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THE EFFECT OF PERCEIVED ENVIRONMENTAL BENEFITS ON YOUNG CONSUMERS' INTENTION TO USE GREEN TRANSPORTATION: EMPIRICAL EVIDENCE IN VIETNAM

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ABSTRACT

Accelerating sustainable urban mobility requires a clearer understanding of how young consumers perceive the environmental value of green transportation. This study examines the effect of perceived environmental benefits on young consumers' intention to use green transportation in Hanoi, Vietnam, with personal norms and attitude tested as mediating mechanisms. Drawing on the Theory of Planned Behaviour and norm-based perspectives on pro-environmental behaviour, the study develops an environmental benefit – norm-attitude framework in which beliefs about environmental sustainability, pollution reduction, natural-resource protection, carbon-emission mitigation, and improvement of living conditions and human health shape intention formation. Primary data were collected from 206 young consumers aged 15–30 who had prior experience with green transportation. The data were analysed using partial least squares structural equation modelling with bootstrapped direct-effect and mediation testing. The findings indicate that perceived environmental benefits are the strongest direct antecedent of intention to use green transportation. They also positively influence personal norms and attitude, suggesting that perceived ecological and public-health value strengthens both moral obligation and favourable evaluation. The mediation analysis further confirms that personal norms, attitude, and their serial pathway partially mediate the relationship between perceived environmental benefits and intention. These findings show that young consumers' intention to use green transportation should be interpreted as an environmentally grounded behavioural decision shaped by perceived ecological value, internalised responsibility, and evaluative judgement. The study contributes to sustainable mobility and consumer - behaviour research by clarifying how environmental benefit beliefs operate through direct, normative, and attitudinal pathways. For policymakers and mobility providers, the results highlight the importance of credible environmental-benefit communication, youth-oriented sustainability campaigns, norm-consistent messaging, and service-quality improvements.

Keywords: green transportation, perceived environmental benefits, young consumers, intention to use; personal norms; attitude; sustainable mobility

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INTRODUCTION

The decarbonisation of urban mobility has become a critical requirement for achieving climate-mitigation and sustainable-development objectives. Transport systems are deeply embedded in daily consumption routines; therefore, reducing transport-related environmental pressure requires not only technological innovation but also repeated behavioural shifts in everyday mobility choices. Demand-side mitigation strategies, commonly conceptualised through the avoid-shift-improve framework, show that emission reduction depends on the combined effects of reduced travel demand, modal shift toward lower-carbon transport, and cleaner vehicle technologies (Creutzig et al., 2022). Similarly, urban transport transition research indicates that electrification alone is insufficient if it is not accompanied by modal shift, reduced dependence on private motorised vehicles, and more sustainable travel behaviour (Winkler, Pearce, Nelson, & Babacan,

2023). These arguments highlight the importance of understanding why consumers, especially young consumers, intend to adopt green transportation in their daily lives.

Green transportation in this study refers to mobility modes and services that can reduce environmental pressure compared with conventional private motorised transport. These include public transport, electric mobility, shared micromobility, active travel, and integrated mobility services that support lower-emission travel. Recent research has shown that such mobility options can contribute to sustainable urban transport, but their environmental contribution depends strongly on consumer acceptance, usage patterns, substitution effects, and the extent to which they replace more carbon-intensive modes rather than merely adding new trips (Badia & Jenelius, 2023). Consequently, the availability of green transportation infrastructure does not automatically translate into actual adoption. Consumers must first perceive green transportation as meaningful, beneficial, and compatible with their environmental values and mobility expectations.

In this context, perceived environmental benefits represent an important psychological antecedent of green transportation intention. Perceived environmental benefits refer to consumers' beliefs that using green transportation contributes to environmental sustainability, pollution reduction, natural-resource protection, carbon-emission mitigation, and improvement of the living environment and human health. This construct is conceptually distinct from perceived economic benefits, which concern affordability, cost savings, or value for money. The present study deliberately focuses on environmental-benefit perceptions because young consumers' green mobility decisions are often shaped by whether they believe that their transport choices can produce visible ecological and public-health value. When green transportation is perceived as reducing emissions, improving air quality, and supporting healthier urban living, it is more likely to be evaluated as a responsible and desirable mobility option.

The relevance of perceived environmental benefits is particularly strong among young consumers. Young people are increasingly exposed to climate-change information and may experience environmental concern as a salient part of their generational identity. A large-scale global study of young people found substantial climate-related concern among individuals aged 16-25, indicating that environmental issues are highly relevant to this cohort's psychological and social outlook (Hickman et al., 2021). However, environmental concern alone does not always lead to sustainable mobility behaviour. Research on green mobility shows that consumers evaluate sustainable transport through multiple motives, including environmental responsibility, convenience, autonomy, comfort, reliability, and social meaning (Herberz, Hahnel, & Brosch, 2020). Therefore, perceived environmental benefits may strengthen intention only when they are translated into favourable attitudes and internalised moral responsibility.

Vietnam offers a relevant empirical context for examining this relationship. Vietnamese urban mobility is characterised by the coexistence of private motorcycles, buses, ride-hailing services, emerging electric mobility, and other low-emission transport alternatives. In motorcycle-dependent urban contexts, consumers' mobility decisions are shaped not only by infrastructure and travel habits but also by psychological evaluations of alternative modes, including safety, convenience, environmental concerns, and perceived usefulness (Hoang & Okamura, 2020). As Vietnam continues to pursue more sustainable urban mobility pathways, young consumers represent an important group because they are forming long-term travel habits while also being exposed to environmental communication, digital mobility platforms, and changing social expectations regarding sustainable consumption.

From a theoretical perspective, the relationship between perceived environmental benefits and intention to use green transportation can be explained through the integration of attitude-based and norm-based mechanisms. Attitude reflects the degree to which consumers evaluate green transportation as favourable, useful, desirable, and worthwhile. If young consumers believe that green transportation generates tangible environmental and health-related benefits, they are more likely to develop a positive attitude toward its use. At the same time, personal norms capture an internalised moral obligation to act in an environmentally responsible way. Recent evidence indicates that personal norms are among the strongest predictors of pro-environmental behaviour and can mediate the effects of broader social and environmental beliefs on behavioural outcomes (Helferich, Thøgersen, & Bergquist, 2023). Thus, perceived environmental benefits may influence intention not only directly but also indirectly by activating personal norms and strengthening favourable attitudes.

The mediating roles of personal norms and attitude are important because sustainable mobility choices are rarely driven by a single motive. Research on commuters' willingness to shift toward multimodal mobility shows that behavioural norms and personal gains may operate together rather than as mutually exclusive explanations (Timmer, Bösehans, & Henkel, 2023). Similarly, evidence on sustainable mobility suggests that climate-change concern can support reduced car use and more sustainable mobility preferences when it is connected to attitudes and lifestyle orientations (Mouratidis & Næss, 2024). These findings imply that perceived environmental benefits may function as an upstream belief that shapes intention through a chain of psychological processes: consumers first recognise the environmental value of green transportation,

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then internalise a sense of responsibility, form a more favourable attitude, and finally develop stronger intention to use green transportation.

