Autonomous vehicles adoption motivations and tourist pro-environmental behavior: the mediating role of tourists’ green self-image

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Abstract

Purpose – This study aims to examine the impact of autonomous vehicles adoption motivations (i.e. technological, ecological and intrinsic motivation) on tourists’ pro-environmental behavior and verify the mediating role of tourists’ green self-image between the relationship of eco-friendly attitudes and autonomous vehicles adoption motivations.

Design/methodology/approach – The data from 586 national and international tourists were analyzed using the partial least squares method.

Findings – The findings revealed that eco-friendly attitude is a significant predictor of tourists’ green self-image; tourists’ green self-image is a significant predictor of autonomous vehicles adoption motivations; and autonomous vehicles adoption motivations are significant predictors of tourists’ pro-environmental behavior. In addition, tourists’ green self-image mediated the relationship between eco-friendly attitudes and autonomous vehicles adoption motivations.

Originality/value – These outcomes provide valuable guidance for the future development of green destination tourism and allow interesting implications for the tourism industry and autonomous vehicles adoption.

Keywords Eco-friendly attitudes, Tourists’ green self-image, Autonomous vehicles, Adoption motivations, Tourist pro-environmental behavior

Paper type Research paper

动机与游客行为：绿色自我形象的中介作用

目的：本研究探讨自主驾驶汽车对游客在驾驶和乘坐时的绿色自我形象和行为的影响，并验证游客绿色自我形象与环保行为之间的中介作用。

设计/方法/途径：收集586份来自国内外游客的数据，采用偏最小二乘法进行分析。

研究结果：研究结果表明，环保态度显著影响游客的绿色自我形象，进而影响自主驾驶汽车的驾驶和乘坐行为。此外，游客的绿色自我形象在环保态度与自主驾驶汽车之间的关系中起中介作用。

原创性/价值：本研究提出了绿色自我形象的概念，并将其与环保行为区分开来。研究结果为绿色目的地旅游业的发展提供了方向。对旅游业和自主驾驶汽车的采纳具有重要意义。

关键词：环保态度、绿色自我形象、驾驶和乘坐行为、绿色自我形象、游客行为

Motivaciones Para la adopción de vehículos autónomos y comportamiento proambiental de los turistas: El papel mediador de la autoimagen ecológica de los turistas

Resumen

Propósito: Este estudio tiene como objetivo examinar el impacto de las motivaciones para la adopción de vehículos autónomos (es decir, motivaciones tecnológicas, ecológicas e intrínsecas) en el comportamiento proambiental de los turistas y verificar el papel mediador de la autoimagen ecológica de los turistas.
de los turistas en la relación entre las actitudes ecológicas y las motivaciones para la adopción de vehículos autónomos.

**Diseño/metodología/enfoque:** Se analizaron los datos de 586 turistas nacionales e internacionales mediante el método de mínimos cuadrados parciales.

**Hallazgos:** Los hallazgos revelaron que la actitud ecológica es un predictor importante de la autoimagen ecológica de los turistas; la autoimagen ecológica de los turistas es un predictor importante de las motivaciones para la adopción de vehículos autónomos; y las motivaciones para la adopción de vehículos autónomos son predictores importantes del comportamiento proambiental de los turistas. Además, la autoimagen ecológica de los turistas medió la relación entre las actitudes ecológicas y las motivaciones para la adopción de vehículos autónomos.

**Originalidad/valor:** Estos resultados proporcionan una orientación valiosa para el desarrollo futuro del turismo de destino ecológico y permiten implicaciones interesantes para la industria turística y la adopción de vehículos autónomos.

