theory has been applied to many fields. For instance, Yuriev et al. (2020) employed TPB to predict people's behaviors toward recycling, energy conservation, and public transportation use. This study aspires to clarify how people's views toward the environment, social norms around environmental conservation, and perceived control over their actions influence their environmental behaviors. More recent research, such as by Albayati et al. (2023), used TPB to identify the variables that influence engagement with Non-Fungible Tokens (NFTs) in the metaverse and found that social, technical, regulatory, market, and trust have an impact on the intention to invest in NFTs and ultimately on forming behaviors. NFTs, like shared e-scooters, represent relatively new concepts for individuals unfamiliar with them. Therefore, when individuals have not previously engaged with these

concepts, they may harbor uncertainties and hesitations. Consequently, examining additional supporting factors that encourage individuals to be among the early adopters is essential. TPB, with its emphasis on understanding intentions and behaviors, provides a suitable framework for exploring these dynamics in shared e-scooter contexts. By leveraging TPB, researchers can delve into the underlying factors that influence individuals' intentions to adopt these innovations, shedding light on the complexities of human decision-making and paving the way for successful adoption strategies. Therefore, this study explores the complex interplay between the intention to utilize shared e-scooters among university students and various essential factors, including social norms, environmental concerns, infrastructure quality, perceived convenience, safety concerns, and cost.

Social norms prescribe how one should interact with other people and when conducting themselves. As a general rule, the more favorable the attitude and social norm, the stronger the person's intention to perform the behavior (Leeuw et al., 2011). Perceived social acceptance can impact people's decisions. Zhang et al. (2016) discovered that the expectation of others and internalized responsibility both raise the intention to use public transportation and increase actual usage of it. In the context of e-scooters, social norms can encourage or hinder potential users from using them. The research by Sanders et al. (2020) indicates that the visibility of e-scooters and the observation of their use by others can normalize this mode of transport and increase its adoption. When considering the previous study by Tsou et al. (2019), the researchers also confirmed that social influence may actually boost adoption. This phenomenon can explain how social influence can create personal confidence when using new services or products. People in a community are pressured by other members or friends to conform. The family's actions and attitude have a significant impact on their cognition. As shared e-scooter use on-campus is a recent initiative for students, social norms may have an influence on their adoption. Hence, it is hypothesized that:

H1: Social norms have a positively significant impact on the intention to use shared e-scooters on university campuses.

Many studies have shown that environmental attitudes can predict the intention to use or adopt services and products. Tsou et al. (2019) found that the more concern for the environment, the higher the adoption, especially energy sharing experiences. In Western countries where cars are the primary form of personal transportation, EVs are most commonly linked with electric vehicles that replace traditional gasoline vehicles. In other parts of the world, such as in Southeast Asia, electrically powered two-wheeled vehicles serve this purpose (Chen et al., 2021). According to Tuli et al. (2021), one approach to reduce carbon footprint and support sustainable urban life is to utilize e-scooters. Another study by Chen et al. (2021) conducted in Taiwan explained that the Taiwan government, for over 20 years promoted research and development of electric scooters, and that users of fossil-fueled scooters who are environmentally conscious attempt to switch to e-scooters. Hence, it is hypothesized that:

H2: Environmental concerns have a positively significant impact on the intention to use shared e-scooters on university campuses.

The infrastructure quality of an urban area significantly influences the adoption and use of various forms of transportation. Hull & O'holleran (2014) claim that good bicycle infrastructure design in cities encourages more people to ride. In the case of e-scooters, bike lanes, parking facilities, and the overall design of the urban landscape can either encourage or hinder the use of e-scooters. Zuniga-Garcia et al. (2021) found that riders prefer paths with a

medium to high level of comfort, such as bike lanes over sidewalks. This demonstrates the importance of infrastructure when deciding to use e-scooters or not. Another study by Ma et al. (2021) found consistent results, which suggested that the quality of pavement and dedicated spaces for scooters can impact usage. The presence of e-scooter parking zones and bike lanes, among other campus infrastructure, may influence university students' mobility decisions. Hence, it is hypothesized that:

H3: Infrastructure quality has a positively significant impact on the intention to use shared e-scooters on university campuses.

