IEEE Access
Multidisciplinary | Rapid Review | Open Access Journal

Received 26 February 2025, accepted 17 March 2025, date of publication 27 March 2025, date of current version 11 April 2025.

Digital Object Identifier 10.1109/ACCESS.2025.3555411

RESEARCH ARTICLE

Why Consumers Resist Urban Air Mobility: A Hybrid SEM-fsQCA Approach

CHUANHUI LIAO[1], SIQI WANG[1], RENGANG GUO[2], AND SHUANG LIN[1]
[1]School of Economics and Management, Civil Aviation Flight University of China, Guanghan, Sichuan 618307, China
[2]Civil Aviation Administration of China Academy, Civil Aviation Flight University of China, Guanghan, Sichuan 618307, China

Corresponding author: Shuang Lin (lsh@cafuc.edu.cn)

This work was supported in part by the Safety Ability Foundation of Civil Aviation Administration of China under Grant 2022-412 and Grant 24B01004, and in part by the Fundamental Research Funds for the Central Universities under Grant PHD2023-031.

ABSTRACT Urban Air Mobility (UAM), represented by drones and electric Vertical Take-off and Landing (eVTOLs), has facilitated the emergence of a nascent and more sustainable intra- and inter-city transportation modality. Nevertheless, extant research has predominantly concentrated on consumers' intentions to embrace UAM from the viewpoints of technology acceptance and diffusion, disregarding the crucial aspect of resistance. To address this disparity, this study put forward a framework integrating the Innovation Resistance Theory (IRT) and prior experience to examine the antecedents and potential strategies regarding UAM resistance. Data were collected via an online survey and subsequently analysed using a symmetrical PLS path model and an asymmetrical fuzzy set qualitative comparative analysis (fsQCA). It was disclosed that usage, value, risk, and tradition barriers, in conjunction with AV and trust, were significant antecedents of consumers' resistance intention towards UAM. The results of fsQCA offered six sufficient solutions that might account for the resistance to UAM. All four perceived barriers constitute a sufficient condition for UAM, with the risk barrier being the most persuasive one, while Autonomous Vehicle (AV) experience and trust are only the peripheral causal conditions. The findings are anticipated to assist manufacturers, operators, and the government in mitigating consumers' resistance towards UAM.

INDEX TERMS AV experience, innovation resistance theory, SEM-fsQCA approach, trust, urban air mobility resistance.

I. INTRODUCTION

With rapid urbanization, the urban transportation system is encountering substantial pressures, such as traffic congestion, air pollution, and escalating costs [1], [2]. In recent years, the transportation sector has witnessed disruptive technological innovations, including electric vehicles, autonomous vehicles, and shared taxis. Among these, Urban Air Mobility (UAM) has emerged as a disruptive innovation in air transportation, presenting a novel mode of inter- and intra-city travel in low-altitude airspace [3]. As an emerging and disruptive technology, UAM utilizes airspace and demands fewer fixed infrastructures like roads, rails, and bridges. It promises reduced traffic congestion, minimal disruptions, and lower environmental pollution due to its reliance on electric engines and airspace utilization [4], [5], [6]. The UAM is projected to have a market value of $500 billion or more by 2030. The success of UAM is primarily attributed to disruptive innovations in UAM air vehicles, low-altitude supervision, and low-altitude operation [4], [7].

With the advancements in Urban Air Mobility (UAM) technologies and trial operations [8], [9], scholars have investigated the factors influencing adoption from the novelty-seeking paradigm. These studies emphasize the factors facilitating individuals adopting innovations [10]. Among them are the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Innovation Diffusion Theory (IDT) [11]. In these studies, innovations are typically depicted as having significant improvements over existing products and services, and

The associate editor coordinating the review of this manuscript and approving it for publication was Barbara Masini.

people are generally assumed to be prone to change [12]. Consequently, people are considered to adopt the latest products and services [10]. However, in the face of disruptive innovations, individuals' behaviors vary, ranging from acceptance to neglect and even rejection [13], [14]. A survey conducted by UBS revealed that approximately 54% of respondents were reluctant to embrace pilotless flights [15]. In Lisbon, Portugal, approximately one-third of citizens held skeptical and denied attitudes toward UAM, potentially impeding its market penetration [13], [16]. Shankar and Nigam [13] hypothesized that the adoption and resistance to innovation are distinct phenomena influenced by different factors. Scholars recognize the significance of exploring the factors leading to resistance intention, as resistance can undermine the successful dissemination of innovation [17], [18]. However, the novelty-seeking paradigm fails to explain why consumers resist innovations due to a pro-innovation bias [19]. According to the Innovation Resistance Theory (IRT) proposed by Ram and Sheth [20], the factors leading to innovation resistance are distinct from those of adoption.

