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Article

How Social Media Shapes Consumers' Adoption Intentions Toward Robotaxis: Symmetric and Asymmetric Evidence

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Abstract

Based on survey data collected from 817 consumers in China who use social media, we examine the factors influencing consumers' adoption intentions toward robotaxis. Although prior research explores social media's role in the marketing domain, its impact on consumers' psychological and behavioral responses in the context of emerging technologies remains insufficiently investigated. To address this gap, we adopt the stimulus-organism-response (S-O-R) model and employ both symmetric (linear regression) and asymmetric (fuzzy-set qualitative comparative analysis, fsQCA) approaches to examine how social media influences consumers' experiential and instrumental attitudes, and their self-efficacy, thereby affecting adoption intentions toward robotaxis. We also examine the moderating role of a pro-environmental self-identity. Our results indicate social media exerts a positive effect on consumers' experiential attitude, instrumental attitude, and adoption intention, while its impact on self-efficacy is not statistically significant. In addition, experiential attitude, instrumental attitude, and self-efficacy emerge as significant predictors of adoption intention, and pro-environmental self-identity positively moderates the relationship between experiential attitude and adoption intention. To complement the results based on structural equation modeling, findings from the fsQCA identify three configurational pathways (two distinct solution types) leading to high adoption intention and four configurational pathways leading to non-high adoption intention. In addition to the study's theoretical and methodological contributions, we identify practical implications for firms and marketers operating during the early-stage deployment of robotaxis.

Keywords: robotaxis; social media; S-O-R model; adoption intention; mixed method

1. Introduction

In recent years, fast-moving developments in autonomous driving technology, combined with the rise of the sharing economy, have rapidly expanded the global robotaxi market. Industry forecasts estimate the size of the robotaxi market in China will grow from USD 54 million in 2025 to USD 47 billion in 2035 (Chang et al., 2025; White, 2025). Compared with traditional taxi services, robotaxis significantly reduce operating costs by eliminating the need for a human driver, and improve transportation availability by operating around the clock (Fagnant & Kockelman, 2015; Narayanan et al., 2020). In addition, by optimizing driving routes and smoothing driving behavior, robotaxis substantially reduce energy consumption and carbon emissions, generating meaningful environmental benefits (Greenblatt & Saxena, 2015; Sperling, 2018). Although robotaxis are seen as a technologically optimized, environmentally friendly transportation solution (Fagnant & Kockelman, 2015; Greenblatt & Saxena, 2015), consumers must still overcome considerable uncertainty before they use robotaxis (Kenesei et al., 2022; Zhang et al., 2022). Unlike incremental automotive innovations such as advanced driver assistance systems, robotaxis require passengers to relinquish

full control to algorithmic systems upon first use (Syahrivar et al., 2021; Waytz et al., 2014). In this early stage of robotaxi commercialization, most consumers lack experiential familiarity with this technology and therefore must evaluate its safety, functionality, and controllability with no firsthand knowledge. Thus, consumers' evaluations and adoption decisions depend more on the external information environment to which they are exposed than on personal experience.

Social media platforms (e.g., WeChat, Weibo, Douyin, Xiaohongshu) have become one of the primary channels through which Chinese consumers obtain information about robotaxis (He et al., 2022; Park et al., 2024). Unlike the unidirectional communication mechanism of traditional mass media, social media provide consumers with a more authentic, transparent, and highly interactive information environment (Wu & Kim, 2025). As digital media platforms integrate informational and entertainment functions, social media content related to robotaxis includes hedonic content such as immersive ride videos, experiential vlogs, and emotionally-driven narrative reviews, as well as functional information regarding operational efficiency, cost advantages, and environmental sustainability (Cheung & Thadani, 2012; Ismagilova et al., 2020; Zheng et al., 2025). Due to these dual informational and hedonic characteristics, consumers' adoption intentions toward autonomous vehicles are influenced by both perceived usefulness and perceived enjoyment (Vafaei-Zadeh et al., 2025). However, existing studies on the influence of social media on consumer technology adoption primarily focus on green products (Nekmahmud et al., 2022; Ng et al., 2025; Zhao et al., 2024) or traditional shared mobility services (Borowski et al., 2020; Chen et al., 2023), while the ways social media affects consumers' adoption of robotaxis in the shared economy context remains underexplored.

Prior research on robotaxi adoption uses various theoretical frameworks from social psychology to explain consumer acceptance mechanisms, including the Technology Acceptance Model (TAM) (Davis, 1989; Liu et al., 2022), the Theory of Planned Behavior (Ajzen & Driver, 1992; Yao et al., 2025), and the Unified Theory of Acceptance and Use of Technology (Greifstein et al., 2026; Venkatesh et al., 2003; Wei et al., 2024). However, these frameworks face two limitations in understanding consumer adoption in a social media-driven context. First, these theories primarily focus on the utilitarian dimension of adopting a new technology, emphasizing consumers' evaluations of its practical consequences (e.g., efficiency and performance), known as instrumental attitudes (Fishbein & Ajzen, 2011; Hornbæk & Hertzum, 2017). However, the interactivity and vividness of social media lead consumers to form hedonic expectations of vicarious experiences (e.g., enjoyment and novelty) prior to actual riding in a robotaxi (Vafaei-Zadeh et al., 2025). This implies that focusing solely on instrumental attitudes is insufficient to capture the full scope of consumer attitudes toward robotaxis, and that their experiential attitudes—defined as consumers' affective evaluations of their own experiences during the adoption process—should also be included (Fishbein & Ajzen, 2011; Hornbæk & Hertzum, 2017; Maton et al., 2025). Although these two types of attitudes are conceptually distinct, prior research typically incorporates only one of them, or combines them into a single-dimensional measure (Maton et al., 2025; Wixom & Todd, 2005; Zhang et al., 2008). This may obscure potential differences in these attitudes' antecedents and outcomes (La Barbera & Ajzen, 2024). Moreover, TAM puts relatively little emphasis on capability-based beliefs. According to social cognitive theory (Bandura, 1986), even without trying an actual ride, consumers may develop confidence in their ability to use robotaxis (i.e., self-efficacy) by observing other users in ride demonstrations and seeing feedback about the experience on social media (Compeau & Higgins, 1995a; Hiustra et al., 2024). In social media environments, such vicarious learning is particularly salient; therefore, self-efficacy is an important factor in understanding robotaxi adoption.

Second, the aforementioned theories assume linear relationships among variables, and existing studies on robotaxi adoption predominantly rely on symmetric methods such as structural equation modeling or regression analysis to identify causal paths (Li et al., 2022; Liu et al., 2022; Wei et al., 2024; Zhou & Yi, 2025). However, in the information-rich social media environment, consumers are exposed to information flows from diverse sources and directions. Rather than exhibiting linear behavior driven by a single piece of information (Balaji et al., 2023; Spais et al., 2024), their

psychological responses are complex, often simultaneously forming affective reactions, functional judgments, and efficacy beliefs during a single exposure, rather than sequentially (Forgas, 1995; Kahneman, 2011). Furthermore, differences in consumers' identity identification and value orientation may influence service adoption decisions (Rather & Hollebeek, 2021; Wu et al., 2019); therefore, consumer psychological and behavioral mechanisms exhibit causal complexity and heterogeneity. As complexity theory suggests, focusing on a single dimension is insufficient to explain the formation of consumer adoption intentions in the sharing economy context; thus, attention should shift from individual dimensions to configurational combinations (Lee et al., 2024; Pappas, 2017). Although symmetric linear methods can effectively estimate the independent net effect of a single variable, they are limited in their ability to reveal the causal asymmetry and equifinality that commonly characterize consumer decision-making (Pappas & Woodside, 2021; Ragin, 2008).

To address these gaps, this study distinguishes between consumers' instrumental and experiential attitudes (La Barbera & Ajzen, 2024; McEachan et al., 2016), and incorporates self-efficacy as a key construct representing consumers' capability beliefs. We develop a research model grounded in the stimulus–organism–response (S-O-R) framework (Mehrabian & Russell, 1974) as our primary theoretical lens. In addition, we adopt Jacoby (2002) reconceptualized evolutionary S-O-R model to construct a configurational model as a complement and employ a mixed-method design combining linear regression and fuzzy-set qualitative comparative analysis (fsQCA). Regression analysis is used to identify the net effects among variables and assumes symmetric linear relationships (Ho et al., 2016; Manosuthi et al., 2024). In contrast, fsQCA explains causality through set relations rather than variable correlations and has distinct advantages in identifying asymmetric relationships between outcome variables and antecedent conditions (Fiss, 2007; Pappas & Woodside, 2021; Ragin, 2008). The two approaches are complementary and have increasingly become mainstream strategies in consumer behavior research (Dogra et al., 2023; Jiang et al., 2026; Kumar et al., 2026; Santos & Gonçalves, 2019; Yuan et al., 2025; Zhang & Cheng, 2025). Specifically, this study seeks to address the following three research questions: (1) How does social media influence consumers' adoption intentions toward robotaxis? (2) Which factors exert a significant impact on consumers' adoption intentions? (3) How do different configurational combinations of factors jointly shape consumers' adoption intentions?