Convenience is one of the elements that influence a passenger's choice of transportation method. Students have various options while commuting from one building to another. Students' adoption of shared e-scooters, especially on university campuses, may be significantly influenced by their convenience. The ease of accessing e-scooters and their flexibility for short-distance travel make them a suitable choice among students. Sanders et al. (2020) explained that the ability to avoid traffic congestion, the lack of a requirement for parking space, and overall travel time efficiency are important factors that contribute to the perceived convenience of e-scooters for those living in urban areas. Furthermore, as technology advances, mobile applications for identifying and unlocking e-scooters have become more accessible and popular among passengers (Guo & Zhang, 2021). When considering the location to conduct this present study, convenience may be one of the reasons for students to use shared e-scooters as flexible mobility solutions due to the Kasetsart campus's density and the students' busy schedules. Hence, it is hypothesized that:

H4: Perceived convenience has a positively significant impact on the intention to use shared e-scooters on university campuses.

Safety is one of the top concerns among passengers when using transportation (Ma et al., 2021). The perception of safety risk, either due to traffic conditions or the behavior of other road users, can be a significant barrier to the use of e-scooters. The research by James et al. (2019) highlighted the impact of vibrations and speed variations on rider safety, emphasizing the need for better infrastructure to mitigate these risks. With their maximum speed of 15–20 mph, off-the-shelf e-scooters can be unsafe when used on busy sidewalks shared by pedestrians. Meanwhile, many facilities may not be able to fully support the safe use of e-scooters, which frequently have small wheels, due to physical limitations. As a result of safety concerns, various places have prohibited the use of e-scooters. In addition, there have been news reports of scooter-related accidents, some resulting in fatalities (Ma et al., 2021). These findings are essential for understanding the reluctance among university students, where safety concerns may outweigh the convenience that e-scooters offer. Hence, it is hypothesized that:

H5: Safety concerns have a positively significant impact on the intention to use shared e-scooters on university campuses.

When choosing a means of transportation, passengers must take the cost of transportation into account. Low costs benefit passengers, particularly those with restricted budgets. Considering the current research context, the majority of Thai students continue to rely on their parents' income to meet their daily living expenses (Paireepinas & Dhiravisit, 2020). As a result, e-scooters must be less expensive or comparable to conventional modes of transportation. Guo & Zhang (2021) found that the economic incentives associated with e-scooter use, such as pricing strategies and promotional offers, can significantly affect a passenger’s decision to use this mode of transport. Additionally, the study by Sanders et al.

(2020) indicates that the relative cost-effectiveness of e-scooters, especially when compared to public transit or personal vehicles, is a compelling factor for cost-conscious passengers. Hence, it is hypothesized that:

H6: Cost has a negatively significant impact on the intention to use shared e-scooters on university campuses.

This present study proposes six hypotheses, consisting of six dependent factors and one dependent factor. The conceptual framework is illustrated in Figure 1.