**Palabras clave** Actitudes ecológicas, Autoimagen ecológica de los turistas, Vehículos autónomos, Motivaciones de adopción, Comportamiento turístico proambiental

**Tipo de papel** Trabajo de investigación

1. Introduction

Decarbonization of the transportation industry is required to satisfy global energy and climate targets, with private mobility being one of the more troublesome sectors due to the continual rise in passenger automobiles (Oldenziel and de la Bruhèze, 2011). Although modern automobiles emit less pollutants, overall pollution from passenger cars has grown. As a result, non-public transportation must be at the forefront of pollution reduction efforts (Stajić et al., 2023). Autonomous vehicles (AVs) are among the most significant disruptors in the future technological revolution (Kaur and Rampersad, 2018). Recently, AVs have been viewed as viable options for maintaining urban mobility by reducing oil reliance and air pollution and providing significant environmental benefits (Wu et al., 2019). Despite AVs’ technical superiority, consumers have many unresolved concerns about them, including ethical and societal problems (Bonnefon et al., 2016), safety (Levin and Wong, 2018) and the potential to revolutionize travel for people who cannot drive, such as the elderly, disabled and young (Cohen et al., 2017). Similarly, a microchip in AVs allows parking in defined places through a smartphone app, theft-prevention technologies and location-based services. (Ma et al., 2018).

Many countries have set targets and applied policies to deploy AVs, and AVs will likely account for an essential share of future vehicle fleets (Buekers et al., 2014). Before the advent of advanced shape AVs, some authors have explored the impacts of autonomous electric vehicles on enjoyment, energy consumption and energy management (Farghali et al., 2023). Notably, the majority of the existing studies on AVs have been conducted in developed countries such as France (Meyer-Waarden and Cloarec, 2022), Germany (Nastjuk et al., 2020), Spain (Montoro et al., 2019) and the USA (Benleulmi and Ramdani, 2022). Whereas a few independent surveys are conducted in the context of developing countries such as China. Thus, this research focuses on Level 2 (partial driving automation) of non-public AVs in China.

In China, the government has implemented a series of preferential policies to promote the development of new energy vehicles since 2009 (Wu et al., 2019). China became the largest AV market in 2016, constituting 40% of world sales (Outlook, 2017). Since 2018, China has implemented nationwide guidelines for testing AVs on public roads, and vehicles with L2 driving automation are already widespread (Jing et al., 2023). From January to November 2020, 2.60 million passenger cars with L2 autonomous driving functions registered in China increased by 118.9% year-on-year. In terms of regions, the installations in Guangdong accounted for 15.9%, much higher than in other provinces (ReportLinker, 2021). From January to September 2022, the installation rate of L2 domestic passenger cars accounted for 28.4%. As Shenzhen, Shanghai, Guangzhou and other cities implement high-level autonomous driving policies, it is estimated that the installation rate of L2 and L2+ will exceed 50% by 2025, of which L2+ may make up 15% (ReportLinker, 2022).
Summing up, different types of motivation lead to pro-environmental behavior (PEB), and scholars have integrated various theoretical frameworks to demonstrate that behavior results from multiple reasons (Wang et al., 2019; Steg and Vlek, 2009). Therefore, exploring the multidimensional adoption motivation of AVs has significant implications for future tourism research and destination management, including uncovering potential benefits for tourism marketing, assisting destination managers in understanding tourists’ motivation and behavior and creating products that meet their demands. Aside from that, the importance of self-identity in environmental research has been emphasized by social responsibility advocates, innovators and environmentalists, as demonstrated in recent studies (Karatepe, 2023). The theory of planned behavior (TPB) suggests that attitudes influence behavior, and that attitude is one of the motivating factors (Ajzen and Fishbein, 1977). However, while eco-friendly attitudes and adoption motives have been analyzed in the context of e-vehicle adoption, there is a need for more research on the relationships between these variables and their combined effects on tourists’ PEB in the context of AVs adoption. The current study addresses these issues in the context of Level 2 AV adoption motivations and PEB among tourists through the application of TPB.

Furthermore, it is unclear whether tourists’ green self-image mediates between the AVs’ adoption motivations and tourists’ PEB. To the best of the authors’ knowledge, no single study investigated the relationship between AVs adoption motivations and tourists’ PEB from a multidimensional standpoint in the context of a developing country. Hence, this uncovered gap and research problems need to be addressed, and the following three unanswered research questions must be answered:

Q1. Do eco-friendly attitudes influence the tourists’ green self-image?
Q2. Does tourists’ green self-image mediate the relationship between eco-friendly attitudes and AVs’ adoption motivations?
Q3. Do AVs’ adoption motivations from a multidimensional standpoint influence the tourists’ PEB?