Therefore, this study endeavours to bridge this research gap to explore UAM resistance by applying the IRT paradigm. Additionally, this study aims to adopt an alternative analytical approach to expand the investigation scope. Previous studies on UAM predominantly employed conventional symmetrical statistical techniques and structural equation models merely to examine the net effects of factors or the indirect effects. However, in practice, these factors do not exist in isolation and may interact. Thus, providing practitioners with combinations/configurations of sufficient factors for practical use is crucial. Hence, this study fills this methodological gap by utilizing the asymmetrical approach of fsQCA to investigate the combinational effects of factors identified in PLS-SEM. Based on Boolean algebra and asymmetric thinking, fsQCA is a potent technique for testing non-linear phenomena. It can explore complex conditions to predict the outcomes through combinations of factors [21]. It offers a distinct approach to identifying all the possible relationships among the factors and provides combinations/configurations sufficient to reduce consumers' UAM resistance. Consequently, this study has two objectives: (a) to identify the antecedents of consumers' trust in and resistance to UAM and (b) to find combinations/configurations that are sufficient strategies for the stakeholders to mitigate consumers' UAM resistance.

The IRT introduces two classifications of barriers: functional and psychological. It is predicted that these barriers might cultivate negative attitudes and emotions, ultimately leading to resistance toward innovation (IRT; [20], [22]. IRT has been applied in various contexts, including mobile payments [23], organic food [24], and online-to-online (O2O) services [23]. Nevertheless, in the transportation sector, IRT remains unexamined, particularly in the nascent field of UAM. Hence, this study aims to bridge this gap by utilizing IRT to investigate the antecedents of inhibitors and barriers to UAM resistance. Consistent with the existing literature, trust is also employed as it is proposed as a crucial attitude and a key psychological outcome resulting from consumers' evaluation of barriers. Trust influences positive behavioral intentions such as adoption, recommendation, and word-of-mouth (WOM) in contexts like medical tourism [25] and Social commerce [26], contributing to less resistance. Furthermore, consumers' prior experience with existing similar innovations would impact their perception of barriers and trust in new ones [27], [28], [29], particularly in security behavioral intentions, loyalty, and the continued use of technology, mobile apps, and e-government websites. In the transportation sector, prior studies suggest that consumers who have driven autonomous vehicles demonstrate a higher propensity to trust the liability and safety of other transportation innovations, such as electric Vertical Take-Off and Landing (eVOTL) vehicles. Therefore, this study hypothesizes that consumers with experience in autonomous vehicles and/or taxis will perceive fewer barriers, possess a higher level of trust, and exhibit a weaker resistance towards UAM. Based on the above discussion, we propose the research framework depicted in Fig. 1, indicating that consumers' perceived conditional and psychological barriers and AV experience are negatively correlated with their trust in UAM, which further leads to resistance.

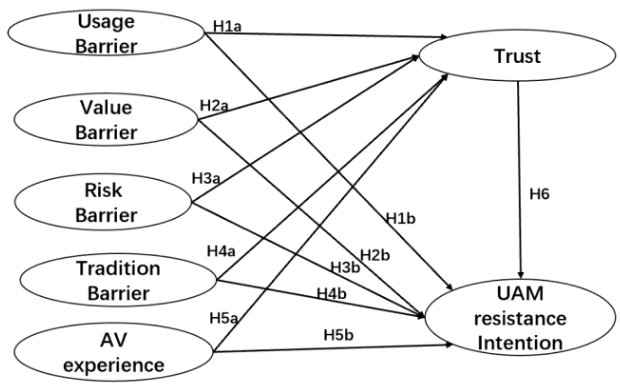

FIGURE 1. The research framework.