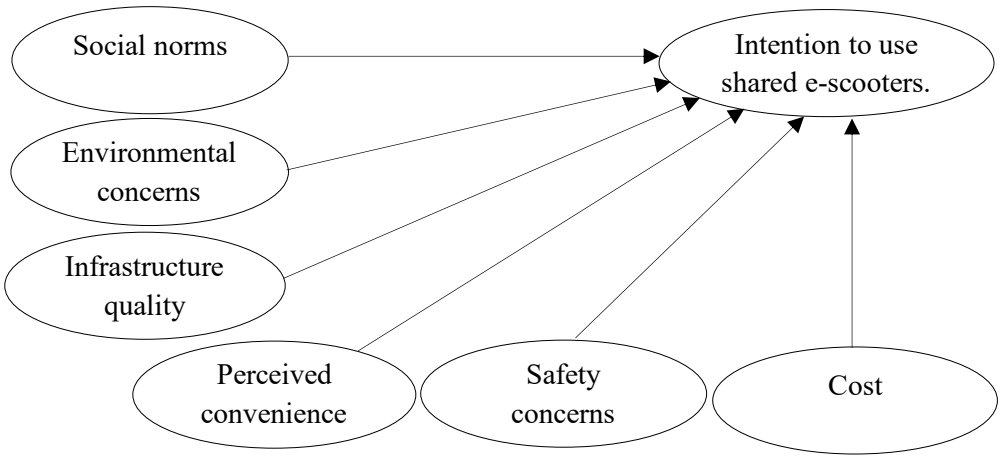

Figure 1. Conceptual Framework of Research

METHODS

The present study was conducted using the quantitative method which is to test theories by means of measurement that emphasizes numerical data on the factors studied. The self-administered survey was used to collect data. Questions in the questionnaire used a five-point Likert scale (from 1 (strongly disagree) to 5 (strongly agree)). The scales for the intention to use shared e-scooters were adapted from Eccarius & Lu (2020). The scales for social norms were adapted from Kellstedt et al. (2021), whereas the scales for environmental concerns were adapted from Halvadia et al. (2022). The scales for perceived convenience were adapted from Sanders et al. (2020), while the scales for cost were adapted from Almannaa et al. (2021). Infrastructure quality and safety concerns were adapted from Guo & Zhang (2021). These questions are appropriate for the present study because they enable the systematic collection and presentation of data about variables of interest. By employing a survey, the research captures a picture of attitudes and perceptions in each factor toward shared e-scooters, which can be used to generate broader patterns and trends within the target population.

The present study's population comprises of students currently enrolled at Kasetsart University's Bangkok campus, with a total enrollment of 36,000 students. Given the diversity of the student population, a random sampling approach was used to ensure that the sample represented the total population. This strategy will eliminate sample bias, making the study's conclusions more generalizable. Additionally, the research encompasses students across all academic levels, including undergraduate, master's, and doctoral candidates. Following the

Cohen (1962) approach in determining the sample size of this population with 95% confidence, and a margin of error of 5%, a sample size of at least 384 people would be necessary. In addition, to compensate for incomplete or unusable surveys, this study collected 450 questionnaires.

A pilot study was conducted with a small subset (30 people) of the target population to further test the survey instrument's reliability. The feedback from the pilot test was used to make adjustments before its wider distribution. Furthermore, this questionnaire achieved the Cronbach's Alpha coefficient of 0.816, showing a high level of reliability. The data for this study was collected over a three-month period, where survey respondents were approached at various locations around the university campus. The researchers utilized a QR code system, allowing students to easily access the online survey via mobile devices.

424 out of 450 questionnaires could be evaluated, with 26 eliminated because respondents did not complete all of the required information. This present study examined the questionnaire responses using the Cronbach Alpha coefficient to determine the level of reliability and consistency for each variable. The score ranged from 0.744 to 0.951 and being close to 1 and not less than 0.65 indicated the variable's reliability met the criterion (Nunnally, 1978). The data was then evaluated with multiple regression statistics.

RESULT AND DISCUSSION

This section discusses the outcomes of the data analysis. Table 1 displays the descriptive statistics and frequencies.

Tabel 1. Characteristics of Respondents

Gender	Female	232	**Year of study**	First	154
	Male	192		Second	121
				Third	65
				Fourth	71
				Other	13
Faculty	Business Administration	58	**Age**	17	11
	Economics	61		18	44
	Science	58		19	102
	Social Science	42		20	68
	Engineering	38		21	71
	Humanities	64		22	65
	Veterinary Medicine	28		23	20
	Agriculture	39		24	38
	Others	36		24 up	5

Source: Data Processed, 2024

Based on the data in Table 1, female respondents accounted for 54.71 percent of the sample. More than 36 percent are still freshmen, followed by sophomores at 28.5 percent. The faculty of Humanities received the most responses (15 percent), followed by the faculty of Economics (14.4 percent). Age varied across all categories, with the most common age of 19, which accounted for 24 percent of the sampled population.