This study makes three primary contributions to the literature. First, it is among the early attempts to distinguish between instrumental and experiential attitudes within the field of consumer behavior, incorporating often-overlooked yet key constructs such as self-efficacy into the research framework. By doing so, we offer a more explanatory theoretical model for understanding how social media influence consumers' psychological and behavioral pathways in the context of emerging robotaxi services. Second, we incorporate pro-environmental self-identity as a moderating variable in the research model, revealing heterogeneity in consumer adoption mechanisms. Our findings indicate that adoption intention is not driven solely by external stimuli or rational evaluations; it is shaped by the interaction between affective evaluations and identity congruence. This result extends the theoretical understanding of individual differences and identity-driven mechanisms in technology adoption research. Third, by employing a mixed-method approach that combines symmetric analysis (linear regression) and configurational analysis (fsQCA), this study supports the view that consumer decision-making involves causal complexity rather than a single linear causal structure (Jiang et al., 2026; Kumar et al., 2026; Yuan et al., 2025; Zhang & Cheng, 2025) and provides a more comprehensive analytical perspective for examining the complex mechanisms underlying consumer behavior. Our results hold practical implications for the early deployment of robotaxis and provide a more complete analytical perspective for understanding consumer decision-making in complex digital environments.

2. Literature Review and Hypothesis Development

2.1. S-O-R Model

The S-O-R model provides a valuable theoretical lens for explaining consumer behavior (Chaudhuri et al., 2026; Jiang et al., 2026; Laato et al., 2020; Pham et al., 2024; Watts et al., 2026). It explains how external environmental factors (the stimuli) shape individuals’ (organisms) internal states, which in turn generate behaviors (responses) (Mehrabian & Russell, 1974). Based on the S-O-R framework, we develop a linear model in which social media content related to robotaxis serves as the stimulus (S), experiential and utilitarian attitudes, and self-efficacy constitute the organism (O), and adoption intention represents the response (R). Pro-environmental self-identity is incorporated as a boundary condition.

However, linear assumptions may constrain the understanding of the dynamic relationships underlying consumer behavior (Bigne et al., 2020). The evolutionary S-O-R model proposed by Jacoby (2002) provides a more comprehensive perspective for explaining consumer behavior (Cui et al., 2016; Lee et al., 2024) by conceptualizing S-O-R as three interconnected circles that together form a dynamic seven-sector Venn diagram (see Figure 1).

Figure 1. S-O-R model as reconceptualized by Jacoby (2002).

Sector 1 represents the external stimuli to which individuals are exposed. Bitner (1992) seminal “servicescape” framework suggests environmental stimuli shape consumer responses, yet it explicitly confines such stimuli to “man-made, physical surroundings as opposed to natural or social environments” (p. 58). However, by excluding the social environment this focus entails a substantial omission. To address this, Tombs and McColl-Kennedy (2003) introduce the concept of the “social-servicescape” and show that socially constructed environmental stimuli within service settings are more effective in triggering consumers’ internal reactions and behavioral responses. In the digital era, the social dimension of the servicescape has extended far beyond face-to-face interactions. In contemporary society, much of what people experience occurs through symbolically mediated communication rather than direct interactions (Bandura, 2001). Social media platforms, a digital form of the social servicescape, differ from physical servicescapes, as those platforms are characterized by scalability, temporal persistence, and multidirectional interactivity (Zhu et al., 2020). In this study, we conceptualize consumers’ interactions with social media as the source of stimuli within our theoretical framework.

After processing stimuli, consumers may enter either Sector 2 or Sector 5. In Sector 2, due to the limited capacity of human memory, individuals unconsciously filter incoming information, retaining only its core elements (Jacoby, 2002). In the social media environment, consumers are confronted with highly fragmented, visual, and rapidly updated information (Mayer et al., 2024). They tend to selectively attend to the cues that appear most salient—such as headlines, thumbnails, and popularity indicators (e.g., numbers of likes and shares)—to form rapid initial judgments (Hussain et al., 2019). The outcomes of such unconscious processing then flow into Sector 3 or Sector 4, where affective cues, associations, or heuristic processing shape an individual’s preliminary cognition, in this case with respect to autonomous taxis. Sector 5 captures reactions that are difficult to trace (Lee et al., 2024).

Sector 3 represents long-term memory structures that store accumulated knowledge, beliefs, and prior experiences (Jacoby, 2002). When affective information from Sector 4 enters Sector 6 and interacts with cognitive information retrieved from Sector 3, consumers form rational evaluations of the utility and value of autonomous taxis. Sector 4 represents affective responses generated when individuals consciously evaluate stimuli (Jacoby, 2002). When consumers actively process information about autonomous taxis, the emotions elicited (e.g., pleasure, curiosity, or anxiety) shape their experiential evaluations. In this study, we conceptualize Sector 4 as experiential attitude, which captures consumers’ emotional responses to stimuli (La Barbera & Ajzen, 2024). We conceptualize the interaction between Sector 3 and Sector 4 as the pathway that forms instrumental attitude, reflecting consumers’ rational judgments. Sector 3 also includes consumers’ confidence in their ability to use autonomous taxis (i.e., self-efficacy). According to social cognitive theory (Bandura, 1986), self-efficacy comes from four sources: mastery experiences, vicarious experiences, verbal persuasion, and

physiological states. Vicarious experiences obtained through social media (in this setting, observing others successfully using a robotaxi service) and verbal persuasion (positive evaluations and expert endorsements) can serve as primary sources in forming self-efficacy.

Sector 6 contains internal responses that are not directly observable, including attitudes and intentions (Jacoby, 2002). In this study, Sector 6 represents a convergence zone in which experiential attitude (from Sector 4), instrumental attitude (from the interaction between Sectors 3 and 4), and self-efficacy (from Sector 3) are integrated into a coherent evaluative state. Note that the depth and mode of a consumer's engagement with social media are influenced by individual characteristics (Nov et al., 2010). Identity theory posits that individuals who are committed to identity goals are more likely to engage in behaviors that signal progress toward those goals (Burke & Stets, 2009). For example, consumers in emerging markets who have strongly pro-environmental self-identities are more inclined to adopt sustainable consumption behaviors (Dermody et al., 2018; Thøgersen & Zhang, 2025). Finally, Sector 7 consists of externally detectable outcomes originating from Sector 4, such as behavioral responses (Lee et al., 2024). In this study, we define the key output of Sector 7 as consumers' external response in the form of intentions to use autonomous taxis.

In summary, consumers' exposure to stimuli via social media invokes a complex, multi-path processing mechanism in which different antecedent conditions may jointly shape adoption intention. This suggests the linear effects of single variables cannot sufficiently explain variations in internal responses and behavioral outcomes. Equifinality theory (Woodside, 2014) posits that multiple antecedent conditions may combine in various ways to produce the same outcome, demonstrating the equivalence of multiple causal pathways. This perspective aligns with the multi-channel processing mechanism described in Jacoby (2002) evolutionary S-O-R model. Both frameworks emphasize that internal responses and observable behaviors do not stem from a single causal path; they emerge from configurations of psychological and situational factors. Therefore, grounded in Jacoby (2002) evolutionary S-O-R framework, we include the configurational method of fsQCA to complement the symmetric inference of linear regression models and identify how different combinations of antecedent conditions lead to high and low levels of adoption intention (Fiss, 2011).

2.2. Social Media and Adoption Intention

Social media platforms have become primary channels through which consumers acquire, process, and share information about emerging technologies and services (Le & Ngoc, 2024). In this study, social media is defined as interactive online platforms (e.g., TikTok-Chinese version: Douyin, Sina Weibo and Bilibili) that, in contrast to traditional mass media, emphasize user-generated content and multidirectional communication (Zhu et al., 2020). When consumers have limited experience with a given technology, social media serves as a key information source and can significantly influence an individual's view of the technology and adoption decisions (Lee et al., 2022; Vafaei-Zadeh et al., 2025; Zhang et al., 2022). When the uncertainty associated with a new technology is high, the discussions and evaluative mechanisms on social media enhance technological familiarity and reduce perceived uncertainty, thereby increasing consumers' adoption intentions, in this case with respect to using robotaxis. Prior research indicates that media exposure significantly affects consumers' consideration and acceptance of autonomous driving technologies (Ghasri & Vij, 2021) and directly predicts behavioral intention across various technology adoption contexts (Kumar & Pandey, 2023; Le & Ngoc, 2024). Given that social media enhances awareness of autonomous mobility services and ultimately exerts a direct positive influence on consumers' adoption intention, we propose the following hypothesis:

H1: Social media positively influences consumers' adoption intentions toward robotaxis.