Despite the growing literature on sustainable mobility, several gaps remain. First, many studies examine green transportation adoption through general environmental concern, service quality, technology acceptance, or economic incentives, while fewer studies explicitly examine perceived environmental benefits as a central belief construct. Second, research has not sufficiently clarified whether perceived environmental benefits influence green transportation intention directly or whether the relationship is transmitted through personal norms and attitude. Third, evidence from emerging Asian mobility contexts remains limited, even though such contexts often face severe urban transport challenges and rapid changes in consumer mobility behaviour. Addressing these gaps is important for both theory and practice because it clarifies how environmental-value perceptions can be converted into behavioural intention among young consumers.

LITERATURE REVIEW

Green transportation

Green transportation refers to mobility modes and service systems that reduce the environmental burden of travel compared with conventional private motorised transport. In urban contexts, green transportation may include public transport, active mobility, shared micromobility, electric mobility, and integrated multimodal services that support lower-emission travel behaviour. The environmental contribution of these modes depends not only on technology and infrastructure but also on whether consumers repeatedly choose them in daily mobility routines. Therefore, green transportation adoption should be examined as both a transport-policy issue and a consumer-behaviour issue.

Recent climate and mobility research shows that transport decarbonisation cannot rely only on technological substitution. Demand-side strategies, including reducing unnecessary travel, shifting to lower-carbon modes, and improving the efficiency of mobility systems, are necessary for achieving climate-mitigation objectives while maintaining human well-being (Creutzig et al., 2022). Similarly, modelling evidence on sustainable urban mobility transitions suggests that vehicle electrification should be accompanied by modal shift, reduced private motorised travel, and broader changes in travel demand if cumulative emissions and energy demand are to be reduced (Winkler et al., 2023). These findings indicate that consumer adoption of green transportation is an essential component of sustainable mobility transitions.

However, the availability of green transportation does not automatically produce adoption. Consumers evaluate transport alternatives through subjective beliefs, perceived benefits, perceived risks, service reliability, convenience, habit, and social meaning. Even when a mobility option is objectively cleaner, consumers may not intend to use it if they do not perceive it as beneficial, accessible, or compatible with daily travel. This is particularly relevant in shared and multimodal mobility systems, where users compare several alternatives before forming adoption intentions. Research on Mobility as a Service shows that different consumer segments evaluate integrated mobility packages differently, suggesting that adoption is shaped by heterogeneous perceptions rather than by service availability alone (Alonso-González, Hoogendoorn-Lanser, van Oort, Cats, & Hoogendoorn, 2020). Studies of shared e-scooter and micromobility services also show that environmental impacts, use patterns, and consumer perceptions vary across contexts, which reinforces the importance of studying perceived benefits rather than assuming uniform acceptance (Badia & Jenelius, 2023; Eccarius & Lu, 2020).

Young consumers are a particularly important population for green transportation research because they are forming durable mobility routines while being exposed to climate-related information, digital mobility platforms, and emerging low-emission transport options. Young people may evaluate mobility choices not only through functional criteria such as convenience and accessibility but also through the perceived environmental consequences of their behaviour. Global evidence indicates that climate concern among younger cohorts is substantial, while recent transport research shows that climate-change concern can support sustainable mobility orientations and reduced car use (Hickman et al., 2021; Mouratidis & Næss, 2024). In this sense, young consumers' intention to use green transportation may reflect a broader environmental value judgment rather than a purely utilitarian travel decision.

In Vietnam, young consumers encounter multiple mobility alternatives, including private motorcycles, public transport, ride-hailing services, electric mobility, and emerging shared mobility options. These alternatives create a complex behavioural environment in which intention to use green transportation may depend on whether consumers perceive green modes as environmentally meaningful and personally relevant. For this reason, the present study focuses on perceived environmental benefits as the central belief construct explaining young consumers' intention to use green transportation.

Theory of Planned Behavior and attitude toward green transportation

The Theory of Planned Behavior provides a useful foundation for explaining intention formation because it assumes that behavioural intention is shaped by evaluative, normative, and control-related beliefs (Ajzen, 2020). In the context of green transportation, attitude is especially important because consumers must evaluate whether using green transportation is desirable, beneficial, wise, and consistent with their daily mobility needs. The present study is TPB-informed rather than a complete replication of the original TPB model because it focuses specifically on attitude and personal norms as psychological mechanisms linking perceived environmental benefits to intention.

Attitude toward green transportation refers to the degree to which consumers evaluate the use of green transportation positively or negatively. A favourable attitude may emerge when consumers believe that green transportation contributes to environmental protection, improves urban liveability, reduces pollution, and supports healthier mobility systems. Empirical evidence from green mobility research confirms that consumer motives and evaluative judgments play a central role in shaping preferences for sustainable mobility alternatives (Herberz et al., 2020). Similarly, research on electric scooter sharing shows that favourable evaluations are associated with adoption intentions, particularly when users perceive micromobility as useful and compatible with their travel needs (Eccarius & Lu, 2020).

The attitude-intention relationship is also supported by broader pro-environmental behaviour research. Meta-analytic evidence suggests that attitude remains a robust predictor of intention in environmentally relevant domains, although its strength varies across contexts and may be influenced by moral and cultural factors (Morren & Grinstein, 2021). Experimental evidence further indicates that pro-environmental attitudes are more likely to translate into behaviour when people perceive that the benefits of action are high and that the personal costs of acting are manageable (Wyss, Knoch, & Berger, 2022). In the present study, perceived environmental benefits are therefore expected to strengthen attitude by making green transportation appear environmentally valuable, socially desirable, and personally meaningful.

Personal norms and moral obligation in green transportation

Personal norms refer to an internalised sense of moral obligation to perform a behaviour. Unlike subjective norms, which reflect perceived social pressure, personal norms represent self-endorsed responsibility and moral commitment. In green transportation contexts, personal norms are relevant because mobility choices have collective environmental consequences, including air pollution, greenhouse gas emissions, resource consumption, and public-health impacts. A consumer who believes that green transportation contributes to environmental protection may feel a stronger personal obligation to use such modes (Ababio-Donkor, Saleh, & Fonzone, 2020).

Recent research shows that personal norms are powerful predictors of pro-environmental behaviour. A meta-analytic synthesis by Helferich et al. (2023) demonstrates that social and personal norms can influence pro-environmental behaviour directly and indirectly, suggesting that normative mechanisms are central to environmental decision-making. Morren and Grinstein (2021) also show that integrating personal norms into TPB-based models improves the explanatory capacity of pro-environmental intention models across cultural contexts. These findings support the inclusion of personal norms as a distinct moral mechanism in the present model.

Normative mechanisms are particularly relevant for sustainable transportation because mobility decisions are repeated, socially visible, and environmentally consequential. Persuasive normative messages can encourage sustainable transportation intentions by making environmental responsibility more salient (Piras et al., 2021). De Groot, Bondy, and Schuitema (2021) further show that personal norms influence how individuals respond to social norm interventions, indicating that internal moral standards can shape the effectiveness of environmental communication. In commuting and multimodal mobility contexts, behavioural norms and personal gains may operate together rather than as competing explanations, which suggests that moral obligation should be examined alongside other evaluative mechanisms (Timmer et al., 2023).