Multiple regression analysis was used to assess the impact of several factors on Kasetsart University students' intentions to utilize shared e-scooters. The model consisted of six independent variables: social norms, environmental concerns, infrastructure quality, perceived convenience, safety concerns, and cost. Table 2 shows that respondents gave answers ranging from strongly disagreeing to highly agreeing. Respondents in this present study chose social norms as the highest scoring variable with an average score of 3.67, followed by perceived convenience, which had an average score of 3.49. The next was Infrastructure quality with an average score of 3.38. The top three criteria with the lowest scores were cost, safety concerns, and environmental concerns, with scores of 3.25, 3.17, and 2.78 respectively.

Table 2. Descriptive Statistics of Respondents' Answer

Variable	Min	Max	Average	St.dev
Social Norms	2	5	3.67	.8642
Environmental Concerns	1	5	2.78	.7121
Infrastructure Quality	2	5	3.38	.7003
Perceived Convenience	2	5	3.49	.8354
Safety Concerns	1	5	3.17	.7223
Cost	2	5	3.25	.7228
Intention to Use Shared E-Scooters	1	5	3.36	.9634

Source: Data Processed, 2024

The model summary is shown in Table 3. The model summary shows a strong relationship between the predictors and the usage intention, with an R square of .762. This means that approximately 76.2% of the variance in usage intention can be explained by the independent variables included in the model. The adjusted R square value of .756 is a more precise estimate of the variance explained by the model when applied to the broader population.

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.850[a]	.762	.756	.74225

a. Predictors: (Constant), Social Norms, Environmental Concerns, Infrastructure Quality, Perceived Convenience, Safety Concerns, Cost

Source: Data Processed, 2024

Examining the proposed hypothesis in this study, the results show that all predictors, with the exception of environmental concerns and cost, contributed considerably to the model, as illustrated in Table 4. Improvements in social norms, infrastructural quality, convenience, and safety can be interpreted as an increase in students' inclination to utilize shared e-scooters. In contrast, environmental concerns and cost had no significant effect on usage intention, demonstrating that in the context of this present study, both the environment and the cost of utilizing shared e-scooters are not determining factors for students.

Table 4. Multiple Regression Results of Intention to Use Shared E-Scooters

Independent factors	Intention to Use Shared E-Scooters				
	B	**SE**	**Beta**	**t**	***p***

Results	**Constant**	.601	.194		3.012	.32
H1: Supported	X1: Social Norms	.326	.058	.275	5.618	.001*
H2: Rejected	X2: Environmental Concerns	.101	.056	.042	.377	.247
H3: Supported	X3: Infrastructure Quality	.184	.059	.134	2.135	.002*
H4: Supported	X4: Perceived Convenience	.231	.058	.181	3.953	.001*
H5: Supported	X5: Safety Concerns	.241	.510	.209	4.122	.002*
H6: Rejected	X6: Cost	.011	.059	.008	.181	.857

Note: * = significant at a significance level 95%
Source: Data Processed, 2024

Compared to previous studies, this study found that social norms have significant influence on the intention to use shared e-scooter. This result is aligned with the findings from Sanders et al. (2020). Social roles can shape passenger transportation preferences. In this study conducted among teenagers, this segment usually likes to emulate or imitate those who are close to them. Therefore, they may have increased desire to make the switch if they see their friends using shared e-scooters to commute. In terms of infrastructure quality, it is important, especially for e-scooters, and it has an impact on passengers willingness to use e-scooters. Bieliński & Ważna (2020) confirmed the contribution of well-developed infrastructural facilities to the growing adoption of e-scooters among citizens in northern Poland. Safety is another factor that impacts the adoption of shared e-scooters. The result of this present study, along with many others, indicates that safety is a strong predictor of adoption. For example, Kazemzadeh et al. (2023) showed that passengers have serious safety concerns when choosing emerging transportation modes such as e-scooters. Safety concerns not only the scooter rider, but also the safety of other vehicles on the road. In terms of convenience, this present study found a positive relationship with the intention to use shared e-scooters. This finding is supported by Sanders et al. (2020) who conducted a study on e-scooters in the United States and found that e-scooters are rapidly changing transportation modes in US university campuses because passengers perceive them as convenient, faster, and better in hot weather than walking. Furthermore, it is used primarily for transportation rather than recreation. The current study is conducted in Bangkok, where parking at the university is limited and the weather in Thailand is hot. As a result, using a shared e-scooter is one of the most practical solutions for students, as it eliminates the need to find parking and allows them to park directly in front of lecture halls.