2.3. Social Media and Experiential Attitude, Instrumental Attitude

Attitudes are inherently both experiential and instrumental in nature (Fishbein & Ajzen, 2011; Maton et al., 2025). In our research context, we define experiential attitude as one's affective

evaluation of engaging in the behavior (e.g., whether it is pleasant or interesting), whereas instrumental attitude reflects one's cognitive evaluation of the outcomes of the behavior (e.g., whether it is useful or wise) (La Barbera & Ajzen, 2024). This distinction is important because the two attitudinal dimensions are formed through different psychological processes and may respond differently to informational stimuli (Conner & Armitage, 1998; Kraft et al., 2005).

Social media is expected to positively influence experiential attitude through affective contagions and vicarious emotional experiences. When consumers are exposed to robotaxi-related content on social media (e.g., ride-experience videos, animated demonstrations, or emotionally expressive user testimonials), they may experience vicarious emotions that shape their affective evaluations. Emotional contagion theory (Hatfield et al., 1993) posits that individuals unconsciously mimic and align with the emotions expressed by others, a process that is amplified in social media environments dominated by visual and audio-visual content (Kramer et al., 2014). In tourism research, social media marketing has been shown to enhance users' affective perceptions of destinations, as images and videos shared online facilitate emotional engagement and enable consumers to "virtually" experience products or services (Vu et al., 2025). Similarly, passengers' expressions of excitement toward robotaxis on social media may evoke curiosity and pleasure among consumers, thereby enhancing their experiential attitude. Accordingly, we propose the following hypothesis:

H2: Social media positively influences consumers' experiential attitudes toward robotaxis.

Instrumental attitude relies on factual information, rational arguments, and evidence regarding the utility, safety, and efficiency of a technology in forming cognitive evaluations of behavioral outcomes (La Barbera & Ajzen, 2024). Social media platforms disseminate a wide range of relevant information, including expert analyses of autonomous driving technologies, news reports on robotaxi safety records, government policy announcements, comparisons of robotaxis and traditional taxi services, and data-driven evaluations of cost and convenience (Ghasri & Vij, 2021; Lee et al., 2022). As consumers process this information, they form instrumental attitudes regarding robotaxis' functional benefits and risks. Empirical findings suggest media exposure enhances consumers' judgments of the performance-related value of autonomous vehicles, shaping their utilitarian evaluations of these services (Vafaei-Zadeh et al., 2025). Based on this, we propose the following hypothesis:

H3: Social media positively influences consumers' instrumental attitudes toward robotaxis.

2.4. Social Media and Self-Efficacy

Social media has become an important source of information and experiential cues regarding new technologies, providing consumers with opportunities for observational learning, usage demonstrations, and peer evaluations. According to social cognitive theory, self-efficacy—defined as a belief in one's ability to successfully perform required behaviors—is one of the most important determinants of individual behavior (Bandura, 1986, 1997). Adopting a new technology involves a learning process in which self-efficacy plays a critical role (Compeau & Higgins, 1995b; Venkatesh et al., 2012b). Social media offers consumers reviews, experience sharing, and opportunities for social interaction, thus serving as an important source of information in the decision-making processes (Abang Othman et al., 2017). In addition, social media's expert endorsements, positive evaluations, and encouragement from peers facilitates verbal persuasion, which can strengthen self-efficacy. Prior research shows both social media and traditional media can enhance consumers' self-efficacy regarding autonomous vehicles (Du et al., 2022; Lee et al., 2022; Wu & Kim, 2025). Therefore, in our context, the more social media shows how to use robotaxis, including actual ride demonstrations and information about successful experiences, the greater the sense of mastery and ability to use robotaxis consumers acquire through vicarious learning, which enhances their self-efficacy. Based on the foregoing, we propose the following hypothesis:

H4: Social media positively influences consumers' self-efficacy toward robotaxis.

2.5. *Experiential Attitude, Instrumental Attitude, and Adoption Intention*

Experiential attitude reflects consumers' affective evaluations of the experience of using robotaxis (La Barbera & Ajzen, 2024). When consumers' experiences or feelings are pleasant and positive, they are more likely to adopt the service. Affective responses are rapid and automatic, and reliance on such feelings functions as a heuristic in judgment and decision making, especially under conditions of uncertainty (Slovic, 2004). In such contexts, experiential attitude can be a particularly powerful predictor of behavioral intention, as affective judgments are formed more rapidly and require less cognitive effort than analytical cost-benefit calculations (Lazarus, 1991). Therefore, enhancing consumers' affective attitudes (e.g., perceived enjoyment or pleasure) can have a significant positive influence on their intentions to use autonomous vehicles (Huang, 2023). Videos related to robotaxis on social media continuously stimulate consumers' interest through vivid visuals and emotionally expressive content, eliciting feelings of novelty, enjoyment, or excitement, thereby strengthening their experiential attitude. Accordingly, we propose the following hypothesis:

H5: Experiential attitude positively influences consumers' adoption intention toward robotaxis.

Instrumental attitude refers to consumers' rational evaluation of the usefulness of autonomous taxis. The Technology Acceptance Model (TAM)(Davis, 1989) posits that if individuals perceive the use of autonomous taxis as beneficial (e.g., saving time and enhancing safety), they are more likely to continue using the service. This evaluative dimension reflects the rational cost-benefit analysis consumers undertake when assessing new technologies, including considerations of efficiency, safety, convenience, and value for the money (Venkatesh et al., 2003). Such utilitarian cognitive judgments can also stimulate adoption intention toward autonomous vehicles (Fagnant & Kockelman, 2015; Huang, 2023; Luo et al., 2024). Consumers who perceive that using autonomous vehicles offers substantial utility tend to have stronger adoption intentions (Alqahtani, 2025). Accordingly, we propose the following hypothesis:

H6: Instrumental attitude positively influences consumers' adoption intention toward robotaxis.

2.6. *Self-Efficacy and Adoption Intention*

Social cognitive theory posits that individuals are more likely to engage in behaviors for which they believe they possess the requisite capabilities (Bandura, 1997). In the context of technology adoption, self-efficacy has been identified as a key determinant of both initial adoption intention and continued actual use (Venkatesh et al., 2003). Because robotaxis operate without human drivers to provide real-time assistance or decision support (Merlin, 2017; Wang & Li, 2024), consumers may be uncertain of their ability to use the service effectively (Choi & Ji, 2015). Unlike traditional taxi services, where passengers delegate navigation and driving decisions to a human driver, robotaxi passengers must manage their trips through a digital interface, including destination, route confirmation, and emergency procedures. Prior research indicates that consumers with higher self-efficacy are more likely to adopt autonomous vehicles (Du et al., 2021; Zhu et al., 2024). Consumers with higher self-efficacy are also better able to cope with technological uncertainty because they perceive such uncertainty as controllable rather than as a source of risk (Ani et al., 2025; Wang & Yao, 2025). For example, consumers who are confident in their ability to navigate the robotaxi interface proficiently, issue voice or touch commands, and manage the travel process are more likely to form positive adoption intentions than those who doubt their own capabilities. Based on this, we propose the following hypothesis:

H7: Self-efficacy influences consumers' adoption intentions toward robotaxis.

Combining Hypotheses H1-H7, we propose the following mediation hypotheses:

- H8:** Experiential attitude mediates the relationship between social media and consumers’ adoption intentions toward robotaxis.
- H9:** Instrumental attitude mediates the relationship between social media and consumers’ adoption intentions toward robotaxis.
- H10:** Self-efficacy mediates the relationship between social and consumers’ adoption intentions toward robotaxis.

2.7. Pro-Environmental Self-Identity

Grounded in identity theory (Burke & Stets, 2009), pro-environmental self-identity can be viewed as an identity-oriented self-cognitive structure that motivates individuals to behave in ways that are consistent with their environmental self-concept. Unlike environmental identity, which emphasizes an affective connection to nature (Clayton & Opatow, 2003), pro-environmental self-identity focuses specifically on the behavioral dimension, namely the extent to which one perceives oneself as an environmentally responsible person who engages in eco-friendly actions (Carfora et al., 2024; van der Werff et al., 2013; Whitmarsh & O’Neill, 2010). It constitutes a powerful motivational force that supports engagement in social issues (Lavuri et al., 2023) and plays a key role in understanding consumer behavior driven by a sense of environmental responsibility (Gatersleben et al., 2014).