In this study, personal norms are expected to play two roles. First, they are expected to directly influence intention to use green transportation because young consumers who feel morally responsible for reducing environmental harm may be more willing to choose green mobility options. Second, personal norms are expected to influence attitude because consumers often seek consistency between their moral standards and their evaluative judgments. When green transportation is perceived as morally appropriate, consumers may also evaluate it more favourably.

Perceived environmental benefits

Perceived environmental benefits refer to young consumers' beliefs that using green transportation contributes to environmental sustainability, reduces pollution, protects natural resources, mitigates carbon emissions, and improves the living

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environment and human health. This construct differs fundamentally from perceived economic benefits. Perceived economic benefits concern affordability, cost savings, fare predictability, and value for money, whereas perceived environmental benefits concern ecological and public-health value. Because the measurement items in this study assess environmental sustainability, pollution reduction, natural-resource protection, carbon-emission reduction, and health-related improvements, the construct is correctly conceptualised as perceived environmental benefits.

Perceived environmental benefits are theoretically important because green transportation adoption is not merely a technical or functional decision. It is also a value-based consumption decision in which consumers judge whether a mobility option contributes to a broader environmental good. When consumers believe that green transportation reduces pollution, protects natural resources, and improves urban living conditions, they may perceive the behaviour as more meaningful and more consistent with their environmental values. In this way, perceived environmental benefits can function as an upstream belief that activates both evaluative and moral mechanisms.

The relationship between perceived environmental benefits and attitude can be explained through belief-based evaluation. Consumers form favourable attitudes when they associate a behaviour with desirable consequences. If green transportation is perceived as beneficial for climate mitigation, air quality, environmental sustainability, and public health, young consumers are likely to evaluate it more positively. This argument is consistent with evidence that green mobility preferences are shaped by multiple motives, including environmental and personal considerations (Herberz et al., 2020). It is also supported by pro-environmental behaviour research showing that environmental attitudes become more behaviourally relevant when individuals perceive meaningful benefits from action (Wyss et al., 2022).

Perceived environmental benefits may also strengthen personal norms. When young consumers understand that green transportation can reduce environmental harm, the moral relevance of mobility choices becomes more salient. This recognition may increase their sense of personal responsibility to use lower-emission transportation. Recent evidence on norms and pro-environmental behaviour supports this logic by showing that normative motivation can mediate the relationship between antecedent beliefs and environmental action (Helferich et al., 2023). Thus, perceived environmental benefits may not only increase intention directly but also strengthen the moral obligation and favourable attitude that support intention.

Finally, perceived environmental benefits may have a direct effect on intention to use green transportation. Young consumers who perceive green transportation as environmentally beneficial may intend to use it because they regard adoption as a meaningful contribution to cleaner cities, healthier communities, and lower-carbon mobility systems. Research on climate concern and sustainable mobility indicates that environmental concern can be associated with reduced car use and stronger sustainable mobility orientation (Mouratidis & Næss, 2024). Therefore, perceived environmental benefits should be treated as a central antecedent of green transportation intention.

Hypotheses development and research model

This study develops an environmental benefit – norm - attitude framework to explain young consumers' intention to use green transportation in Vietnam. Green transportation refers to comparatively low-carbon urban mobility options, including public transport, shared micromobility, electric mobility, and integrated multimodal services that can reduce the environmental burden of everyday travel when they substitute for more polluting modes. However, the adoption of green transportation is not determined by service availability alone. Consumers form intentions through subjective evaluations of whether green transportation is environmentally meaningful, personally acceptable, morally appropriate, and compatible with their daily mobility routines.

Within this framework, perceived environmental benefits refer to young consumers' beliefs that using green transportation contributes to environmental sustainability, reduces pollution, protects natural resources, mitigates carbon emissions, and improves the living environment and human health. Personal norms (PN) capture an internalised moral obligation to choose environmentally responsible mobility options. Attitude (ATT) reflects the overall favourable or unfavourable evaluation of using green transportation. The dependent construct is intention to use green transportation (ITU). The proposed model positions PEB as an upstream environmental-belief construct that influences ITU directly and indirectly through PN and ATT.

This revised model is theoretically grounded in the Theory of Planned Behaviour and norm-based approaches to pro-environmental behaviour. The Theory of Planned Behaviour explains intention formation through evaluative and normative mechanisms, while recent pro-environmental behaviour research shows that personal norms can strengthen intention models by capturing moral motivation that is not fully explained by conventional attitudinal beliefs (Ajzen, 2020; Morren & Grinstein, 2021). This integration is especially relevant for young consumers because they are forming durable mobility routines while being increasingly exposed to climate-related information and sustainability expectations. Global evidence

shows that climate-related concern is highly salient among young people, and recent mobility research indicates that climate concern can support sustainable mobility orientations and reduced car use (Hickman et al., 2021; Mouratidis & Næss, 2024).

Perceived environmental benefits

Perceived environmental benefits are expected to influence personal norms because recognising the environmental and public-health value of green transportation can make the moral consequences of mobility choices more salient. When young consumers believe that using green transportation contributes to cleaner air, lower emissions, resource conservation, and healthier urban living, they may feel a stronger personal obligation to choose such modes. This argument is consistent with norm-based pro-environmental research showing that personal norms are strongly associated with environmentally responsible behaviour and often transmit the effects of other environmental and normative antecedents (Helferich et al., 2023). Therefore, the first hypothesis is formulated as follows:

H1. *Perceived environmental benefits are positively associated with personal norms toward using green transportation.*

Perceived environmental benefits are also expected to influence attitude. From a belief-based perspective, consumers evaluate a behaviour more favourably when they associate it with desirable outcomes. In the context of green transportation, perceived contributions to environmental sustainability, pollution reduction, carbon-emission mitigation, and public health can make the behaviour appear beneficial, responsible, and worthwhile. Prior research on green mobility indicates that consumer motives and perceived benefits are important for promoting sustainable mobility alternatives, while environmental psychology research shows that pro-environmental attitudes are more behaviourally relevant when environmental benefits are clear and meaningful (Herberz et al., 2020; Wyss et al., 2022). Hence, the second hypothesis is proposed:

H2. *Perceived environmental benefits are positively associated with attitudes toward using green transportation.*

Beyond their effects on moral obligation and evaluative judgement, perceived environmental benefits are expected to exert a direct effect on intention to use green transportation. Young consumers who believe that green transportation contributes to environmental protection and healthier urban living may be more willing to use it because adoption is perceived as a meaningful contribution to collective sustainability. This logic is supported by sustainable mobility research showing that climate concern can be associated with reduced car use and stronger sustainable mobility orientations (Mouratidis & Næss, 2024). Accordingly:

H3. *Perceived environmental benefits are positively associated with intention to use green transportation.*

Personal norms

Personal norms capture young consumers' felt moral obligation to use green transportation because doing so is perceived as environmentally responsible and ethically appropriate. Unlike external social pressure, personal norms represent an internal moral standard. This distinction is important in sustainable mobility contexts because travel choices generate collective consequences, including emissions, air pollution, energy consumption, and public-health effects. A consumer may therefore intend to use green transportation not only because it is convenient or attractive, but also because it is perceived as the right thing to do.