In contrast to the findings of most prior studies, the intention to use shared e-scooters in this present study is not significantly impacted by environmental concerns. When examining the responses from the questionnaire respondents, it is found that the environmental concern factor received the lowest average score. When considering each question within the environmental concern factor, such as "Using shared e-scooters helps reduce carbon emissions" or "University-led environmental initiatives encourage me to consider using shared e-scooters as a more sustainable transportation option," it becomes apparent that the majority of questionnaire respondents tend to disagree with these statements. One possible explanation for this could be that most students either disregard or believe that environmental issues are irrelevant to them. As a result, individuals may not understand how using shared e-scooters can help improve the environment. In terms of cost, this study did not find any impact on the intention of using shared e-scooters significant. When considering the responses from the questionnaire, it becomes apparent that scores regarding the cost of using shared e-scooters are relatively low compared to other factors. Furthermore, when analyzing

specific questions in cost factor such as "I am concerned about the cost of using shared e-scooters on a daily basis" or "The cost savings compared to other modes of transportation significantly influenced my decision to use shared e-scooters," a significant number of respondents tend to disagree with these statements. This suggests that they may not consider the cost of using shared e-scooters or believe that using e-scooter transportation does not result in significant savings. Additionally, considering the labor force in Thailand, where labor costs are relatively low, using motorcycle taxis for commuting within university campuses may not incur high expenses for students. Furthermore, this result can imply that Kasetsart University students prioritize social acceptance by others and safety before cost. Alternatively, it's possible that students are keenly aware that the university, being located in the capital of the country, expects a higher cost of living. Therefore, students could budget in advance and not focus on the cost of using an e-scooter. Chen et al. (2021) claimed that when passengers opt to use e-scooter, the ease of usage is more important than the price.

CONCLUSIONS

This study sheds light on the elements that influence university students' desires to utilize shared e-scooters, providing a valuable viewpoint on urban academic mobility. According to the research, students chose the e-scooter mode of transportation based on a variety of reasons, including following social norms, availability of decent infrastructure, wanting convenience, and being concerned about safety. Remarkably, both environmental concerns and cost had no significant effect on the desire to use shared e-scooters. This implies that students place a higher importance on safety and ease of use for short excursions than on price and environmental friendliness. These results, along with several previous studies, show that users do place higher importance on factors other than cost and environment concerns when it comes to using shared transportation services.

This study contributes to the theoretical understanding of shared e-scooter adoption among university students by employing the Theory of Planned Behavior (TPB). The TPB framework provides a comprehensive lens through which to explore the intricate dynamics of human intention and behavior. By applying TPB, this research investigates into the underlying factors shaping students' intentions to adopt shared e-scooters, explaining the complexities of decision-making processes in the context of sustainable transportation options. For instance, TPB facilitates analyze how individual attitudes, subjective norms, and perceived behavioral control impact the intention to adopt shared e-scooters. This approach provides insights into the cognitive mechanisms guiding students' choices in sustainable transportation, highlighting interactions between personal beliefs, social influences, and perceived control over behavior. Through this lens, the study elucidates how factors like environmental concerns, social norms, and convenience perceptions collectively influence students' intentions to embrace shared e-scooters as a viable transportation option on university campuses.