2. Conceptual framework and hypotheses development

2.1 Eco-friendly attitudes

It is prevalent in the literature to come across several synonyms that express attitudes toward the environment (Šagovnović and Stamenković, 2022). Eco-friendly, environmental, pro-environmental, sustainable or green are such phrases. When discussing products, eco-friendly is frequently used as a synonym for green, sustainable, ecological or environmentally friendly (Fullerton and McCullough, 2023). Thus, environmental attitudes are a collection of views about the environment, specific environmental conditions and people or items related to the environment. Similarly, ecological attitudes are among the most important predictors of ecologically responsible behavior (Li and Wang, 2017). Baniya et al. (2023) found that positive performance, social learning and eco-labels can influence tourists’ choice of green locations. Tourists with eco-friendly attitudes know the planet’s worsening ecological predicament, highlighting the need for severe environmental preservation measures (Šagovnović et al., 2022). Furthermore, environmentally conscious tourists are more inclined to acquire environmentally friendly items and advise others on using them more ecologically (Coudounaris et al., 2016). Therefore, eco-friendly attitudes are knowledgeable about the various aspects of the environment and are likely to shape and influence tourists’ green self-image, a valuable predictor for environmental sustainability.

2.2 Tourists’ green self-image

In the context of defining, conceptualizing and operationalizing the concept of tourists’ green self-image, the background factors that shape tourists’ green self-image in the
tourism environment have been well studied; these crucial elements cover extended issues, such as personal norms (Wasaya et al., 2023), recreation and co-creation experience (Lee and Jan, 2015; Mohammadi et al., 2021), perceived value (Brochado et al., 2022), environmental concern (Pham and Khanh, 2021), place attachment (Shen and Shen, 2021) and ecological knowledge (Pham and Khanh, 2021). Usually, these studies are carried out within the established theoretical framework. Examples of methods used include the value–belief–norm theory, motivational theory, norm-activation theory, expectancy–value theory and reasoned action theory. These theories try to define, conceptualize and predict self-image within a pro-environmental context (Karatepe, 2023). In this paper, we defined and conceptualized the tourists’ green self-image, which means avoiding those activities and actions that maximize negative impact on the destination community and natural environment of Shenzhen in China. In the context of Avs’ adoption, tourists’ green self-image mainly includes lifestyle protection measures (such as energy-saving) and social environmentalism (such as respecting environmental customs and values at the local level and participating in the local environmental activity).

2.3 Multidimensional autonomous vehicles’ adoption motivations

Motivation, a psychological phenomenon that originates within an individual can be explained as the driving force behind the initiation, direction, intensity, persistence and quality of behavior, as defined by Wentzel (2020). It is considered a crucial factor that encourages individuals to progress (Afsar and Umrani, 2020) and has been categorized into different types that lead to PEB. Scholars have integrated various theoretical frameworks to demonstrate that behavior results from multiple motivations (Wang et al., 2019). Behavior stems from numerous, rarely uniform motivations (Foltram et al., 2023). This research examined three distinct motivations for adopting AVs: technology, ecological and intrinsic motivation. Although AVs adoption motivations is an essential construct, investigating the impact of only one dimension of motivation on tourists’ PEB may not provide comprehensive outcomes because motivation has multiple dimensions that are highly personal, dynamic and diverse among tourists with varying backgrounds and experiences during the Avs’ adoption process for temporary use. Ignoring one type of motivation may lead to more issues, as the explanatory power of each motivation alone is insufficient. Therefore, conducting a comprehensive analysis incorporating multiple perspectives is recommended, where different dimensions of Avs’ adoption motivations may have varying effects on tourists’ PEB.