Personal norms are expected to influence Attitude because individuals often seek consistency between their moral standards and evaluative judgements. When consumers feel personally obliged to reduce environmental harm, they may evaluate green transportation more positively because favourable evaluation supports moral self-consistency. Recent evidence indicates that personal norms shape how individuals respond to environmental norm interventions, suggesting that internal moral standards can structure evaluative and behavioural responses (De Groot et al., 2021). Therefore:

H4. *Personal norms are positively associated with attitudes toward using green transportation.*

Personal norms are also expected to directly influence intention to use green transportation. In mobility contexts, internalised moral obligation can motivate consumers to choose lower-emission options even when such choices require adjustment to existing travel habits. Recent evidence on multimodal commuting shows that normative considerations are important in explaining intentions to switch toward more sustainable mobility patterns (Timmer et al., 2023). In the broader pro-environmental evidence base, personal norms remain among the most consistent predictors of environmentally responsible behaviour (Helferich et al., 2023). Hence:

H5. *Personal norms are positively associated with intention to use green transportation.*

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Attitude

Attitude refers to young consumers' overall favourable or unfavourable evaluation of using green transportation. In this study, a favourable attitude reflects the belief that using green transportation is beneficial, wise, desirable, useful, and appropriate. The attitude - intention relationship is central to intention-based behavioural models because consumers are more likely to intend to perform behaviours that they evaluate positively.

In green and shared mobility contexts, empirical evidence supports the importance of attitude in explaining adoption intention. Research on electric scooter sharing found that favourable evaluations are associated with stronger adoption intentions among university students (Eccarius & Lu, 2020). Recent evidence on e-scooter use also shows that attitudes and behavioural intentions differ systematically between users and non-users, confirming the relevance of attitudinal appraisal in emerging mobility contexts (Öztürk & Akay, 2025). Therefore:

H6. *Attitudes toward green transportation are positively associated with intention to use green transportation****.***

Mediation hypotheses

The proposed model further assumes that perceived environmental benefits influence intention to use green transportation through indirect psychological mechanisms. First, Attitude is expected to mediate the relationship between PEB and ITU because environmental-benefit beliefs may strengthen favourable evaluations, which subsequently increase intention. Second, personal norms are expected to mediate the relationship between PEB and ITU because recognising the environmental value of green transportation can activate moral obligation, which then strengthens intention. Third, a serial mediation pathway is expected because perceived environmental benefits may strengthen personal norms, personal norms may improve attitude, and attitude may increase intention to use green transportation.

In addition, because the empirical model includes ATT as an endogenous construct, the indirect pathway from PEB to ATT through PN should be explicitly stated. Finally, because the model also includes PN as an antecedent of ATT and ITU, ATT is expected to mediate the relationship between PN and ITU. These mediation hypotheses are formulated as follows:

- **H7a.** Attitude mediates the relationship between Perceived Environmental Benefits and Intention to Use Green Transportation.
- **H7b.** Personal Norms mediate the relationship between Perceived Environmental Benefits and Intention to Use Green Transportation.
- **H7c.** Personal Norms and Attitude serially mediate the relationship between Perceived Environmental Benefits and Intention to Use Green Transportation.
- **H7d.** Personal Norms mediate the relationship between Perceived Environmental Benefits and Attitudes toward using green transportation.
- **H7e.** Attitude mediates the relationship between Personal Norms and Intention to Use Green Transportation.

Figure 1 shows the conceptual relationship model of the study.

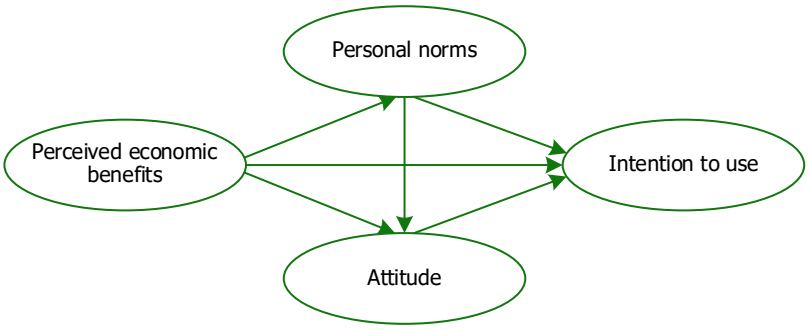

Figure 1. Research model.

AIMS AND OBJECTIVES

This study aims to assess the effect of perceived environmental benefits on young consumers' intention to use green transportation in Vietnam and to examine the mediating roles of personal norms and attitude. The specific objectives are as follows:

1. To develop a theoretical framework and empirical model linking perceived environmental benefits, personal norms, attitude, and young consumers' intention to use green transportation.
2. To examine the direct effects of perceived environmental benefits, personal norms, and attitude on young consumers' intention to use green transportation in Vietnam.
3. To evaluate the mediating roles of personal norms and attitude in the relationship between perceived environmental benefits and intention to use green transportation.
4. To propose managerial and policy implications for promoting green transportation adoption among young consumers through credible environmental-benefit communication, norm-consistent messaging, youth-oriented sustainability campaigns, and service-quality improvements.

METHODS

Survey and measurement

This study used a cross-sectional, self-administered questionnaire to examine the relationships among perceived environmental benefits, personal norms, attitude, and intention to use green transportation. A survey design was appropriate because the study focused on subjective beliefs, moral obligation, evaluative judgment, and behavioural intention, which are psychological constructs best captured through respondents' self-reported perceptions.

The questionnaire was structured into three parts. The first part introduced the purpose of the study, explained the voluntary and anonymous nature of participation, and provided a standardized definition of green transportation. In this study, green transportation was defined as environmentally oriented mobility options that may reduce pollution, carbon emissions, fossil-fuel dependence, and negative environmental impacts compared with conventional private motorised travel. Examples included public transport, walking, cycling, electric buses, metro services, and shared low-emission mobility. This definition was provided to reduce ambiguity and to ensure that respondents evaluated the same focal behaviour when answering the questionnaire.

Second, the core constructs were measured using reflective indicators on a five-point Likert scale (1= strongly disagree; 5= strongly agree). A five-point format was selected because it is widely used in consumer and transport behavior research, supports adequate response variability, and is compatible with variance-based SEM estimation. The measurement model included: perceived environmental benefits was measured with five items adapted from (Huong, Mai, Mai, & Nhu, 2025; Yildiz, Çiğdem, & Meidutė-Kavaliauskienė, 2024); personal norms was measured using five items derived from (Adnan, Nordin, Rahman, & Rasli, 2017; Jakovcevic & Steg, 2013; Zhang, Sheng, Zhang, & Zhang, 2020); attitude was obtained through four items introduced by (Huang & Ge, 2019) and (Chen & Yan, 2019); and as for intention to use, six items developed by (Yildiz et al., 2024). The overall item pool was adapted from recent empirical research applying planned behavior logic to shared and sustainable mobility and from contemporary work on moral and normative drivers of pro-environmental action.

The third part collected demographic and mobility-related information, including gender, age, residential location, main travel mode, and frequency of transport use. These variables were used to describe the sample and to verify whether respondents satisfied the study's eligibility criteria. The questionnaire avoided personally identifiable information and used neutral wording to reduce social desirability pressure, especially because the study measured environmentally and morally sensitive constructs such as personal norms and green transportation intention.