Bringing share e-scooters for students is considered an investment by the university; therefore, utilization of resources such as the use of share e-scooters will encourage continued investment. In addition, increased utilization of e-scooters can improve the university's eco credentials for sustainable environmental management. Therefore, the involved stakeholders including university administrators, lecturers, student council board, and e-scooter suppliers, may benefit from the outcomes of this study to encourage higher adoption of shared e-scooter

use. As social norms influence students' decision-making, stakeholders should promote social initiatives aimed at making e-scooter use more commonplace within the university community. In terms of infrastructure quality and safety, stakeholders should prioritize road safety on campus by providing special lanes for e-scooters. Also, the e-scooter must be robust and safe, and the university should strongly enforce traffic rules or require users to wear helmets for their own protection. Parking for e-scooters and having a sufficient number of scooters cannot be overlooked. Students will be more inclined to utilize scooters if they realize that they are readily available at all locations and that they don't have to waste time searching for parking spaces.

Although this study did not find significant importance in terms of cost and environmental concerns, future research should examine these two factors to comprehend the underlying reasons. This will provide a more comprehensive understanding of the dynamics influencing students' intentions regarding shared e-scooter adoption on university campuses. The lack of significance regarding cost and environmental concerns in this study may stem from the specific context or location where the research was conducted. Alternatively, the use of shared e-scooters may vary in different locations, leading to differences in cost implications. For instance, when comparing the costs of shared e-scooter usage with other transportation methods in different countries or regions, there may be significant variations in expenses. These differences could impact individuals' decision-making processes when selecting e-scooters. Moreover, awareness or perception of environmental factors may differ among populations in various areas, influencing users' decisions regarding shared e-scooter adoption. Therefore, it is crucial to consider these factors when planning future research endeavors. Furthermore, future research should address the long-term sustainability of e-scooter programs and how they integrate with other modes of transportation. Furthermore, comparative studies across universities, nations, or cultural contexts may provide larger insights regarding shared e-scooter mobility. It is critical to recognize the limitations of the current investigation. Because the focus of the study is on Kasetsart University, the findings may not be immediately applicable to another context. Furthermore, this study solely focused on sampling students, excluding lecturers or university staff. Thus, future research can enhance this limitation by integrating qualitative methods alongside quantitative approaches and by comparing various groups within the university community. This comprehensive approach would provide additional perspectives by examining a broader spectrum of participants, thereby addressing this limitation more effectively.

REFERENCES

Ajzen, I. (1991). The theory of planned behaviour. *Organizational behaviour and human decision processes*, *50*(2), 179-211.

Albayati, H., Alistarbadi, N., & Rho, J. J. (2023). Assessing engagement decisions in NFT Metaverse based on the Theory of Planned Behavior (TPB). *Telematics and Informatics Reports*, *10*(100045), 1-14.

Almannaa, M. H., Alsahhaf, F. A., Ashqar, H. I., Elhenawy, M., Masoud, M., & Rakotonirainy, A. (2021). Perception analysis of E-scooter riders and non-riders in Riyadh, Saudi Arabia: Survey outputs. *Sustainability*, *13*(863), 1-24.

Bieliński, T., & Ważna, A. (2020). Electric scooter sharing and bike sharing user behaviour and characteristics. *Sustainability*, *12*(22), 1-13.

Chen, C.-F., Eccarius, T., & Su, P.-C. (2021). The role of environmental concern in forming intentions for switching to electric scooters. *Transportation Research Part A: Policy and Practice*, *154*, 129-144.

Chumpawadee, U., Homchampa, P., Thongkrajai, P., Suwanimitr, A., & Chadbunchachai, W. (2015). Factors related to motorcycle accident risk behavior among university students in northeastern Thailand. *Southeast Asian J Trop Med Public Health*, *46*(4), 805-821.

Cohen, J. (1962). The statistical power of abnormal-social psychological research: a review. *The Journal of Abnormal and Social Psychology*, *65*(3), 144-176.

Eccarius, T., & Lu, C.-C. (2020). Adoption intentions for micro-mobility–Insights from electric scooter sharing in Taiwan. *Transportation research part D: transport and environment*, *84*(102327), 1-18.