Methodologically, this study integrates the symmetrical Partial Least Squares (PLS) path model with the asymmetrical Fuzzy Set Qualitative Comparative Analysis (fsQCA). The PLS path model is extensively employed in consumer behavior studies [11], [30] to explore antecedents and outcomes' individual or net effects. Nevertheless, the PLS cannot explain the complex configurations of variables [31]. To address this gap, we employ fsQCA, frequently utilized to investigate how various combinations of causal conditions can lead to the same outcome by employing configuration analysis to elucidate complex situations [21]. Consequently, in this study, the PLS path model is initially used to identify the individual effects of barriers, AV experience, and trust on resistance. Subsequently, fsQCA is utilized to discover these antecedents' effective causal condition combinations (configurations) to provide practical marketing recommendations for reducing consumers' resistance towards UAM.

The novelty and potential contributions of this research can be classified as follows. Firstly, this study aims to provide insights into the mechanisms underlying the perceived barriers to trust and resistance towards Urban Air Mobility (UAM). Secondly, it will clarify the effects of Autonomous Vehicle (AV) experience on trust and resistance. As a result, stakeholders will understand how these barriers hinder trust and resistance towards UAM. Thirdly, this study employs Structural Equation Modeling - Fuzzy Set Qualitative Comparative Analysis (SEM - fsQCA) to examine the understudied perspectives of consumers' psychological resistance towards UAM. To our knowledge, it is one of the first to combine the traditional symmetric approach (PLS) and the asymmetric technique (fsQCA) in studying UAM resistance. Finally, this research will offer valuable theoretical insights and practical implications for governments, manufacturers, and marketers, facilitating the effective promotion of UAM marketing and reducing resistance intentions.

The structure of this study is organized as follows. Following the introduction in Part 1, Part 2 presents a literature review and hypotheses. Part 3 details the methodology and data collection processes. Part 4 analyzes the collected data and presents the results. Part 5 discusses the findings, while Part 6 concludes the study, outlining its applications and limitations.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

A. INNOVATION RESISTANCE THEORY

The IRT was initially proposed by [22] and modified by [20]. It provides a framework for exploring the factors that trigger consumers' resistance towards an innovation. When encountering an innovation, consumers tend to evaluate its potential threat to their existing situations and personal beliefs, which might result in their refusal, rejection, or opposition to the innovation [20], [22]. The IRT has been applied in various fields, such as mobile payments [19], [23], organic food [24], and O2O services [23]. The outcomes highlight the significance of perceived barriers in influencing consumers' resistance-related behavioral decisions toward innovation [23]. The IRT is highly appropriate for this study because Urban Air Mobility (UAM) is a novel system that utilizes disruptive technology in the transportation sector.

B. BARRIERS, TRUST, AND RESISTANCE INTENTION

The Innovation Resistance Theory (IRT) identifies two main barriers: functional and psychological. Functional barriers relate to an innovation's technological characteristics and can be further divided into four fundamental types: usage, value, image, and risk barriers. The psychological group mainly consists of image and tradition barriers. Since Urban Air Mobility (UAM) is a fledgling transportation system still in the early stages of its development, the image barrier will not be addressed in this context.

1) USAGE BARRIER

The usage barrier pertains to consumers' evaluation of the perceived performance of innovation with the perceived efforts required for adaptation [32]. Due to the complexity or inconvenience of innovative technologies, they often present challenges and obstacles for consumers, thereby endangering the prospects of innovation diffusion [23]. According to the expectancy-value theory and the technology acceptance model [33], an innovation's higher ease of use is associated with an increased enjoyment of a new system [34]. Consequently, when usage barriers arise due to perceptions of lower ease of use, consumers perceive lower usefulness, leading to negative emotions, attitudes, and resistance towards the innovation [20], [22]. Usage barriers have been recognized as a crucial factor in consumer resistance to innovation in m-commerce [35] and the travel and hospitality industry [36]. In the transportation sector, [37] and [38] have emphasized the significance of the convenience of innovative technologies, noting that commercial drivers are more inclined to replace traditional cars with light-duty electric vehicles if they are easy to operate. Furthermore, the study by Lee et al. [38] also confirmed the positive effects of self-efficacy on the acceptance of non-piloted vehicles. Additionally, usage barriers related to the usability, functionality, and convenience of online applications may result in consumers' distrust [23] and further resistance to their adoption. Hence, it can be proposed that the usage barrier of UAM would negatively affect consumers' trust and positively lead to resistance intention, and it is proposed that:

H1a: The usage barrier is negatively correlated with trust in UAM.