In the context of this study, consumers with high levels of pro-environmental self-identity are likely to associate autonomous taxis with environmental advantages such as optimized driving efficiency, reduced emissions, and shared electric mobility (Barbarossa et al., 2015; Fagnant & Kockelman, 2015). This provides an identity-driven motivation but is not solely an independent predictor of adoption intention; rather, it strengthens the extent to which existing psychological evaluations are translated into behaviors. Specifically, attitudinal evaluations or capability beliefs that are congruent with pro-environmental self-concepts amplifies the behavioral force of these evaluations, as acting on them both satisfies functional or affective needs and helps to verify one’s environmental identity (Dermody et al., 2015; Lavuri et al., 2023). Accordingly, social media is likely to reinforce adoption intentions for consumers with a stronger pro-environmental self-identity, who are more likely to evaluate the emissions-reduction and sustainability features of robotaxis positively. Furthermore, having both high usage-related confidence and a strong environmental identity may create a synergy between capability and motivation, resulting in more sustainable behaviors (Dermody et al., 2015; Qasim et al., 2019). Based on this, we propose the following hypothesis:

- H11:** Pro-environmental self-identity moderates the relationships between (a) social media and adoption intentions, (b) experiential attitude and adoption intentions, (c) instrumental attitude and adoption intentions, and (d) self-efficacy and adoption intentions.

The theoretical model of this study is shown in Figure 2.

Figure 2. Research model.

2.8. Model Specification for fsQCA

Configurational theory emphasizes the principle of equifinality, which posits that a given outcome can be explained by multiple combinations of causal conditions (Woodside, 2014). Given the mixed effects social media has on consumers’ adoption intentions, configurational analysis is particularly relevant here. On the one hand, social media may enhance consumers’ adoption intention by providing social support and strengthening trust and satisfaction (Aref, 2024). However,

information-related features (e.g., personalized recommendations, information overload, and concerns regarding privacy and autonomy) may increase perceived threats, thereby inhibiting adoption intention (Li, 2024; Valensia & Nugroho, 2019; Yang & Lin, 2017). A configurational approach can help to capture the complexity of these underlying mechanisms.

First, unlike human-driven taxicabs, robotaxis do not involve direct driver–passenger interactions, as they operate via algorithms, sensors, and automated decision-making systems (Fagnant & Kockelman, 2015). Therefore, when assessing this highly automated and technology-dominated mode of transportation, consumers' key evaluation criteria shift from traditional service attributes to perceptions of the technology's safety and the ability to control the experience (Choi & Ji, 2015). Social media offers a multisource, dynamic information environment, so the extent to which consumers' perceptions of robotaxis are formed from social media, those perceptions are not shaped by a single cue but from a multidimensional, interactive, sociotechnical information-processing mechanism. Under this complex mechanism, the conditional configurations across the entire set of causal conditions constitute the decisive factors that affect adoption intentions toward robotaxis. Second, when consumers encounter this emerging technology they exhibit heterogeneous behavioral responses (Rogers et al., 2005). For example, differences in age, income, or educational level significantly influence consumers' acceptance and risk evaluations of new technologies (Venkatesh et al., 2003; Venkatesh et al., 2012a). Meanwhile, varying levels of pro-environmental self-identity affect whether consumers perceive robotaxis as aligning with their "green" or "responsible" identity (Whitmarsh & O'Neill, 2010). However, as service providers cannot directly control these consumer-specific characteristics, identifying alternative configurations that lead to the same outcome (i.e., equifinality) can assist those providers in selecting feasible pathways and managing the service dimensions that can deliver optimal outcomes. Configurational theory also proposes causal asymmetry, meaning the presence or absence of a given causal condition depends on how it is combined with other conditions (Woodside, 2014). Accordingly, we develop the following configurational model (Figure 3) based on the evolutionary S-O-R model proposed by Jacoby (2002):

Adoption Intentions = $f(\text{Controls, Social Media, Experiential Attitude, Instrumental Attitude, Self-Efficacy, Pro-environmental Self-identity})$

Figure 3. Configurational model.

3. Research Method

3.1. Study Context

China provides a unique and appropriate research context for this study. It is the world's largest automobile market and has demonstrated strong ambitions in the development of autonomous vehicles (Govorova, 2023; Wang et al., 2020). A survey conducted by the McKinsey Center for Future Mobility in December 2024 indicates that compared with their Western counterparts, Chinese consumers are more interested in autonomous driving technologies and are more willing to pay for such services (Heineke et al., 2024). China also has a highly developed social media ecosystem and a vast digital user base. By early 2025, the number of social media users in China was approximately 1.1 billion, or roughly 76.5% of the country's population (Zhao, 2025). Although Chinese digital platforms have certain context-specific institutional and cultural characteristics, the underlying mechanisms examined in this study are not unique to China. Overall, the Chinese market provides a representative empirical context for testing the relationships proposed in this study and offers insights that may inform how they apply to other parts of the world.

3.2. Measures and Data Collection

The questionnaire used in this study consisted of three main sections. First, a screening question at the beginning of the survey asked, "In the past month, have you watched videos related to

robotaxis on social media platforms (e.g., TikTok, Sina Weibo, and Bilibili)?” If the response was “no,” the survey was automatically terminated. The second section collected respondents’ demographic information, including sex (labeled as gender in the questionnaire), age, education level, occupation, monthly income, and other relevant characteristics. The third section contained the measurement items for the study variables, all of which were adapted from established constructs that had been tested and validated in prior research. The complete list of items is provided in Appendix A. Experiential attitude was measured by asking respondents to evaluate the statement, “In the next two weeks, using robotaxis would be:” on four five-point bipolar adjective scales (bad–good, stressful–relaxed, unpleasant–pleasant, boring–interesting). Similarly, instrumental attitude was assessed with four items (unwise–wise, harmful–beneficial, useless–useful, wrong–right). All other constructs were measured using five-point Likert scales ranging from “1 = strongly disagree” to “5 = strongly agree.”

Prior to administering the formal survey, we conducted a pilot test at a university in South Korea. A total of 50 questionnaires were distributed to faculty members and students, and minor wording revisions were made based on their feedback. To ensure the accuracy of the scales in the Chinese context, the original English questionnaire was translated into Chinese with the assistance of a multilingual expert. A back-translation procedure was then employed to verify the consistency of the translated version with the original scales in terms of content and contextual meaning (Beaton et al., 2000; Brislin, 1980). As the study could not fully cover all segments of the target population (Babbie, 2020), we used a non-probability convenience sampling approach. The questionnaire was distributed through Questionnaire Star (<https://www.wjx.cn/>), a well-known online survey platform in China that maintains a panel of approximately 6.2 million verified users, providing a sufficient source for obtaining diverse samples of Chinese consumers (Sojump, 2026). As compensation for participation, respondents who completed the questionnaire received a voucher worth RMB 20 (approximately USD 3).

Data collection lasted for five weeks and was completed in November 2025. To reduce common method bias, the order of all items was randomized, and an attention check in the form of a question with an obvious answer (“please answer the following question: Which number is larger, 2 or 9?”) was embedded in the questionnaire (Perfecto & O’Donnell, 2025). A total of 955 questionnaires were collected. After excluding responses that failed the attention check (31), contained logical inconsistencies (26), exhibited straight-lining responses (18), were completed in less than one minute (35), or originated from duplicate IP addresses (28), the final valid sample consisted of 817 responses, an effective response rate of 85.5%.

3.3. Method of Analysis

Before testing our hypotheses, we conducted a confirmatory factor analysis (CFA), reliability tests, and correlation analysis on the measurement model using AMOS 26.0 and SPSS 27.0, and examined common method bias with AMOS 26.0 and Mplus 8.3. During the hypothesis testing stage, we used the PROCESS macro for SPSS developed by Hayes et al. (2017), which supports models involving complex mediation and moderation effects (Huertas-Valdivia et al., 2018). Finally, we conducted the fsQCA using the fsQCA 3.0 program. fsQCA has been used to identify strategic configurations across various fields, including consumer psychology and behavior (Diwanji, 2023; Jiang et al., 2026; Santos & Gonçalves, 2019; Yuan et al., 2025; Zhang & Cheng, 2025) and the transportation domain (Chen et al., 2021; Mustafa et al., 2026; Xu & Cheng, 2019). The method is grounded in Boolean algebra and applies comparative logic across multiple cases (Fiss, 2011; Ragin, 2009). Each case is represented as a configuration of antecedent conditions associated with a particular outcome, and these configurations can be compared and logically minimized through a bottom-up Boolean pairing and reduction process (Fiss, 2011; Ragin, 2009).