Data collection

Primary data were collected in Hanoi, Vietnam, from August to November 2025. This period was selected because it corresponded to a regular study and working period, allowing respondents to evaluate green transportation in relation to routine mobility needs rather than exceptional holiday or seasonal travel. Hanoi was selected as the empirical setting because young consumers in the city are exposed to diverse mobility options, including public transport, walking, cycling, electric buses, metro services, ride-hailing, and other emerging low-emission mobility alternatives.

The target population consisted of young consumers aged 15-30 who were residents of Hanoi and had prior experience using at least one form of green transportation. Prior experience was required because respondents who had used public transport, walking, cycling, electric buses, metro services, or shared low-emission mobility were expected to have sufficient

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familiarity to evaluate the environmental benefits, personal norms, attitudes, and intention-related items in the questionnaire. Respondents without any experience of green transportation were excluded because their answers would be more hypothetical and less grounded in actual mobility experience.

Because no complete sampling frame was available for young green transportation users in Hanoi, a non-probability convenience sampling approach was adopted. Respondents were recruited through university groups, student communities, social media groups, public-transportation user groups, and face-to-face distribution sites. The questionnaire was administered both online and offline. Online responses were collected using Google Forms. For offline recruitment, respondents were approached directly and invited to complete the same Google Forms questionnaire through a QR code or survey link, thereby maintaining consistency between online and offline data collection modes.

To be included in the final dataset, respondents had to satisfy four criteria: they had to be between 15 and 30 years old; reside, study, or work in Hanoi; have prior experience using at least one form of green transportation; and complete the full questionnaire. Responses were excluded if they were incomplete, duplicated, outside the defined age range, inconsistent with the Hanoi-resident criterion, showed no prior green-transportation experience, or displayed low-quality response patterns such as invariant answers across construct items.

The initial screened dataset contained 222 responses. During the revision process, the age criterion was applied more strictly to ensure consistency with the study's focus on young consumers. Sixteen responses were removed because they were outside the predefined age range, including two respondents under 15 years old and fourteen respondents over 30 years old. The final analytical sample therefore comprised 206 valid respondents. All descriptive statistics, measurement-model results, structural-model estimates, and mediation results should be recalculated using this corrected sample.

Data analysis

The data were analysed using partial least squares structural equation modelling (PLS-SEM) in SmartPLS 4. PLS-SEM was selected because the study aimed to test a theory-informed behavioural model involving multiple latent constructs, direct effects, and mediation pathways. The method is suitable for examining predictive relationships among reflective constructs and for assessing both measurement quality and structural relationships in consumer-behaviour research. Recent methodological literature also emphasises the need for transparent reporting of measurement-model quality, structural-model diagnostics, effect sizes, predictive relevance, and mediation results when PLS-SEM is used (Guenther, Guenther, Ringle, Zaefarian, & Cartwright, 2023; Hair Jr, Howard, & Nitzl, 2020).

The analysis was conducted in two stages. First, the measurement model was evaluated to assess the reliability and validity of the reflective constructs. Internal consistency was assessed using Cronbach's alpha and composite reliability. Convergent validity was evaluated using indicator loadings and average variance extracted (AVE). Indicator-level collinearity was assessed using outer variance inflation factor (outer VIF) values. Discriminant validity was assessed using the Fornell–Larcker criterion and heterotrait–monotrait ratio (HTMT). Items that did not satisfy measurement-model criteria were removed only when their exclusion improved measurement quality and did not compromise construct meaning.

Second, the structural model was examined to test the hypothesised relationships. Inner VIF values were used to assess multicollinearity among predictors. The explanatory power of the model was evaluated using R^2 and adjusted R^2. Predictive relevance was assessed using Q^2. Model fit was reported using the standardized root mean square residual (SRMR). Path coefficients, standard errors, t-statistics, p-values, and confidence intervals were estimated using non-parametric bootstrapping with 5,000 resamples. In addition to statistical significance, effect sizes were evaluated using f^2 to assess the practical importance of each predictor.

Mediation effects were examined using bootstrapped indirect effects. The analysis tested the indirect pathway from perceived environmental benefits to intention through attitude, the indirect pathway from perceived environmental benefits to intention through personal norms, the serial pathway from perceived environmental benefits to personal norms, attitude, and intention, and the pathway from personal norms to intention through attitude. Total effects were calculated by combining direct and indirect effects. Variance accounted for (VAF) was used as a descriptive indicator of mediation magnitude, while mediation type was determined based on the significance and direction of direct and indirect effects.

RESULTS

Respondent profile

The participants' demographic and mobility characteristics are summarized in Table 1. The final analytic dataset comprised 206 valid responses, retained after data screening for completeness and response quality.

Table 1. Demographic information of respondents. *(Source: Data analysis from SmartPLS 4)*

Categories		Frequency	Percentage (%)
Gender	Male	45	21.8
	Female	158	76.7
	Unrevealed	3	1.5
Age	From 15 to 20 years old	94	45.6
	From 21 to 25 years old	94	45.6
	From 26 to 30 years old	18	8.8
Location	Downtown	14	6.8
	City center	192	93.2
Main vehicles	Grab/Uber	10	4.9
	Bicycle	5	2.5
	Bike	155	75.2
	Private auto	4	1.9
	Public transport	27	13.1
	Other	5	2.5
Frequencies used	One times/week	4	1.9
	Two times/week	10	4.9
	Three times/week	9	4.4
	Over three times/week	183	88.8

Regarding gender composition, female respondents accounted for 76.7% of the sample, whereas male respondents represented 21.8%. The remaining participants selected unrevealed or other. This distribution indicates that the empirical estimates largely reflect intention formation among young female consumers, which is important for interpreting external validity.

The age structure was strongly concentrated in late adolescence and early adulthood. Specifically, respondents aged 15-20 years comprised 45.6% of the sample, and those aged 21-25 years comprised another 45.6%. Together, these two groups represented 91.2% of participants. A smaller proportion was observed for ages 26 - 30.

Although the study is positioned around young consumers, the descriptive profile shows a limited number of respondents outside the typical young-adult range; given their small share, they are unlikely to dominate the structural estimates, but the distribution motivates subgroup robustness tests in future work.

In terms of location, Table 1 reports downtown and city center. As the reported percentages exceed 100% when combined, the categories may not be mutually exclusive or may contain a reporting inconsistency. Therefore, location is treated as descriptive context rather than an inferential basis in the present results.

Beyond demographics, respondents were asked to report their main vehicle. The most common category was bike (75.2%), followed by public transport, ride hailing services (Grab/Uber), private auto, bicycle, and other. Notably, Table 1 contains at least one percentage and frequency inconsistency (e.g., public transport), whereas the frequencies across travel modes sum exactly to 206. Accordingly, interpretation relies primarily on internally consistent frequencies and the latent variable results.

Finally, the sample displayed high travel intensity. The majority of participants reported using their main mode more than three times per week (88.8%), with smaller shares reporting one time/week (1.9%), two times/week (4.9%), and three

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times/week (4.4%). This high frequency suggests that respondents formed intentions in a context of routine mobility, which strengthens the behavioral realism of intention measures.