H1b: The usage barrier is positively correlated with UAM resistance intention.

2) VALUE BARRIER

The value barrier is defined as consumers' perception of an innovation's performance to the price paid compared to its alternatives [20], [22]. Consumers encounter value barriers when they perceive that the innovative service or product does not offer sufficient value for the extra or additional price [24]. According to the expectancy-value theory, when confronted with an innovative technology, consumers initially assess its potential benefits and then compare them to the cost. They are more inclined to accept the innovation if it provides greater value than alternative options within the same price range [10]. Previous studies have indicated higher adoption intentions for an innovative technology are attained when perceived as affordable [39]. If consumers perceive an unreasonable price, they may have a lack of trust in the new technology and products, suggesting a significantly negative association between the value barrier and trust in the contexts of travel apps and food delivery applications [23], [40]. In the transportation sector, UAM is identified to be faster, cheaper, time-saving, and on-time reliable [41] only for journeys of 35 km and above and in cities with insufficient public transportation networks [42]. However, the effective diffusion of UAM requires sufficient and dedicated take-off and landing points as well as airports, which are currently insufficient and may not be fulfilled soon. This shortage of dedicated infrastructure reduces consumers' perception of value and increases distrust in the reliability of UAM, ultimately resulting in resistance [19]. Therefore, we propose that:

H2a: The value barrier is negatively correlated with trust in UAM.

H2b: The value barrier is positively correlated with UAM resistance intention.

3) RISK BARRIER

In innovative technology, the risk barrier is consumers' perception of uncertainty associated with potential faults, fraudulence, and privacy concerns [20], [23], [35]. It is a crucial factor influencing behavioral decisions concerning new technologies and has been extensively researched in online commerce [35]. These studies underscore the significance of risk perception in purchase decisions, highlighting consumers' apprehensions regarding privacy breaches and information protection [35]. When consumers are uncertain about the reliability and security of new technology, they are less inclined to trust the technology and the products or services that employ it [43]. Existing literature has demonstrated that consumers' trust is influenced by perceived risks in various contexts, including food delivery services, tourism, and the hospitality industry [23], [43], [44]. In the transportation sector, previous studies have indicated that consumers prefer human-controlled vehicles over autonomous ones [45]. In the case of Urban Air Mobility (UAM), as air vehicles operate at low altitudes and overhead, consumers may perceive a higher threat of potential accidents involving those on board and the ground [16]. This perception further intensifies distrust in the technology and resistance towards UAM. Hence, we propose that:

H3a: The risk barrier is negatively correlated with trust in UAM.

H3b: The risk barrier is positively correlated with UAM resistance intention.

4) TRADITION BARRIER

The traditional barrier lies within the realm of psychological and cultural change [20], [22]. It pertains to consumers' evaluation of whether adopting an innovative technology would collide with their cultural norms or lifestyle. Traditions are deeply ingrained in the culture and people's daily lives, and any perceived conflicts between culture and tradition can evoke negative attitudes and boycotts towards technological innovation [23], [32], thereby heightening the traditional barrier. Previous studies have demonstrated that the conventional barrier adversely affects the intentions to adopt innovation in various contexts, such as e-commerce, food delivery services, tourism, and the hospitality industry [23], [43], [44]. Furthermore, the traditional barrier has been proven to negatively impact consumer trust in the hospitality industry [23]. In the context of UAM, Straubinger, Rothfeld et al. [46] has noted that the public perception of UAM significantly differs from that of commercial aviation, as UAM requires consumers to invest more effort in learning and understanding the technology. For individuals familiar with pilot-controlled flights, taking an automatic airplane like a UAV (Unmanned Aerial Vehicle) commonly used in the UAM system may cause anxiety and discomfort. Hence, we propose that:

H4a: The traditional barrier is negatively correlated with trust in UAM.