4. Data Analysis

4.1. Demographic Profile

Table 1 presents descriptive statistics for the respondents’ demographic characteristics. The gender distribution is relatively balanced, with males accounting for 52.4% (females 47.6%). The largest age group is 46–55 years (32.9%), followed by 36–45 years (25.6%), which is consistent with the fact that urban mobility demand is primarily driven by the working-age population (International Transport Forum, 2023). In terms of educational attainment, more than half of the respondents hold a bachelor’s degree or higher. In terms of occupations, the sample is mainly composed of private-sector employees and self-employed individuals, and 82.4% of the respondents report a monthly income above RMB 5,000. Regarding preferences for commonly used social media platforms, the results of a multiple-choice question indicate that Douyin (the Chinese version of TikTok) is the most widely used platform (84.8%), followed by Xiaohongshu (71.2%) and Bilibili (25.1%).

Table 1. Sample demographics (n = 817).

Demographics	Items	Frequency	Percentage%
Gender	Male	428	52.4
	Female	389	47.6
Age	Under25	125	15.3
	26–35	117	14.3
	36–45	209	25.6
	46–55	269	32.9
	Over 55	97	11.9
Education	High School or Below	52	6.4
	Associate Degree	258	31.6
	Bachelor’s Degree	468	57.3
	Master’s Degree or Above	39	4.8
Occupation	Government employee	36	4.4
	Private employee	287	35.1
	Own business	261	31.9
	Others	125	15.3
IncC status (monthly)	Below CNY ¥5000	144	17.6
	CNY ¥5001-CNY ¥8000	265	32.4
	CNY ¥8001-CNY ¥11000	189	23.1
	CNY ¥11001-CNY ¥14000	147	18
	Above CNY ¥14001	72	8.8
Social media platforms (Multiple Choices)	Douyin	693	84.8
	Sina Weibo	97	11.9
	Bilibili	205	25.1
	Xiaohongshu	582	71.2
	Others	59	7.2

4.2. Descriptive Statistics and Correlations

Table 2 shows the means, standard deviations, and pairwise correlations of all variables. Gender, age, educational attainment, occupation, and monthly income are used as control variables in the analysis. Overall, the correlations are consistent with theoretical expectations and provide preliminary support for the hypothesized relationships among the constructs.

Table 2. Descriptive statistics and Pearson correlations.

Construct	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1 Gender	1.480	0.500	1										
2 Age	3.120	1.244	0.016	1									
3 Education	2.600	0.680	0.024	−0.128**	1								

4 Occupatio n	2.98 0	1.10 0	0.039	-0.347 **	0.119* *	1								
5 Income status (CNY)	2.68 0	1.20 9	-0.00 1	0.048	-0.008	-0.01 5	1							
6 SM	3.25 5	1.01 4	0.044	0.006	-0.025	-0.03 4	0.059	1						
7 EA	3.05 3	1.05 1	0.016	-0.005	-0.055	-0.00 8	-0.00 7	0.289* *	1					
8 IA	3.24 1	1.03 5	0.061	-0.006	-0.069 *	-0.05 2	-0.00 3	0.280* *	0.512* *	1				
9 SE	3.21 9	1.04 8	0.054	0.003	-0.026	-0.04 3	0.021	0.050	0.296* *	0.362* *	1			
10 PESI	3.28 7	1.02 9	0.064	-0.071 *	0.006	0.023	0.010	0.135* *	0.423* *	0.324* *	0.233* *	1		
11 AI	3.09 6	1.02 9	-0.00 1	-0.090 *	-0.036	0.026	0.040	0.356* *	0.472* *	0.452* *	0.322* *	0.261* *	1	

Notes: SM=Social Media, EA=Experiential Attitude, IA=Instrumental Attitude, SE=Self-Efficacy, PESI=Pro-Environmental Self-Identity, AI=Adoption Intention. * and ** indicate significance at the 0.05 level (2-tailed) and 0.01 level (2-tailed), respectively.

4.3. Common Method Variance

To mitigate the potential impact of common method bias on the research results, we anonymized the data collection process and randomized the order of the items in the survey questionnaire. We used three approaches to test for common method bias. First, we used Harman’s single-factor test. The first factor accounted for 31.5% of the total variance, while the total explained variance was 70.32%. This result meets the criterion that the variance explained by the first factor should be less than 50% of the total explained variance (Podsakoff et al., 2003), indicating that common method bias was not a serious concern. Second, we constructed a single-factor model by loading all items onto one factor. As shown in Table 3, the model fit was poor ($\chi^2/df = 22.790$, IFI = 0.476, TLI = 0.433, CFI = 0.475, RMSEA = 0.163, SRMR = 0.129) and significantly worse than that of the baseline model. Finally, we adopted the common latent factor (CLF) approach (Podsakoff et al., 2003), adding a common factor to the baseline model to build the CLF model. Although the CLF model showed good fit ($\chi^2/df = 1.480$, IFI = 0.990, TLI = 0.988, CFI = 0.990, RMSEA = 0.024, SRMR = 0.026), it did not significantly improve upon the baseline model. In sum, we conclude that common method bias is not a substantial concern in this study.

Table 3. Confirmatory factor analysis.

Model	χ^2/df	IFI	TLI	CFI	RMSEA	SMRM
CLF factor	1.480	0.990	0.988	0.990	0.024	0.026
6 factor	1.561	0.988	0.985	0.988	0.026	0.029
5 factor	4.569	0.920	0.920	0.920	0.066	0.061
4 factor	8.709	0.823	0.800	0.822	0.097	0.078
3 factor	15.399	0.662	0.626	0.661	0.133	0.107
2 factor	21.332	0.516	0.471	0.515	0.158	0.126
1 factor	22.790	0.476	0.433	0.475	0.163	0.129
Criteria	Acceptable<5	>0.8	>0.8	>0.8	<0.08	<0.08
	Ideally <3	>0.9	>0.9	>0.9		

4.4. Reliability and Validity

To ensure sampling adequacy and structural validity, we measured the Kaiser-Meyer-Olkin (KMO) value of the overall questionnaire and conducted Bartlett’s test of sphericity. The results of the KMO test (KMO = 0.882) and Bartlett’s test ($\chi^2= 9021.311$, $p < 0.001$) indicated the sample data were

suitable for using a CFA to examine the model fit (Hair et al., 2019). The results showed the measurement model fit the data well ($\chi^2/df = 1.561$, RMSEA = 0.026, NFI = 0.967, CFI = 0.988, IFI = 0.988, RFI = 0.960, TLI = 0.985, SRMR = 0.029), meeting the recommended thresholds proposed by Hair et al. (2013). We further assessed the reliability and validity of the measurement model using composite reliability (CR), average variance extracted (AVE), and Cronbach’s alpha. As shown in Table 4, for all constructs, AVE exceeded the threshold of 0.5, while CR and Cronbach’s alpha were well above the critical value of 0.7 (Bagozzi, 1981), supporting the reliability of the measurement. All factor loadings were greater than 0.6, and all AVE values were above 0.5, confirming the data’s reliability and convergent validity (Hair et al., 2017).

Table 4. Factor loadings, composite reliability, average variance extracted, and Cronbach’s alpha.

Variables	Items	Loadings	CR	AVE	Cronbach’s alpha
SM	SM1	0.608	0.761	0.517	0.755
	SM2	0.779			
	SM3	0.758			
EA	EA1	0.667	0.839	0.567	0.838
	EA2	0.787			
	EA3	0.746			
	EA4	0.804			
IA	IA1	0.872	0.876	0.642	0.871
	IA2	0.734			
	IA3	0.909			
	IA4	0.666			
SE	SE1	0.727	0.873	0.638	0.866
	SE2	0.931			
	SE3	0.858			
	SE4	0.647			
PESI	PESI1	0.630	0.873	0.637	0.867
	PESI2	0.891			
	PESI3	0.745			
	PESI4	0.895			
AI	AI1	0.754	0.786	0.555	0.771
	AI2	0.602			
	AI3	0.857			

Note: SM=Social Media, EA=Experiential Attitude, IA=Instrumental Attitude, SE=Self-Efficacy, PESI=Pro-Environmental Self-Identity, AI=Adoption Intention.

4.5. Discriminant Validity Analysis

The discriminant validity of each construct is supported by the Fornell-Larcker criterion, as the square root of each construct’s AVE exceeds the absolute values of its correlations with other constructs. The correlations among constructs range from 0.052 to 0.580, indicating the variables used in this study demonstrate good discriminant validity (Bagozzi, 1981). We also computed the heterotrait-monotrait ratio (HTMT) and all values are well below the conservative threshold of 0.9, providing further evidence of discriminant validity (Hair et al., 2017). These results are presented in Table 5.

Table 5. Correlation matrix and discriminant validity tests.