Evaluation of the measurement model

The measurement model was composed of 26 items that measure a total of five first-order constructs. According to Hair, Risher, Sarstedt, & Ringle (2019), the measurement model was evaluated by assessing the individual reliability of each item; its internal consistency through Cronbach's Alpha and composite reliability (CR); and convergent validity through the average variance extracted (AVE).

The results of the estimation process (Table 2) allowed us to conclude that there was internal consistency and convergent validity in all the latent constructs with reflective indicators of the model. The loads of the items with their respective latent variables exceeded the threshold of 0.707 suggested by Carmines and Zeller (1979). Cronbach's alpha (ranging from 0.703 to 0.821) and the Composite Reliability (ranging from 0.816 to 0.870) of each construct exceeded the threshold value of 0.80 established by Nunnally and Bernstein (1978), confirming the internal consistency reliability (Hair et al., 2019). The AVE value ranged between 0.526 and 0.570, which was higher than the minimum value of 0.50, as advised by Hair et al. (2019). Therefore, the convergent validity of the model in this study was also confirmed.

Table 2. Evaluation of the measurement model for reliability and convergence. Note: PEB4* item was deleted. *(Source: Data analysis from SmartPLS 4)*

Latent Construct	Indicator	Item	Cronbach's Alpha	CR	AVE	Outer VIF
Attitude (ATT)	ATT1	I think it is very necessary to use green transportation.	0.740	0.839	0.570	1.451
	ATT2	I think using green transportation is a good choice.				1.826
	ATT3	I support the country in introducing more policies to encourage individuals to use green transportation.				1.941
	ATT4	I have a positive attitude towards fully green transportation				1.185
Intention to use green transportation (ITU)	INT1	I intend to use green transportation in the future.	0.821	0.870	0.529	1.491
	INT2	I plan to use green transportation frequently in my daily life.				1.536
	INT3	I am likely to use green transportation as my primary mode of transportation.				1.723
	INT4	I would speak favourably about full green transportation to others.				1.752
	INT5	I would recommend my friends, colleagues, and classmates around me to use green transportation.				1.732
	INT6	I think it's a great choice to use green transportation.				1.501
Perceived environmental benefits (PEB)	PEB1	Using green transportation will contribute to environmental sustainability.	0.703	0.816	0.526	1.317
	PEB2	Using green transportation will encourage a reduction in pollution.				1.491
	PEB3	Using green transportation is important for protecting natural resources.				1.378
	PEB4*	Using green transportation is beneficial for reducing carbon emissions and mitigating energy shortages.				
	PEB5	Using green transportation contributes to improving the living environment and human health.				1.197
Personal norms (PN)	PN1	I feel personally obliged to travel in an environmentally sound way, such as by using green transportation.	0.786	0,851	0.533	1.443
	PN2	I would be a better person if I used green transportation more often instead of the car.				1.392
	PN3	I feel obliged to bear the environment and nature in mind in my daily behavior.				1.969
	PN4	I think I feel obliged to take the environmental consequences of vehicle use into account when making adoption choices				1.655
	PN5	I think that using green transportation is an obligation for me, to reduce carbon emissions regardless of what other people do				2.086

Discriminant validity was assessed and supported by applying the Fornell–Larcker criterion (i,e., the comparison between the square roots of all constructs' AVEs and the correlations among all latent constructs. Specifically, as demonstrated in

Table 3, the correlations between two constructs were always smaller than the square root of the construct's AVE, confirming discriminant validity (Fornell & Larcker, 1981). Furthermore, Table 4 presents the Heterotrait-Monotrait ratio (HTMT), with values ranging from 0.534 to 0.791. These were below the 0.85 threshold, suggesting satisfactory discriminant validity as suggested by Henseler, Ringle, and Sarstedt (2015).

Table 3. Discriminant validity by Fornell – Larcker criterion. Note: The diagonal components represent the square root of the AVE. *(Source: Data analysis from SmartPLS)*

	Attitude	Intention to use green transportation	Perceived environmental benefits	Personal Norms
Attitude	**0.755**			
Intention to use green transportation	0.573	**0.727**		
Perceived environmental benefits	0.423	0.624	**0.725**	
Personal norms	0.409	0.533	0.450	**0.730**

Table 4. Discriminant validity by HTMT ratio. *(Source: Data analysis from SmartPLS)*

	Heterotrait-monotrait ratio (HTMT)
Intention to use green transportation <-> Attitude	0.729
Perceived environmental benefits <-> Attitude	0.570
Perceived environmental benefits <-> Intention to use green transportation	0.791
Personal norms <-> Attitude	0.534
Personal norms <-> Intention to use green transportation	0.626
Personal norms <-> Perceived environmental benefits	0.558

Evaluation of the structural model

Hypothesis testing

A bootstrapping procedure with 5,000 subsamples was adopted to derive the path coefficients and the respective p-values as per the recommendation of Hair et al. (2019). The results of the hypotheses were tested for direct effects (see Table 5). The results indicated that all of the direct effects hypotheses were supported at a 99% confidence level (p-value = 0.000). Specifically, perceived environmental benefits had a significant impact on Personal norms as well as attitude. Besides, both Personal norms and attitude had a significant impact on intention to use green transportation; Personal norms also had a positive effect on attitude.

In terms of effect size, f-square has become a useful indicator in order to evaluate the level of effectiveness. Regarding factors affecting intention to use green transportation, the effect of perceived environmental benefits, Personal norms, and attitude were 0.239, 0.086, and 0.165, respectively. Therefore, both effect sizes of perceived environmental benefits and attitude were medium, while the effect size of Personal norms was small. Regarding the direct impact on attitude, the effect size of perceived environmental benefits was stronger than the effect size of Personal norms (i.e., f-square was 0.094 compared to 0.079), but both effect sizes were equally small.

Table 5. Results of path model estimation. *(Source: Data analysis from SmartPLS)*

	Original sample (O)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	f-square	Inner VIF	Decision
Attitude -> Intention to use green transportation	0.300	0.061	4.917	0.000	0.165	1.314	Supported
Perceived environmental benefits -> Attitude	0.320	0.071	4.485	0.000	0.094	1.254	Supported
Perceived environmental benefits -> Intention to use green transportation	0.418	0.067	6.225	0.000	0.239	1.372	Supported
Perceived environmental benefits -> Personal norms	0.471	0.052	9.102	0.000	0.254	1.000	Supported
Personal norms -> Attitude	0.259	0.071	3.629	0.000	0.079	1.254	Supported
Personal norms -> Intention to use green transportation	0.213	0.044	4.896	0.000	0.086	1.353	Supported

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All inner VIF values were smaller than the threshold of 3, so there was no multicollinearity issue in our SEM.

The structural model provides evidence that perceived economic benefits function as the central financial-behavioural lever in young consumers' intention to use green transportation. Among the three direct antecedents of intention, perceived economic benefits show the largest standardized coefficient ($\beta = 0.418$, $p < 0.001$), followed by attitude ($\beta = 0.300$, $p < 0.001$) and personal norms ($\beta = 0.213$, $p < 0.001$). Interpreted in standardized terms, a one-standard-deviation increase in perceived economic benefits is associated with a 0.418 standard-deviation increase in intention, holding the other predictors constant. This result indicates that affordability, perceived cost savings, and value for money are not peripheral service attributes; rather, they represent the strongest direct adoption driver in the model.