H4b: The traditional barrier is positively associated with the intention of UAM

5) PRIOR EXPERIENCE, TRUST, AND ADOPT INTENTION

Prior experience refers to consumers' perceptions founded on their previous interactions with a specific product, service, or technology. Research has affirmed that the knowledge and skills acquired through prior experience significantly impact consumers' attitudes and willingness to adopt technological innovations [47]. In the context of the acceptance of innovative technologies and products, consumers' prior experience and knowledge have remarkable positive effects on their privacy perceptions and concerns [29], [47], security behavioral intentions [27], [28], loyalty and continued use of technology [28] in various scenarios, including mobile apps, e-government websites, and web-based trip planning tools. Moreover, prior experience also influences consumers' trust levels toward innovations in the context of e-government websites [29]. A previous study of [47] demonstrated that consumers with positive prior experiences displayed higher trust levels than those with negative experiences. Consumers might modify their behavioral intentions in response to negative prior experiences, such as service failures. In China, electric vehicles (EVs) and autonomous vehicles (AVs) are typical technological innovations and products that have achieved widespread acceptance in transportation. Hence, this study assumes that the knowledge and skills consumers acquire using AVs can boost their trust and reduce their intention to resist urban air mobility (UAM). Therefore, this study hypothesizes that:

H5a: AV experience is positively correlated with trust in UAM.

H5b: AV experience is negatively correlated with UAM resistance intention.

C. TRUST AND RESISTANCE INTENTION

In technology diffusion studies, trust is defined as consumers' favorable beliefs regarding products and service providers [47]. Trust in providers and products mitigates consumers' concerns and nurtures positive attitudes and satisfaction, ultimately resulting in acceptance and utilization of new technologies [47]. Prior research has affirmed trust as a critical factor in uncertain circumstances, especially in Internet banking and hospitality services [48]. In the transportation sector, trust is of utmost importance in behavioral decisions. Studies by f [49] and [50] have emphasized that individuals with experience in autonomous vehicles (AVs) tend to have favorable attitudes and higher trust towards AVs, which subsequently enhances their intention to use them. Additionally, it is confirmed that initial trust is the most significant predictor of the adoption intention towards UAM [11]. According to the Theory of Trust Transfer, trust can be transferred from one source to another. For instance, consumers' trust in offline bank services may be transferred to online banks, individuals' trust in community members may be transferred to the social network community they belong to, and consumers' trust in information-based social commerce to company trust [51]. Therefore, we aim to measure consumers' prior experience and assess how the perceived knowledge and skills acquired from their experiences with autonomous vehicles are transferred to consumers' trust in UAM, as AVs and UAM are in the same industry and share similarities in advanced technologies, less congestion, and lower environmental pollution. Therefore, we propose H6 as:

H6: Trust is negatively correlated with UAM resistance intention.

III. MATERIAL AND METHODS

A. MEASUREMENTS

As shown in table 1, there are seven constructs in which all the items were adapted from existing literature in the scope of innovation resistance, UAM, and consumer behavioral studies. We have modified the items to fit the context of UAM. Specifically, UAM resistance intention, the dependent variable, was measured by a 4-item scales following the studies of [19]. Five independent variables, i.e. the prior experience of AVs, and the barriers of usage, value, risk, and tradition, were adapted from [13], [30], and [51] with 3-, 2-, 4-, and 3-item scales respectively. The mediator variable, trust, were measured with a 5-item scale adapted from [51]. All the constructs, items, and references are shown in table 1.

TABLE 1. Constructs and measurement items.

Construct	Items	Description
Risk barrier	RB1	I believe that using UAM is dangerous.
	RB2	I am anxious about the potential safety issue associated with UAM.
	RB3	I am afraid of having an accident when using UAM.
	RB4	I am worried about the cybersecurity of all the enabling IT systems.
Value barrier	VB1	The cost of adopting UAM will be more than the benefits received.
	VB2	UAM helps reduce the traffic congestion in the cities.
Usage Barrier	UB1	I am worried whether UAM will perform as well as it is supposed to.
	UB2	The thought of using UAM causes me to be concerned about how the UAM system connects to other existing urban transportation modes.
	UB3	I believe the UAM is technically mature so far.*
Tradition barrier	TB1	Conventional civil transportation is enough for me.
	TB2	I found it difficult to distinguish it from other traditional urban transportation modes.
	TB3	I found it easy to get some information about UAM.*
UAM Resistance Intention	URI1	In sum, the adoption of UAM would cause problems that I do not need.（deleted）
	URI1	I would not pay more for a UAM than a conventional transportation mode.
	URI2	I would not recommend UAM to my relatives and friends.
	URI3	In the near future, the adoption of UAM would be connected with too many uncertainties.
Trust	TRU1	UAM seems dependable.
	TRU2	UAM seems secure.
	TRU3	UAM seems pro-environmental.
	TRU4	UAM seems to mitigate congestion.
	TRU5	UAM seems reliable.
AV experience	AV1	I have the knowledge to drive an autonomous vehicle.
	AV2	I have the experience to drive an autonomous vehicle.
	AV3	I have taken an autonomous vehicle as a driver or passenger.