2.3.1 Technological motivation. Recent studies indicate that the adoption of innovative technology such as artificial intelligence (Goel et al., 2022), robots (Ivanov et al., 2023), drones (Sevilla-Sevilla et al., 2023) and AVs (Benleulmi and Ramdani, 2022) are likely to be valuable tools for environmental sustainability within the perspective of tourism Agenda 2030. Adopting innovative technology is a crucial motivator for consumers to act environmentally friendly. Technological motivation is one of the important reasons for adopting smart vehicles, as the new technology brings a new segment of users into the market (Hardman and Tal, 2016). Consumers increasingly use smart technologies to reduce emissions and conserve energy resources (Farghali et al., 2023). AVs are considered a sustainable and innovative technology that has recently entered the market (Iranmanesh et al., 2023). Early adopters of AVs are primarily motivated by technical features such as charging facilities and reliability (Etminani-Ghasrodashti et al., 2023), and those who are more curious about new technology are more likely to adopt this eco-friendly option (Le Tan and Quang, 2023). AVs have a microchip that enables parking in designated areas via a mobile app, theft-prevention systems and location-based services (Hemmati and Rahmani, 2022). AVs offer a solution for injured, disabled or elderly individuals who cannot ride conventional EVs (Mosaferchi and Naddeo, 2023). AV technology increases travel
convenience and makes trips easier since they do not require parking (Etminani-Ghasrodashti et al., 2023). While studies have highlighted technological motivation as a positive factor for PEB, research on adopting AVs for technological advancement is still limited.

2.3.2 Ecological motivation. As a psychological phenomenon, motivation encompasses environmental and ecological motivation, which is a successful predictor of environmentally friendly behavior (Saleem et al., 2021). People with more substantial ecological concerns are more likely to engage in energy-saving activities. The conduct of tourist consumers is crucial in conserving and ensuring the environment of the locations they visit (Shen et al., 2023). The adoption of AV is also driven by environmental reasons, which offer various benefits, including exercise, transporting children and goods, cost savings, environmental advantages and spending time with loved ones (Jing et al., 2020). AVs also encourage longer and more frequent rides and enable riders to access previously unreachable areas due to geographical barriers associated with conventional EVs (Benleulmi and Ramdani, 2022). Recent research suggests that people choose AVs over conventional EVs and positive experiences of AVs’ adoption for environmental reasons (Etminani-Ghasrodashti et al., 2023; Jing et al., 2020). The discussion presented above proposes that tourists using AVs with strong environmental concerns are more likely to improve their PEB.

2.3.3 Intrinsic motivation. The concept of intrinsic motivation refers to behavior that is personally satisfying or enjoyable (Steinhorst and Klöckner, 2018). People are intrinsically motivated to participate in AVs’ adoption activities because this new technology brings comfort and happiness, allowing them to use and park their AVs at will, choose their route and go wherever they want without worrying about parking (Jing et al., 2020). AVs provide extrinsic and intrinsic benefits, such as reducing traffic congestion, lowering carbon footprint and facilitating enjoyment (Foroughi et al., 2023). Although intrinsic motivation is a new concept in e-vehicle usage, there is evidence that intrinsically motivated individuals behave more sustainably in society (Iranmanesh et al., 2023). The ideas presented above suggest that when people find AVs enjoyable, they are more likely to use them, ultimately influencing their behavior.

2.4 Conceptual model and proposed hypotheses

The discussion and ideas presented above suggest that the adoption motivations, such as ecological, intrinsic motivation and technological aspects, collectively form the AV adoption framework. Hence, adoption motivations of potential temporary users of AVs are likely to influence the tourists’ PEB. Furthermore, attitudes inform motivations that, in turn, inform behavior, indicating that relationships between attitude and adoption motivations are likely to mediate by tourists’ green self-image. Tourists are knowledgeable about the various aspects of AVAM, so they will likely find AVs a useful tool for environmental sustainability. To that end, we projected the following hypotheses:

\[ H_1 \] Eco-friendly attitudes positively affect tourists’ green self-image.

\[ H_{2a-2c} \] Tourists’ green self-image positively affects AV adoption motivations (i.e. technological, ecological and intrinsic).

\[ H_{3a-3c} \] AV adoption motivations (i.e. technological, ecological and intrinsic) positively affect tourists’ PEB.

\[ H_{M4a-M4c} \] Tourists’ green self-image positively mediates the relationship between eco-friendly attitudes and AV adoption motivations (i.e. technological, ecological and intrinsic).