Guo, Y., & Zhang, Y. (2021). Understanding factors influencing shared e-scooter usage and its impact on auto mode substitution. *Transportation research part D: transport and environment*, *99*(102991), 1-13.

Halvadia, N. B., Bhatt, K., Sharma, M., Sharma, A., & Dash, S. (2022). Consumers' intention to use bicycle-sharing services: The role of consumer consciousness. *Cleaner and Responsible Consumption*, *7*(100076), 1-7.

Hull, A., & O'holleran, C. (2014). Bicycle infrastructure: can good design encourage cycling? *Urban, Planning and Transport Research*, *2*(1), 369-406.

James, O., Swiderski, J., Hicks, J., Teoman, D., & Buehler, R. (2019). Pedestrians and e-scooters: An initial look at e-scooter parking and perceptions by riders and non-riders. *Sustainability*, *11*(20), 5591.

Kazemzadeh, K., Haghani, M., & Sprei, F. (2023). Electric scooter safety: An integrative review of evidence from transport and medical research domains. *Sustainable Cities and Society*, *89*(104313), 1-11.

Kellstedt, D. K., Spengler, J. O., & Maddock, J. E. (2021). Comparing Perceived and Objective Measures of Bikeability on a University Campus: A Case Study. *Sage Open*, *11*(2), 1-10.

Leeuw, A., Valois, P., & Houssemand, C. (2011). Predicting the intentions to buy fair-trade products: The role of attitude, social norm, perceived behavioral control, and moral norm. *OIDA International Journal of Sustainable Development*, *2*(10), 77-84.

Limphaiboon, C., Suphachan, S., & Ruttanatheerawichien, K. (2022). Factors affecting the development to become a green university of Thai private universities. *KKBS Journal of Business Administration and Accountancy*, *6*(1), 34-47.

Ma, Q., Yang, H., Mayhue, A., Sun, Y., Huang, Z., & Ma, Y. (2021). E-Scooter safety: The riding risk analysis based on mobile sensing data. *Accident Analysis & Prevention*, *151*(105954), 1-22.

Nunnally, J. C. (1978). *Psychometric theory*. McGraw-Hill.

Paireepinas, P., & Dhiravisit, A. (2020). Educational Inequality: A Study of the Urban Poor in Thailand. *International Journal of Interdisciplinary Educational Studies*, *15*(1), 1-11.

Puratmaja, Y., Handayani, L., & Sunardi, K. S. (2017). Factors Associated with Motorcycle Risk Behavior in Thai University Students, Khon Kaen. *International Journal of Evaluation and Research in Education*, *6*(4), 270-276.

Sanders, R. L., Branion-Calles, M., & Nelson, T. A. (2020). To scoot or not to scoot: Findings from a recent survey about the benefits and barriers of using E-scooters for riders and non-riders. *Transportation Research Part A: Policy and Practice*, *139*, 217-227.

Tsou, H., Chen, J., Chou, C. Y., & Chen, T. (2019). Sharing economy service experience and its effects on behavioral intention. *Sustainability*, *11*(18), 5050.

Tuli, F. M., Mitra, S., & Crews, M. B. (2021). Factors influencing the usage of shared E-scooters in Chicago. *Transportation Research Part A: Policy and Practice*, *154*, 164-185.

United Nations. (2017). *Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development*. Retrieved 17 January 2024 from https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%202021%20refinement_Eng.pdf

Yuriev, A., Dahmen, M., Paillé, P., Boiral, O., & Guillaumie, L. (2020). Pro-environmental behaviors through the lens of the theory of planned behavior: A scoping review. *Resources, Conservation and Recycling*, *155*(104660), 1-16.

Zhang, D., Schmöcker, J.-D., Fujii, S., & Yang, X. (2016). Social norms and public transport usage: empirical study from Shanghai. *Transportation*, *43*, 869-888.

Zuniga-Garcia, N., Juri, N. R., Perrine, K. A., & Machemehl, R. B. (2021). E-scooters in urban infrastructure: Understanding sidewalk, bike lane, and roadway usage from trajectory data. *Case studies on transport policy*, *9*(3), 983-994.