Constructs	SM	EA	IA	SE	PESI	AI
SM	0.719	0.358	0.321	0.053	0.151	0.439
EA	0.357	0.753	0.582	0.344	0.469	0.558

IA	0.319	0.580	0.801	<i>0.412</i>	<i>0.335</i>	<i>0.506</i>
SE	0.052	0.343	0.410	0.799	<i>0.258</i>	<i>0.382</i>
PESI	0.150	0.467	0.333	0.256	0.798	<i>0.306</i>
AI	0.436	0.554	0.502	0.379	0.303	0.745

Notes: The lower left diagonal is the correlation. The diagonal elements in the bond are the square root of AVE. The HTMT ratio is printed in the upper right diagonal in italics. SM=Social Media, EA=Experiential Attitude, IA=Instrumental Attitude, SE=Self-Efficacy, PESI=Pro-Environmental Self-Identity, AI=Adoption Intention.

4.6. Hypothesis Testing

To understand the antecedents of consumers’ adoption intentions toward robotaxis, we used Hayes’ PROCESS macro in SPSS to run a single moderated mediation model (Hayes et al., 2017). Although both Model 14 and Model 15 provide the required paths for a moderated mediation model, we selected Model 15 as it accounts for the potential moderating role of pro-environmental self-identity in the relationship between social media and adoption intention (Regorz, 2021).

We use the bootstrap method to test our hypotheses, using 5,000 resamples with a 95% confidence interval. The results, shown in Table 6, indicate that social media exerts a positive influence on adoption intention ($\beta = 0.211, p < 0.001$), EA ($\beta = 0.303, p < 0.001$), and IA ($\beta = 0.286, p < 0.001$), but its effect on self-efficacy is not significant ($\beta = 0.050, p = 0.170$). Therefore, H1 through H3 are supported, whereas H4 is not supported. Experiential attitude ($\beta = 0.239, p < 0.001$), IA ($\beta = 0.199, p < 0.001$), and self-efficacy ($\beta = 0.148, p < 0.001$) all have significant positive effects on adoption intention. Therefore, H5 through H7 are supported.

The results of the mediating variable analysis indicate the indirect effects of experiential attitude (0.073, 95% CI = [0.046, 0.103]) and instrumental attitude (0.057, 95% CI = [0.034, 0.084]) are significant, whereas the indirect effect of self-efficacy is not significant (0.007, 95% CI = [-0.003, 0.019]). Accordingly, H8 and H9 are supported, while H10 is not supported.

Regarding moderating effects, our results show pro-environmental self-identity significantly moderates the relationship between experiential attitude and adoption intention ($\beta = 0.134, p < 0.001$). However, the interaction terms for social media and adoption intention ($\beta = 0.008, p > 0.05$), IA and AI ($\beta = -0.027, p > 0.05$), and self-efficacy and adoption intention ($\beta = 0.005, p > 0.05$) are not significant. Therefore, H11b is supported, whereas H11a, H11c, and H11d are not supported.

To visualize the moderating effect, we divide the sample into high and low groups using cut-offs of one standard deviation above and below the mean of pro-environmental self-identity and plot the moderating effect for these groups separately. Figure 4 shows that in the “high” group, the higher the level of pro-environmental self-identity, the stronger the effect of experiential attitude on adoption intention, whereas this effect weakens when pro-environmental self-identity is low.

Table 7 presents the results of the moderated mediation effect test using the bootstrap method. As shown in the table, the indirect effect of social media on consumers’ adoption intention through experiential attitude is significant at both high (coefficient = 0.114, 95% CI = [0.074, 0.160]) and low (coefficients = 0.031, 95% CI = [0.000, 0.064]) levels of pro-environmental self-identity. The index of moderated mediation is 0.041, with a 95% confidence interval of [0.018, 0.067], which does not include zero.

Table 6. Results of the bootstrap analysis on indirect mediating effects.

Hypothesis	Path	Coefficients	S.E.	t	p	95% CILL	95% CIUL	Supported
Main effects								
H1	SM→AI	0.211	0.031	6.831	0.000	0.151	0.272	Yes
H2	SM→EA	0.303	0.035	8.670	0.000	0.235	0.372	Yes
H3	SM→IA	0.286	0.034	8.265	0.000	0.218	0.354	Yes
H4	SM→SE	0.050	0.036	1.374	0.170	-0.021	0.122	NO

H5	EA→AI	0.239	0.035	6.839	0.000	0.171	0.308	Yes
H6	IA→AI	0.199	0.035	5.713	0.000	0.131	0.267	Yes
H7	SE→AI	0.148	0.031	4.866	0.000	0.089	0.208	Yes
Mediating effects								
H8	SM→EA→AI	0.073	0.014			0.046	0.103	Yes
H9	SM→IA→AI	0.057	0.013			0.034	0.084	Yes
H10	SM→SE→AI	0.007	0.006			-0.003	0.019	NO
Moderating effects								
H11a	SM*PESI→AI	0.008	0.031	0.267	0.790	-0.052	0.069	NO
H11b	EA*PESI→AI	0.134	0.036	3.696	0.000	0.063	0.204	Yes
H11c	IA*PESI→AI	-0.027	0.034	-0.782	0.435	-0.093	0.040	NO
H11d	SE*PESI→AI	0.005	0.030	0.179	0.858	-0.054	0.065	NO

Notes: S.E. = standard error; CI = confidence interval; LL = lower limit; UL = upper limit. SM=Social Media, EA=Experiential Attitude, IA=Instrumental Attitude, SE=Self-Efficacy, PESI=Pro-Environmental Self-Identity, AI=Adoption Intention.

Figure 4. Moderating effect of pro-environmental self-identity on experiential attitude and adoption intention.

Table 7. Results of the moderated mediating indirect effects test.

Mediator	Clusters	Coefficients	S.E.	95% CILL	95% CIUL	Index of moderated mediation	
						Index	95% CI
EA	High PESI	0.114	0.022	0.074	0.160	0.041	[0.018,0.067]
	Low PESI	0.031	0.016	0.000	0.064		

Notes: S.E. = standard error; CI = confidence interval; LL = lower limit; UL = upper limit. EA=Experiential Attitude, PESI=Pro-Environmental Self-Identity, AI=Adoption Intention.

4.7. Fuzzy-Set Quantitative Comparative Analysis.

4.7.1. Selecting and Calibrating Variables

We use six variables, namely social media, experiential attitude, instrumental attitude, self-efficacy, pro-environmental self-identity and age as antecedent conditions, based on the following considerations. Prior theoretical and empirical research shows these factors influence consumers’ adoption intentions. Our findings indicate age is negatively correlated with adoption intention ($r = -0.090, p < 0.05$), whereas other demographic variables show no significant relationship with adoption intention. Therefore, we include age as an antecedent condition.

We calculate the mean values of these six variables and convert five of them into fuzzy-set membership scores by applying three qualitative anchors: 5% (Fully Out), 95% (Fully In), and 50% (Crossover Point) (Ragin, 2008). For age, a categorical variable, we use “under 25” as 0.05, “ages 26–35” as 0.18, “ages 36–45” as 0.501, “ages 46–55” as 0.82, and “over 55” as 0.95. To avoid excluding any cases, all values equal to 0.5 in the fuzzy-set data are recoded as 0.501 (Ragin, 2006).

The results of the necessity analysis are presented in Table 8. Following Dul (2015), a condition is regarded as necessary for an outcome only when its consistency value is 0.90 or higher. In this study, all of the constructs have consistency values below 0.90; therefore, they cannot be considered necessary conditions for adoption intention.

Table 8. Results of fsQCA necessary analysis of high and non-high adoption intention.

Construct	High AI		Non-high AI	
	Consistency	Coverage	Consistency	Coverage
AGE	0.658	0.579	0.700	0.669
~AGE	0.624	0.657	0.560	0.640
SM	0.730	0.684	0.553	0.563
~SM	0.534	0.524	0.690	0.735
EA	0.763	0.711	0.508	0.514
~EA	0.479	0.472	0.715	0.766
IA	0.777	0.720	0.537	0.540
~IA	0.503	0.500	0.721	0.778
SE	0.734	0.686	0.557	0.565
~SE	0.535	0.527	0.690	0.738
PESI	0.693	0.669	0.541	0.568
~PESI	0.553	0.526	0.685	0.708

Notes: ~ indicates negation. ~X is considered a lower level of X. SM=Social Media, EA=Experiential Attitude, IA=Instrumental Attitude, SE=Self-Efficacy, PESI=Pro-Environmental Self-Identity, AI=Adoption Intention.

4.7.2. fsQCA Results

We employed fsQCA 3.0 for the analysis, selected configurations with Raw Consistency values above 0.80 and set the case frequency threshold to 5.0 (Fu et al., 2024). We also performed a further filtering step using the Proportional Reduction in Inconsistency (PRI) coefficient. According to Sharma et al. (2024), the PRI indicator helps rule out the possibility that a configuration simultaneously constitutes a subset of the outcome and the absence of the outcome. In our QCA analysis, we set the PRI consistency cut-off at 0.75.