Given the proposed hypotheses and the above insights, we propose conceptual model illustrated in Figure 1.
3. Methodology

3.1 Sample and data collection

The respondent-friendly draft of the preliminary survey questionnaire was first prepared and then tested with the criticism and advice of small environment experts to ensure maximum accuracy. Julious (2005) suggested a minimum sample size of 12 per group as a rule of thumb for a pilot study. After an initial pre-test, a pilot test was undertaken in December 2022 with 26 respondents. Minor adjustments were made to refine the final version of the surveys. Eventually, 29 questions remained and were adapted regarding wording, expression and order to consider and test the reliability and validity of the questionnaire. Following this, improvements were made according to the feedback received to complete the questionnaire. Although there is limited information about the overall proportion of temporary users of AVs among national and international tourists in China, local-level statistics from some areas indicate that the share is minimal. Hence, to reach a sufficiently large number of temporary users of AVs among national and international tourists, the commercial panel used WeChat to recruit temporary users of AVs in addition to the panel data.

An online survey using WeChat App was sent out to 750 nation and international tourists, and 612 responded, resulting in a response rate of 81.6%. To minimize common method bias (Podsakoff et al., 2003), we used a two-wave time-lagged method to collect the data, leaving at most one week between each wave of collection, which depended on tourists' whole duration of the trip. In Wave 1, tourists were asked to complete a questionnaire about their demographic information on the first day of the trip. In the second wave, questionnaires were distributed to tourists who had responded in the first stage. In Wave 2, on the last day of the trip, they were requested to report their responses to the 29-item questionnaire on a seven-point Likert scale anchored between 1 (strongly disagree) and 7 (strongly agree). Out of 612 questionnaires, 586 valid questionnaires were used for data analysis. The data collection was completed between March 2023 and April 2023. Table 1 presents descriptive information of the respondents. Among the total respondents of temporary users of AVs, 48.46% were Chinese national tourists, and 51.54 were international tourists. Table 1 suggests that more than 80% of the respondents were between 18 and
54 years old, and nearly 24.74% and 43.34% had bachelor’s and master’s degrees or higher, respectively.

3.2 Measurement

Eco-friendly attitudes were assessed using nine items adapted from the work of Leonidou et al. (2014). We set tourists’ green self-image by adjusting three items of the Sparks and Shepherd (1992) self-identity scale. Tourist PEB was measured using a six-item scale (Su and Swanson, 2017). Technological motivation was measured using a three-item scale from Jansson et al. (2010). A three-item scale to measure ecological motivation was chosen from concomitant studies (Peters et al., 2018; Noppers et al., 2015). Intrinsic motivation was measured using the four-item scale (Steinhorst and Klöckner, 2018). All the items of the constructs are listed in Appendix.

4. Results

4.1 Measurement model

Table 2 shows that the values of factor loadings ranged from 0.725 to 0.915, Cronbach’s alpha (α) ranged from 0.745 to 0.928, composite reliability (CR) ranged from 0.854 to 0.944 and average variance extracted (AVE) ranged from 0.551 to 0.758 are more significant than the threshold values of 0.707, 0.6, 0.7 and 0.5, respectively (Hair Jr et al., 2023), which met the suggested requirements. Table 3 indicates that the AVE values’ square root is greater than the off-diagonal correlation between constructs (Fornell and Larcker, 1981). Table 4 reveals that the values of the heterotrait-monotrait ratio were also smaller than 0.90 (Henseler et al., 2015).
4.2 Common method bias

Harman’s single-factor test is the simplest, widely used measure to report and check common method bias (Podsakoff et al., 2003). The percentage of variance (extraction sums of squared loadings) shows that we have less than 50% of the common variance.
(43.941%), which supports that the common method bias is not a concern in this study.