The relative magnitude of the effects further reinforces the economic interpretation. The direct effect of perceived economic benefits on intention is approximately 39.3% stronger than the effect of attitude and approximately 96.2% stronger than the effect of personal norms. The effect-size analysis leads to the same conclusion. Perceived economic benefits have the largest effect size on intention ($f^2 = 0.239$), whereas attitude has a medium effect ($f^2 = 0.165$) and personal norms have a smaller effect ($f^2 = 0.086$). Therefore, the results suggest that young consumers' adoption intention is strongly conditioned by whether green transportation is perceived as financially advantageous and practically affordable.

From a transport-economics perspective, this finding is consistent with recent evidence that mobility adoption is strongly affected by users' evaluation of mobility costs, willingness to pay, and fare-related value. For example, MaaS research shows that users compare new mobility packages with current mobility costs and that financial attractiveness is central to adoption decisions. Liljamo et al. found that 43% of respondents were willing to adopt a mobility package, but their relative willingness to pay averaged approximately 64% of current mobility costs, leading the authors to conclude that MaaS should reduce users' mobility costs to be financially attractive (Liljamo, Liimatainen, Pöllänen, & Utriainen, 2020). Similarly, Tsouros et al. modelled demand and willingness to pay for MaaS plans and showed that willingness-to-pay estimates are useful for mobility operators and policymakers when designing service packages (Tsouros, Tsirimpa, Pagoni, & Polydoropoulou, 2021).

Evaluation of mediating effect

The mediating variable has played an important role in the study of behaviour tracking; it has also become more and more popular in SEM models. It was a specific variable that predicted more detail the association between the independent variable and dependent variable.

The results of the mediating effect test were presented in Table 6. The findings showed that personal attitude as well as social norm played a significant role in mediating the relationship between supporting policies and intention to green transportation usage. In particular, personal attitude acted as a complementary mediator in the relationship between push & pull policy and intent to use green transportation, and social norms also played the same mediating role. Consequently, all hypotheses related to mediation were supported.

Table 6. Results of mediation analysis. *(Source: Data analysis from SmartPLS)*

	Original sample (O)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	VAF %	Mediation effect
Perceived environmental benefits -> Attitude -> Intention to use green transportation	0.096	0.026	3.637	0.000	15.1	Single mediator
Personal norms -> Attitude -> Intention to use green transportation	0.078	0.028	2.800	0.005	38.5	Single mediator
Perceived environmental benefits -> Personal norms -> Attitude -> Intention to use green transportation	0.037	0.014	2.675	0.007	8.8	Serial mediator
Perceived environmental benefits -> Personal norms -> Attitude	0.122	0.038	3.215	0.001	39.4	Single mediator
Perceived environmental benefits -> Personal norms -> Intention to use green transportation	0.100	0.025	4.062	0.000	16.7	Single mediator

The total standardized effect of perceived economic benefits on intention can be decomposed into one direct and three indirect components. The direct effect is 0.418. The indirect effect through attitude is 0.096; the indirect effect through

personal norms is 0.100; and the serial indirect effect through personal norms and attitude is 0.037. Therefore, the total standardized effect of perceived economic benefits on intention is approximately 0.651.

This decomposition shows that approximately 64.2% of the total effect of perceived economic benefits is direct, while approximately 35.8% is transmitted through personal norms and attitude. This means that perceived economic benefits influence adoption intention in two ways. First, they directly increase intention by making green transportation appear financially reasonable. Second, they indirectly increase intention by strengthening moral obligation and favourable attitude. Thus, economic feasibility does not replace moral and attitudinal motivation; instead, it helps activate and reinforce them.

The coefficient of determination was employed to assess the explanatory power of the model. The coefficient for green transportation choice intention (54.4%) indicates that the research model demonstrates a moderate level of explanatory capability regarding variations in green transportation choice intention (Table 7) (Hair Junior, Hult, Ringle, & Sarstedt, 2022).

Table 7. Evaluation of explanation and prediction ratio. (*Source: Data analysis from SmartPLS)*

	R-square	R-square adjusted
Attitude	0.239	0.233
Intention to use green transportation	0.544	0.539
Personal norms	0.202	0.200

The goodness-of-fit of the PLS-SEM model was evaluated using two primary indices, namely the Standardized Root Mean Square Residual (SRMR) and the Normed Fit Index (NFI). Both the SRMR and NFI values were not entirely satisfactory. Specifically, the SRMR value reached 0.090, exceeding the recommended threshold of < 0.080, while the NFI value was 0.711, falling below the acceptable threshold of > 0.80 (Table 8) (Hu & Bentler, 1999).

Table 8. Evaluation of model fit summary. (*Source: Data analysis from SmartPLS)*

	Saturated model	Estimated model
SRMR	0.090	0.090
d_ULS	1.536	1.536
d_G	0.367	0.367
Chi-square	591.648	591.648
NFI	0.711	0.711

These findings may be attributed to the characteristics of the dataset. In particular, the SRMR index can be biased when the sample size is relatively small or when the survey data exhibit heteroscedasticity in empirical research. Furthermore, a major limitation of the NFI is its sensitivity to the number of observed variables, as the index tends to increase with a larger number of indicators. According to Hu and Bentler (1999), the NFI has become less commonly used in contemporary studies due to this inherent bias.

DISCUSSION

The findings show that young consumers' intention to use green transportation in Hanoi is anchored primarily in the perceived environmental value of the mobility option rather than in an abstract endorsement of sustainability. Because the construct captures beliefs about sustainability, pollution reduction, resource protection, carbon-emission mitigation, and improvements in living conditions and health, the results suggest that green transportation becomes behaviourally attractive when young consumers connect its use with concrete ecological and public-health outcomes. This interpretation is consistent with demand-side mitigation research, which argues that low-carbon mobility transitions require not only technological substitution but also behavioural shifts supported by meaningful environmental benefits (Creutzig et al., 2022; Winkler et al., 2023). It also extends studies of green mobility motives by showing that perceived ecological value can function as an immediate adoption driver rather than merely as a background expression of environmental concern (Herberz et al., 2020; Mouratidis & Næss, 2024).

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At the same time, the findings refine TPB-based explanations of green transportation intention. Attitude remains important, yet favourable evaluation appears stronger when consumers perceive green transportation as environmentally consequential. This aligns with micromobility and shared mobility research showing that adoption intention depends on how users evaluate the usefulness and desirability of alternative modes (Badia & Jenelius, 2023; Eccarius & Lu, 2020). In the Vietnamese context, where young consumers compare green transportation with motorcycles, ride-hailing, and other routine mobility options, environmental benefits may therefore help transform a general positive orientation toward sustainability into a more specific willingness to adopt greener travel modes.

The role of personal norms further demonstrates that intention is not purely evaluative; it is also morally mediated. The results support norm-based research suggesting that internalized responsibility is a proximal antecedent of pro-environmental behaviour (Helferich et al., 2023; Morren & Grinstein, 2021). However, the Vietnamese evidence adds nuance by showing that moral obligation is activated by perceived environmental benefits and then translated through attitude. This pattern is consistent with De Groot et al. (2021), who argue that personal norms shape responses to environmental information, and with Piras et al. (2021), who show that normative messages can encourage sustainable transportation. Thus, perceived environmental benefits make the moral relevance of travel choices more salient, while attitude converts this moral recognition into behavioural readiness.