The analysis generates a complex solution, a parsimonious solution, and an intermediate solution. The complex solution includes all logically possible combinations of conditions. The parsimonious solution identifies the necessary conditions that cannot be eliminated from any solution, while the intermediate solution provides a partially simplified explanation without excluding substantively important conditions (Sharma et al., 2024). We focus primarily on the intermediate solution and refer to the parsimonious solution when determining core and peripheral conditions.

The configurational solutions are presented in Table 9. The consistency values of the configurations range from 0.831 to 0.890, and raw coverage ranges from 0.264 to 0.467. Sukhov et al. (2023) note that a raw coverage value of at least 0.200 indicates an acceptable explanatory level for a given configuration. Here, the overall solution’s consistency exceeds 0.750, meeting the acceptable threshold proposed in Beynon et al. (2016).

Specifically, three causal configurations were identified as leading to a high adoption intention, including two sub-configurations (labeled S1a and S1b). Both sub-configurations include younger age groups (i.e., under 36 years old), high social media usage, and a high level of experiential attitude. In particular, S1a also includes high self-efficacy, whereas S1b includes high pro-environmental self-identity. Configuration S2 shows that among the six antecedent conditions, all variables except age constitute core conditions.

fsQCA identifies four combinations as causal configurations associated with an adoption intention that is not high. Among them, S1 shows a combination of low social media usage, low experiential attitude, and low instrumental attitude jointly lead to adoption intentions that below the threshold for high adoption intention. In S2, the four core conditions are low experiential attitude, low instrumental attitude, low self-efficacy, and low pro-environmental self-identity. In S3, in addition to low social media usage, low instrumental attitude, and low self-efficacy, peripheral conditions require a high level of pro-environmental self-identity rather than a low level. S4 indicates that among younger consumers (those under 36 years old), a lack of instrumental attitude, self-efficacy, and pro-environmental self-identity result in non-high adoption intention.

4.7.3. Robustness Check

We assess the robustness of these results by increasing the consistency threshold from 0.80 to 0.85 (Skaaning, 2011). The resulting configurations are largely identical to the original configurations in terms of solution structure, coverage, and consistency, confirming the robustness of our findings.

Table 9. Configurations for achieving high adoption intention and not high adoption intention.

Factor	Solutions						
	High AI			Not-high AI			
	S1a	S1b	S2	S1	S2	S3	S4
AGE	⊗	⊗					⊗
SM	●	●	●	⊗		⊗	
EA	●	●	●	⊗	⊗	⊗	⊗
IA			●	⊗	⊗		
SE	●		●		⊗	⊗	⊗
PESI		●	●		⊗	●	⊗
Raw coverage	0.363	0.366	0.379	0.467	0.423	0.264	0.326
Unique coverage	0.041	0.044	0.075	0.086	0.036	0.012	0.012
Consistency	0.923	0.903	0.912	0.884	0.918	0.925	0.918
Solution coverage	0.482			0.572			
Solution consistency	0.876			0.868			

Note: A black circle indicates the presence of a condition; a circle with an “×” means a condition is absent. Large circles indicate core conditions; small circles indicate peripheral conditions.

5. Discussion

Based on the S-O-R model, we develop a model to examine how social media (stimulus) affects consumers’ adoption intentions toward robotaxis (response) through the mediating mechanisms of experiential attitude, instrumental attitude, and self-efficacy (organism), and investigate the boundary role of pro-environmental self-identity. Linear regressions indicate social media exerts direct positive effects on adoption intention, experiential attitude, and instrumental attitude. This finding is consistent with prior studies (Du et al., 2022; Hasan & Sohail, 2020; Vu et al., 2025). In the robotaxi context, social media serves as an important channel through which consumers obtain information about this technology-based service. Emotionally engaging user-generated content—such as riding vlogs and experiential narratives—can enhance consumers’ experiential attitudes, while informational content regarding safety, efficiency, and cost can shape their instrumental evaluations (Fishbein & Ajzen, 2011; Zheng et al., 2025).

A mediation analysis indicates that both experiential attitude and instrumental attitude partially mediate the relationship between social media and adoption intention, with the effect of experiential attitude slightly stronger than that of instrumental attitude. This result is consistent with the reasoned action approach, which posits that the experiential (affective) component of attitude is often more closely associated with behavioral intention than the instrumental (cognitive) component (Ajzen & Driver, 1992; Lawton et al., 2007). This suggests that emotionally engaging and hedonically oriented social media content has a greater influence on consumer behavior than purely informational content. Our findings differ from prior studies in showing that negative information on social media exerts a stronger influence on consumers’ perceptions of emerging technologies (Dwivedi et al., 2021; Loh et al., 2022; Mirbabaie et al., 2023; Zhu et al., 2025). We attribute this divergence to the evolving maturity of the robotaxi market. When robotaxi services were first introduced, the public lacked direct experience and domain knowledge and were therefore susceptible to negative information (Frank et al., 2023). However, as autonomous driving technology has gradually matured and content about robotaxis on social media, including first-hand user experiences, has become more widespread, consumers have accumulated more experiential and cognitive resources. This allows positive content on social media to exert a stronger influence than negative content (Li et al., 2022).

However, social media influence does not significantly affect self-efficacy. This result is consistent with Zhu et al. (2020), who found that neither social media nor mass media significantly enhances consumers' self-efficacy. Self-efficacy relies less on external informational stimuli and more on individuals' direct usage experience (Bandura, 1997). Robotaxis represent a qualitatively different technological experience in which consumers are passive passengers rather than active operators. Consequently, vicarious learning through social media—such as observing others' riding experiences—does not substantially alter consumers' judgments of their own capabilities, particularly when no operational skills are required. In addition, the rapid turnover, fragmentation, and source heterogeneity of social media content may generate informational uncertainty, which may undermine rather than enhance self-efficacy. Nevertheless, self-efficacy remains an important predictor of adoption intentions toward robotaxis, suggesting it may originate from sources other than social media, such as digital literacy, prior ride-hailing experience, or technological confidence accumulated in other digital contexts, and word-of-mouth from peers (e.g., friends or relatives sharing their experiences with robotaxis) (Venkatesh et al., 2012b).

Regarding the moderating effect of pro-environmental self-identity, only the interaction between experiential attitude and adoption intention is significant. This finding is consistent with identity theory (Burke & Stets, 2009), which posits that identity-driven motivation is more readily activated when a behavior aligns with an individual's self-concept at an affective and symbolic level rather than on purely utilitarian or competence-based grounds. Consumers with a strong pro-environmental self-identity are not only more receptive to robotaxi-related social media content framed in a hedonic manner, but are also more likely to translate such experiential attitudes into adoption intention, as adopting a low-carbon, algorithm-optimized shared mobility service is consistent with their environmental identity (van der Werff et al., 2013).

Through fsQCA, we identify three configurations that predict high adoption intention, in which social media and experiential attitude appear as either peripheral or core conditions. This result is supported by the linear regression analysis and is consistent with findings in Mustafa et al. (2026) that suggest that younger consumers are more likely to adopt robotaxis through a pathway jointly driven by enjoyment and experiential stimulation generated by social media, rather than relying solely on rational and cognitive evaluations. In addition, although the linear regression analysis indicates social media does not exert a significant effect on self-efficacy, self-efficacy can still lead to high adoption intention when combined with other conditions. This finding reflects the multi-faceted nature of causal relationships in complex adoption decisions (Ragin, 2008): while social media alone may not enhance consumers' self-efficacy with respect to robotaxis, when consumers who already possess sufficient self-efficacy are exposed to experiential stimulation through social media, these conditions combine to produce a pathway that leads to high adoption intention. Such configurational synergies cannot be captured by a regression analysis (Pappas & Woodside, 2021; Vis, 2012). We also identify four configurations that create pathways that do not meet the threshold of high adoption intentions. Experiential attitude is absent across all four of these configurations, indicating that the lack of a positive experiential attitude almost constitutes a barrier to robotaxi adoption, which supports prior research showing that hedonic motivation is among the most critical factors in accepting autonomous vehicles (Liu et al., 2026; Nordhoff et al., 2020). These findings not only confirm the principle of equifinality, meaning that similar outcomes may arise from different causal paths (Katz & Kahn, 2015), but also support the proposition of causal asymmetry (Fiss, 2011).

6. Conclusions

6.1. Theoretical Implications

This study makes three main theoretical contributions.

First, we extend the application boundary of the S-O-R framework in the context of autonomous driving mobility services. Prior research predominantly treats attitude as a single-dimensional mediating variable (Chaihananchai & Anantachart, 2023; Venkatesh et al., 2003; Yuen et al., 2020).