4.3 Structural model

Table 5 presents the hypotheses testing of the direct effects. The hypothesized relationships of the structured model were assessed using bootstrapping (4,000 resamples) to produce confidence intervals and $t$-values. We also reported the confidence interval to check the significance of the structural path coefficients (Streukens et al., 2010). First, eco-friendly attitudes positively and significantly affect tourists' green self-image ($H_1$, $\beta = 0.545$, $t = 14.003$), supporting $H_1$. Second, tourists' green self-image positively and significantly affects Aves' adoption motivations (e.g. technological, $\beta = 0.230$, $t = 4.196$; ecological, $\beta = 0.301$, $t = 5.839$; and intrinsic, $\beta = 0.238$, $t = 5.603$), which support $H_2a$, $H_2b$ and $H_2c$. Third, Aves' adoption motivations (e.g. technological, $\beta = 0.124$, $t = 3.040$; ecological, $\beta = 0.201$, $t = 3.887$; and intrinsic, $\beta = 0.346$, $t = 6.206$) were also positively and significantly effects tourists' PEB, which support $H_3a$, $H_3b$ and $H_3c$ (see Figure 2).

Table 6 presents the values of the coefficient of determination ($R^2$), Cohen's $f^2$ and the predictive relevance and accuracy of the model. The structured model explained 53.2% of the variance in tourists' PEB. The value of $Q^2 > 0$ indicates the model's predictive relevance, and the values of $f^2$ (0.02, 0.15 and 0.35) are referred to as weak, moderate and strong effect sizes of the constructs, respectively (Cohen, 1992). In conclusion, the present study's structural model was acceptably good.

4.4 Mediating effect

The hypothesized mediation paths of the structured model were also assessed using bootstrapping (4,000 resamples) to produce confidence intervals and $t$-values (Table 7). The results revealed that the specific indirect effects of the concerned exogenous variables were also significantly supported, as 0 values were not counted in either confidence interval. Specifically, tourists' green self-image mediated the relationship between
eco-friendly attitudes and AVs’ adoption motivations (e.g. technological, $\beta = 0.125$, $t = 4.179$; ecological, $\beta = 0.164$, $t = 5.908$; and intrinsic, $\beta = 0.130$, $t = 5.533$), which support HM4a, HM4b and HM4c, respectively.

5. Discussion and conclusion

As expected, the findings reveal that tourists’ green self-image mediated the relationship between AVs’ adoption motivations for environmental reasons. Both indirectly and directly,
the Avs’ adoption motivations are also significant and positive predictors of tourists’ PEB, which provides partial support for the concerned mediating hypotheses. Besides, the current study analysis findings generally supported all projected hypotheses. First, as predicted by H1 associated with the direct effect of eco-friendly attitudes, the results revealed that eco-friendly attitudes is a significant and positive predictor of tourists’ green self-image. Second, as predicted by H2a, H2b and H2c associated with the direct effect of tourists’ green self-image, the findings revealed that tourists’ green self-image is a significant and positive predictor of Avs’ adoption motivations (e.g. H2a: technological; H2b: ecological; and H2c: Intrinsic.). Third, as predicted by H3a, H3b and H3c associated with the direct effect of Avs’ adoption motivations, the findings revealed that these concerned adoption motivations were significant and positive predictors of tourists’ PEB. Finally, as predicted by HM4a, HM4b and HM4c associated with the mediation role of tourists’ green self-image, the findings revealed that tourists’ green self-image mediated the relationship between eco-friendly attitudes and Avs’ adoption motivations (e.g. HM4a: technological; HM4b: ecological; and HM4c: intrinsic.). These results are similar to the findings of previous studies (White and Sintov, 2017; Van der Werff et al., 2013).