Several limitations should be acknowledged. The study used cross-sectional survey data; therefore, causal relationships should be interpreted with caution. The dependent variable measured intention rather than actual repeated use, while real behaviour may be affected by travel time, infrastructure access, service reliability, habit, household constraints, and competing mobility options. The sample was limited to young consumers in Hanoi who had prior experience with green transportation, and the gender distribution was uneven, which may restrict the generalisability of the findings. Moreover, the study focused on perceived environmental benefits rather than objectively measured environmental performance.

Overall, the study contributes to sustainable mobility research by positioning perceived environmental benefits as an upstream belief that connects environmental cognition, moral obligation, and evaluative judgement. For policy and managerial practice, environmental communication should be specific, credible, and behaviourally actionable. General appeals to "green transport" may be less persuasive than messages that make reductions in pollution, emissions, resource pressure, and health risks visible to young consumers. Nevertheless, the findings should be interpreted with caution because the study uses cross-sectional intention data and a sample concentrated among frequent young urban travellers. Future research should examine whether perceived environmental benefits continue to predict actual and repeated use when service quality, infrastructure accessibility, travel time, and habit are incorporated into longitudinal or experimental designs.

CONCLUSIONS

This study examined the effect of perceived environmental benefits on young consumers' intention to use green transportation in Hanoi, Vietnam, and assessed the mediating roles of personal norms and attitude. By repositioning the central construct as perceived environmental benefits, the study provides a conceptually consistent explanation of how young consumers evaluate green transportation through its perceived contribution to environmental sustainability, pollution reduction, natural-resource protection, carbon-emission mitigation, and improvement of living conditions and human health.

The findings confirm that young consumers' intention to use green transportation is shaped by an integrated psychological process in which environmental-benefit beliefs, moral obligation, and favourable evaluation operate together. Perceived environmental benefits emerge as a central antecedent of intention, suggesting that young consumers are more likely to consider green transportation when they believe that such modes generate meaningful environmental and public-health value. This result supports the argument that green mobility adoption should not be interpreted only as a response to infrastructure availability or service convenience. Rather, intention formation depends strongly on whether consumers perceive green transportation as environmentally consequential and personally meaningful.

The study also demonstrates that personal norms and attitude play important mediating roles. Perceived environmental benefits strengthen young consumers' sense of moral responsibility, which in turn contributes to a more favourable attitude and stronger intention to use green transportation. This finding is theoretically important because it shows that environmental-benefit beliefs do not influence intention only through direct cognitive evaluation. They also activate internalised responsibility and positive appraisal. In this sense, green transportation intention reflects both environmental cognition and moral self-regulation. Young consumers who recognize the environmental value of green transportation are more likely to feel personally responsible for choosing it and to evaluate it as a desirable mobility option.

The study contributes to the literature on sustainable mobility and consumer behaviour in three main ways. It clarifies the role of perceived environmental benefits as a distinct belief construct in green transportation adoption. It extends TPB-informed and norm-based explanations by showing how environmental-benefit beliefs are translated into intention through personal norms and attitude. It also provides empirical evidence from Vietnam, an emerging urban mobility context where young consumers frequently compare conventional private mobility with public transport, low-emission travel, and other green alternatives. These contributions are particularly relevant because young consumers' mobility routines may shape future demand for sustainable transportation systems.

The findings have practical implications for policymakers, transport authorities, and mobility providers. Communication strategies should not rely only on general claims that green transportation is "good for the environment." Instead, they should make environmental benefits visible, concrete, and credible by emphasizing reduced air pollution, lower carbon emissions, protection of natural resources, improved urban liveability, and public-health benefits. Such communication should be integrated with norm-consistent messages that encourage young consumers to see green transportation as a personally responsible and socially valuable choice. At the same time, environmental communication must be supported by reliable service quality, convenient access, safety, and route availability, because positive beliefs are unlikely to translate into durable intention if green transportation is difficult to use in daily life.

Future research should extend this study through longitudinal, experimental, or quasi-experimental designs to examine whether perceived environmental benefits predict actual and repeated green transportation use over time. Further studies should also test the model in other Vietnamese cities and compare young consumers with older consumer groups to identify possible generational differences in sustainable mobility intention. In addition, future research may apply Necessary Condition Analysis to examine whether minimum levels of perceived environmental benefits, personal norms, or attitude are required to achieve high intention to use green transportation. Such extensions would deepen understanding of both the average predictive effects and the threshold conditions underlying green transportation adoption.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ВПЛИВ УЯВНИХ ЕКОНОМІЧНИХ ВИГОД НА НАМІР МОЛОДИХ СПОЖИВАЧІВ ВИКОРИСТОВУВАТИ ЗЕЛЕНИЙ ТРАНСПОРТ: ЕМПІРИЧНІ ДОКАЗИ У В'ЄТНАМІ

Прискорення сталої міської мобільності вимагає чіткішого розуміння того, як молоді споживачі сприймають екологічну цінність зеленого транспорту. У цьому дослідженні розглянуто вплив сприйнятих екологічних переваг на намір молодих споживачів користуватися зеленим транспортом у Ханої, В'єтнам, при цьому особисті норми та ставлення тестовані як посередницькі механізми. Спираючись на теорію планової поведінки та нормоорієнтовані погляди на проекологічну поведінку, дослідження розробляє рамку екологічної користі – норми – ставлення, у якій переконання щодо екологічної сталості, зменшення забруднення, захисту природних ресурсів, пом'якшення викидів вуглецю й покращення умов життя та здоров'я людини формують формування намірів. Первинні дані були зібрані поміж 206 молодих споживачів віком від 15 до 30 років, які мали попередній досвід у зеленому транспорті. Дані були проаналізовані за допомогою структурного моделювання рівнянь часткових найменших квадратів із використанням тестування прямого ефекту та медіації. Результати свідчать, що сприйняті екологічні переваги є найсильнішим прямим передвісником наміру використовувати зелений транспорт. Вони також позитивно впливають на особисті норми та ставлення, свідчачи про те, що сприйнята екологічна та громадська цінність зміцнює й моральний обов'язок, і сприятливу оцінку. Аналіз медіації додатково підтверджує, що особисті норми, ставлення та їхній послідовний шлях частково опосередковують зв'язок між сприйнятими екологічними перевагами та наміром. Ці результати показують, що намір молодих споживачів користуватися зеленим транспортом слід трактувати як екологічно обґрунтоване поведінкове рішення, сформоване на основі сприйнятої екологічної цінності, внутрішньої відповідальності та оціночного судження. Дослідження сприяє дослідженню сталої мобільності та поведінки споживачів, пояснюючи, як переконання щодо екологічної користі діють через прямі, нормативні й установлені шляхи. Для політиків і постачальників мобільності результати підкреслюють важливість надійної комунікації щодо екологічних вигід, молодіжних кампаній зі сталого розвитку, стандартних повідомлень і покращення якості послуг.

Ключові слова: зелений транспорт, сприйняті економічні вигоди, молоді споживачі, намір використовувати, особисті норми, ставлення, сталий транспорт, ціноутворення на транспорт

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