By distinguishing between experiential attitude and instrumental attitude, we refine the concept of attitudes toward technology use (Hornbæk & Hertzum, 2017; La Barbera & Ajzen, 2024; Venkatesh & Thong, 2016). Consistent with the argument in Maton et al. (2025), we posit that beyond the instrumental evaluations traditionally emphasized in TAM research (Hornbæk & Hertzum, 2017), consumers also rely on hedonic evaluations derived from affective experiences when making technology adoption decisions. As technology shifts a utilitarian product into an experiential service, judgments based on functional utility are no longer the sole decision anchor; rather, consumers' evaluations of enjoyment, novelty, and emotional gratification generated during human–technology interaction become key drivers of their adoption intentions (Hassenzahl, 2004; van der Heijden, 2004). By revealing the differentiated roles of these two attitude dimensions in shaping robotaxi adoption intentions, this study advances prior research that typically examines consumer attitudes in a general manner, rarely distinguishing between experiential and instrumental attitudes.

Second, we incorporate pro-environmental self-identity into our research model as a critical boundary condition for explaining heterogeneity in consumer adoption mechanisms. Existing studies often assume that consumers respond relatively homogeneously to factors that drive attitudes (Lavuri et al., 2023; Venkatesh et al., 2012b). Drawing on identity theory and the self-concept perspective (Burke & Stets, 2009; Whitmarsh & O'Neill, 2010), this study demonstrates that adoption intention is not driven solely by external stimuli or rational evaluations; rather, it is shaped by the interaction between affective evaluations and identity congruence. By integrating pro-environmental self-identity into the S-O-R model, this study extends the theoretical understanding of individual differences and identity-driven mechanisms in technology adoption research.

Finally, at the methodological level this study offers a complementary research design that combines linear regression and fsQCA to both test symmetric net effects and uncover asymmetric configurational pathways (Fiss, 2011; Ragin, 2008). Linear regressions reveal average causal effects among variables, whereas fsQCA identifies multiple equifinal configurations leading to high and non-high adoption intentions, confirming the presence of equifinality and causal asymmetry (Fiss, 2011; Ragin, 2008). Notably, although self-efficacy is not significant in our regression analysis, fsQCA show that when combined with other conditions, self-efficacy can generate high adoption intention, reflecting the essence of conjunctural causation (Vis, 2012). This mixed-method design addresses the limitations of single-method approaches. Symmetric regression models assume that variables independently and additively influence outcomes, which may obscure conjunctural causation and alternative equivalent pathways (Ragin, 2008). In contrast, although the asymmetric fsQCA approach can reveal complex causal relationships at the configurational level, it does not quantify the independent marginal effect of a single variable on the outcome (Vis, 2012). Our mixed-method approach provides a transferable methodological pathway for exploring complex causal relationships in consumer behavior research.

6.2. Practical Implications

This study also holds actionable, practical implications for robotaxi operators, social media marketing strategists, and policymakers.

For robotaxi operators, experiential attitude constitutes the strongest mediating channel linking social media influence to adoption intention. Accordingly, operators should prioritize emotionally resonant content in their social media marketing strategies—such as ride-experience narratives and scenario-based videos—rather than focusing mostly on promoting functional aspects of the service. Furthermore, given that self-efficacy with respect to using robotaxis is primarily derived from direct experience rather than media exposure, operators should actively provide low-threshold trial opportunities, enabling consumers to build operational confidence through firsthand experience.

From the perspective of social media marketing strategies, the channel-specific moderating effect of pro-environmental self-identity implies that differentiated content strategies should be adopted for different consumer groups. For consumers with a strong environmental identity, content that integrates the low-carbon and ride-sharing attributes of robotaxi services with hedonic experiences

can more effectively activate identity motivation and facilitate adoption. For consumers with a lower environmental self-identity, marketing communication should emphasize functional attributes such as efficiency, safety, and cost advantages. In addition, fsQCA results indicate that adoption intentions for younger consumers are more likely to result from an experience-driven pathway, further supporting the logic of precision content targeting across different consumer segments.

For policymakers, the absence of experiential attitude among the configurations leading to non-high adoption intention suggests a lack of positive experiential cognition of robotaxi services constitutes a central barrier to adoption. At the policy level, initiatives such as establishing open-access experience stations in core urban areas and supporting robotaxi experience-sharing campaigns on short-video platforms could enhance public experiential awareness and thereby lower the psychological threshold for adoption.

6.3. Limitations and Future Research

Although this study makes substantial theoretical and managerial contributions, several limitations should be acknowledged. First, the cross-sectional data cannot rule out the possibility of reverse causality. For example, consumers who already possess strong adoption intentions may actively seek robotaxi-related content on social media, thereby inflating the observed effects. Future research should employ longitudinal designs to further strengthen the accuracy of causal inference. Second, all of the respondents to our questionnaire are from China. China’s social media ecosystem and robotaxi regulations differ substantially from those in Western and other Asian markets (Chen et al., 2018; Eastman et al., 2023). Chinese platforms integrate social, informational, and commercial functions within single applications, and robotaxis have already been commercialized in several cities. These characteristics may limit the generalizability of our findings to markets with more fragmented media environments and earlier stages of technological development. Therefore, future research should conduct cross-cultural comparisons to examine the applicability of these findings across different cultural and regulatory contexts. Finally, we do not distinguish between different types of social media content or platform characteristics. In practice, consumers are exposed to diverse forms of robotaxi-related content on social media, and different platforms (e.g., short-video-oriented platforms such as Douyin versus text-oriented platforms such as Weibo) may exert differential influences on consumers (Sundar, 2008; Voorveld et al., 2018). Future research should differentiate social media exposure by content type (affective vs. informational) and media format (visual vs. textual) to provide more fine-grained evidence for understanding consumer psychology and behavior.

Appendix A

Table A1. List of items by construct.

Construct	Item	Content	Source
Social Media (SM)	SM1	I have encountered information about robotaxis shared by individuals within my social media network.	(Tran & Corner, 2016)
	SM2	I have read posts or reports recommending robotaxis on social media platforms.	
	SM3	I have come across news or discussions about robotaxis on popular social media platforms or forums.	
Experiential Attitude (EA)	In the next two weeks, using robotaxis would be:		(Kraft et al., 2005)
	EA1	Bad - Good	
	EA2	Stressful - Relaxed	
	EA3	Unpleasant - Pleasant	
	EA4	Boring - Interesting	

Instrumental Attitude (IA)	IA1	Unwise - Wise	
	IA2	Harmful - Beneficial	
	IA3	Useless - Useful	
	IA4	Wrong - Right	
Self-efficacy (SE)	SE1	I believe I am capable of mastering the skills required to use a robotaxi.	(Dermod y et al., 2015)
	SE2	I believe I can effectively issue commands to a robotaxi according to system instructions.	
	SE3	I believe I am able to successfully complete a trip using a robotaxi.	
	SE4	Overall, I believe I am capable of using a robotaxi.	
Pro-environmental Self-identity (PESI)	PESI1	I consider myself an environmentally friendly consumer.	(Cook et al., 2002; Sparks & Shepherd, 1992)
	PESI2	I regard myself as someone who is very concerned about environmental issues.	
	PESI3	I would feel uncomfortable if others considered me to have an environmentally friendly lifestyle. (reverse-coded)	
	PESI4	I would not want my family or friends to think of me as someone who cares about environmental issues. (reverse-coded)	
Adoption Intention (AI)	AI1	I predict that I will try to use robotaxis in the future.	(Huang & Ge, 2019)
	AI2	I would like to try robotaxis now if I had the opportunity.	
	AI3	I intend to use robotaxis in the future if they become available in my city.	

Appendix B

Table A2. Intermediate Solution of Robustness Test by Changing Consistency Cutoff.

Outcome: Adoption intention			
Model: AI=f (AGE, SM, EA, IA, SE, PESI)			
Algorithm: Quine-McCluskey			
Frequency cutoff: 5			
Consistency cutoff: 0.927115			
Configurations	Raw Coverage	Unique Coverage	Consistency
~AGE*SM*EA*SE	0.363	0.041	0.923
~AGE*SM*EA*PESI	0.366	0.044	0.903
SM*EA*IA*SE*PESI	0.379	0.075	0.912
solution coverage	0.482		
solution consistency	0.876		
Outcome: Adoption intention			
Model: AI=f (AGE, SM, EA, IA, SE, PESI)			
Algorithm: Quine-McCluskey			
Frequency cutoff: 5			
Consistency cutoff: 0.938422			
Configurations	Raw Coverage	Unique Coverage	Consistency
~SM*~EA*~IA	0.467	0.086	0.884
~EA*~IA*~SE*~PESI	0.423	0.037	0.918
~SM*~EA*~SE*PESI	0.264	0.012	0.926

~AGE*~EA*~SE*~PESI	0.326	0.011	0.918
solution coverage	0.572		
solution consistency	0.868		

Notes: SM=Social Media, EA=Experiential Attitude, IA=Instrumental Attitude, SE=Self-Efficacy, PESI=Pro-Environmental Self-Identity, AI=Adoption Intention.

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