Tourists’ green self-image symbolism is an independent and robust mediator to predict Avs’ adoption motivations toward tourists’ PEB. This result expands the previous literature, acknowledging the significance of similar constructs or factors separately but not studying them together (White and Sintov, 2017; Noppers et al., 2015). Our study approves that innovator, environmentalist and social status symbolism in specific is a significant predictor for AVs’ adoption motivation. Over and above the predictors of tourists’ PEB and psychological and demographic characteristics, this social uniqueness self-identity as tourists’ green self-image symbolism should be considered in the future direction. This predictor is distinct from the measures that have often previously been examined of concern about PEB and climate change (Krupa et al., 2014) and also separate from once-reviewed measures of environmental-related attributes (Noppers et al., 2015) due to its construction of AVs adoption reflections of environmentalist green person status and self-identity. Eco-friendly attitudes have been associated with the moral responsibility to act pro-environmentally, influencing AVs’ adoption motivations (Foroughi et al., 2023; White and Sintov, 2017). In line with the limited literature, our results on the social innovator, environmentalist, cost-effective, self-sacrificing signaling can achieve tourists’ green self-image, clarifying the importance of green status, innovator and intrinsic motivations for predicting tourists’ PEB. Furthermore, paying attention to intrinsic motivation for AVs’ adoption to set an ecologically friendly trend might be another element to improve tourists’ PEB. These findings align with the previous scholar that potential adopters evaluated e-vehicle symbolism highly if they perceived instrumental attributes and intrinsic incentives (Noppers et al., 2015).

AVs’ adoption motivations through the lens of tourists’ green self-image within the context of tourists’ PEB gaining ground for environmentally friendly micro-mobility. Some important conclusions could be drawn from current research work, and our study’s findings can be meaningfully viewed in several aspects by covering the existing research gap in PEB and AVs tourism. First, tourists would adopt a green self-image from eco-friendly attitudes, which leads towards AVs’ adoption motivations (i.e. technological, ecological and intrinsic) no matter whether they have their prior PEB or not, and the impact of such influence is higher if tourists have no prior PEB. Second, the TGS allows tourists to update their knowledge of AVs’ adoption motivations, through which their PEB is finally influenced. Additionally, the magnitude of the influence of eco-friendly attitudes on the AVs’ adoption motivation also depends on the mediating role of tourists’ green self-image. Hence, we demonstrate that tourists’ green self-image could trigger potential tourists to practice AVs adoption motivations, which finally leads to improving tourists’ PEB.
5.1 Theoretical and managerial implications

Research on AVs’ adoption motivations as the antecedent of tourists’ PEB is rare, and the pertinent research is generally biased, dispersed and ad hoc. Hedonic and environmental motivations have attracted most of the focus in studies that have examined the effect of AVs adoption motivations, rarely concerning the other dimensions of AVs’ adoption motivations. In addition, relevant research probed into the mediation role of tourists’ green self-image on PEB without integrating with eco-friendly attitudes. Nevertheless, tourists behaved as pro-environmentalists for relatively everyday simple actions to gain a green self-image; this aspect has been overlooked instead of examining the link between AVs’ adoption motivations and tourists’ PEB from a mediation approach. Mainly, eco-friendly attitudes currently focus more on achieving tourists’ green self-image via investigating several motivational facets to become pro-environmentalists; because each form of adoption motivation has a limited explanatory capacity, ignoring one will only bring further issues (Mehmood and Zhou, 2023). Based on a multidimensional motivation perspective, the current study found that three forms of motivation – technological, ecological and intrinsic motivation – are antecedents of tourists’ PEB. Tourists’ green self-image was used in the current investigation as a mediating variable, and it was found to mediate the relationship between eco-friendly attitudes and AVs’ adoption motivations. As a result, the present paper enhances and strengthens eco-friendly attitudes, tourists’ green self-image AVs adoption motivations and tourists’ PEB research and has a specific theoretical contribution.

Our study also provides practical implications for the environmental, tourism and AVs’ management industries. The concerned authorities should emphasize the importance of tourists’ green self-image within pro-environmental campaigns. So, it seems rational for practitioners to maximize tourists’ PEB who travel toward tourism destinations. In the context of tourists’ PEB, the potential of AVs’ adoption to reaffirm their social innovator and environmentalist identities provides implications for AVs’ marketing, uptake strategies and tourists’ PEB policies. Tourists’ green self-image is significant for AVs’ adoption marketing because it distinguishes potential adopters from others within the society. Therefore, only educating societies about the importance of the natural environment and climate change may not be adequate to boost tourists. However, explaining why it is crucial for them and the environment may encourage people to take moderating action to protect the environment, being an eco-friendly and social innovator.

AVs are also equipped with theft-prevention systems, and location-based services allow them to not worry about where to park their AVs to avoid being stolen. Therefore, AVs’ adoption program professionals should encourage the adoption of AVs by focusing on environmentally friendly micro-mobility during AVs’ marketing and promotions. Government policy and AVs’ management industries should concentrate on different compensations for different generations to promote AVs’ adoption because AVs’ adoption experiences vary from generation to generation. Compared to conventional e-vehicles, AVs enable people to cover longer distances and manage more efficiently, and passengers will experience a smoother riding experience. These highlighted reasons provide rational grounds for tourism managers and government and non-government organizations for AVs’ marketing and promotional campaigns. These might be vital features to incorporate into wellness and AVs’ encouragement programs such as branding, open streets, safe routes to tourism destinations, AV training and education, AVs’ sharing programs and promotion events.

5.2 Limitations and future research

Although this study provides fruitful insights and represents a pioneering attempt to investigate the mediating role of tourists’ green self-image, its shortcomings open avenues for future work. Specifically, research should investigate the attitude–behavior gap while taking a “cognition perspective” on environmental behavior. Eco-initiatives significantly
contribute to green sustainability, but green creativity in the tourism sector still needs further exploration. From the theoretical perspective, adding gender differences in our proposed framework can be imperative for a more precise understanding of tourists’ PEB. Research should continue to understand the policy implications better to encourage AVs’ adoption and tourists’ PEB by focusing on the significance of tourists’ green self-image.

References


Appendix: Measurement Items

(Strongly disagree [1] to Strongly agree [7])

Tourists’ green self-image
- “I think of myself as someone who is concerned about environmental issues.”
- “I think of myself as a “green” tourist.”
- “I would describe myself as an ecologically conscious consumer.”

Tourist pro-environmental behavior
- “I comply with the rules so as to not harm the destination environment.”
- “I report to the appropriate destination administration any environmental pollution or destruction at the destination.”
- “When I see garbage and debris at the destination, I put it in the trash.”
- “If there are environment improvement activities at the destination, I am willing to attend.”
- “I try to convince others to protect the natural environment at the destination.”
- “I try not to disrupt the fauna and/or flora when visiting the destination.”

Technological motivation
- “I get very enthusiastic about technology.”
- “I keep up to date with new technological developments.”
- “I am often the first in my group of friends to acquire a new technology.”

Ecological motivation
- “AVs emits little CO2.”
- “Harming the environment as little as possible by driving an AV.”
- “Depletion of natural resources like oil.”
Intrinsic motivation
- “Being environmentally conscious is a fundamental part of who I am.”
- “I think it is a sensible thing to do in order to improve the environment.”
- “It is part of the way I want to live my life.”
- “It is a reasonable way to contribute to a better environment.”
- “If we just carry on as before, we are heading for an environmental catastrophe.”

Tourists’ eco-friendly attitudes
- “Tourism must protect the environment now and for the future.”
- “The diversity of nature must be valued and protected by tourism.”
- “I think that tourism should strengthen efforts for environmental conservation.”
- “Tourism needs to be developed in harmony with natural the environment.”
- “Proper tourism development requires that wildlife and natural habitats be protected at all times.”
- “Tourism development must promote positive environmental ethics among all parties that have a stake in tourism.”
- “Regulatory environmental standards are needed to reduce the negative impacts of tourism development.”
- “I believe that tourism must improve the environment for future generations.”
- “As a tourist, I would be willing to reduce my consumption to help/protect the environment.”

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