Note: Items with * will be reversely coded.

B. DATA COLLECTION AND SAMPLE

A self-administered questionnaire was used to collect data from May 15th to 30th, 2024. Initially, the questionnaire was developed in Chinese and subsequently translated into English by an English teacher from this university. To ensure accuracy, two additional scholars, with one specializing in transportation and another in English, translated the questionnaire back into Chinese. By comparing the original Chinese version with the back-translated one, meticulous adjustments were made to the wording and phrasing in Chinese and English to enhance conciseness and clarity.

A screening question, "Do you know what UAM is?" was incorporated as the initial question to determine respondents' acquaintance with UAM. Only those who responded "Yes" could proceed with the survey. The questionnaire was structured into four sections. Section I introduced the purpose of the study and assured participants of confidentiality. Section II briefly introduced the UAM system and included the screening question. Section III encompassed queries related to the dependent, independent, and mediating constructs. Section IV collected socio-demographic information from the participants. All items were measured using a 5-point Likert scale, ranging from 1 (''absolutely disagree'') to 5 (''absolutely agree'').

Before the formal survey, a preliminary investigation was conducted with 18 randomly selected university students from diverse majors. Twelve out of 17 had heard of UAM. These students were requested to complete the questionnaire and offer feedback on the clarity and conciseness of the wording and sentences. Based on their comments, the questionnaire was accordingly revised.

The questionnaire was developed on Wenjuanxing, a widely utilized online survey platform, and a QR code was generated for convenient access. The snowball sampling technique was employed to disseminate the QR code across various social media platforms, including but not limited to QQ, QQ groups, QQ Zone, WeChat, WeChat groups, and WeChat moments. Participants were encouraged to share the QR code with their friends and colleagues.

Over the survey period, 327 responses were received. Upon reviewing the answers, 36 were excluded due to incompleteness or with identical answers in 5 consecutive items. The final valid sample consisted of 295 responses ready for further analysis. The sample demographics indicated that 52% were males, 60% were aged between 21 and 40, 72% held a postgraduate degree or higher, and 80% earned a monthly income between 5001 and 12000 Chinese yuan.

IV. DATA ANALYSIS

A. COMMON METHOD BIAS

The present research investigates the effects of five independent variables—namely, four types of barriers and prior experience—on consumers' trust and resistance intention towards Urban Air Mobility (UAM). Structural Equation Modelling (SEM) was chosen as the analytical framework considering the complex interrelationships among the latent variables. SEM was employed broadly in previous studies of behavioural research [11], [30]. Since data were collected through the questionnaire survey, the common method bias (CMB) may exist. This study used three methods to test CMB. First, we used Harmon's single-factor test, the result indicated that there are 7 factors, with the first one to explain 38% of the covariance. Second, we used the confirmatory factor analysis of common method factors. We added a common method factor, the results shown that the predictive indicators do not change significantly. SRMR changed by 0.006, less than the recommended threshold of 0.05. Last, we calculated the variance inflation factor (VIF) of each item, and found that all the CIF values were between 1.151 and 2.236, all below the threshold of 3. The results from these analyses further confirmed the absence of severe common method bias in the data.

B. PLS-SEM ANALYSIS

1) MEASUREMENT MODEL ANALYSIS

We conducted a confirmatory factor analysis (CFA) to evaluate the reliability and validity of our measurement instruments. Initially, we evaluated the reliability of the measurement model using Cronbach's alpha and composite reliability. As presented in Table 2, all values exceeded the threshold of 0.7, aligning with the recommendations outlined in [30]. Secondly, we evaluated the convergent validity through factor loading (FL), construct reliability (CR), and average variance extracted (AVE). The results indicated that all constructs' FL, CR, and AVE values surpassed the recommended thresholds of 0.7, 0.7, and 0.5, respectively, conforming to the guidelines provided in [30]. Thirdly, we used two methods to assess the discriminant validity, the results are shown in Table 2. On one hand, the discriminant validity was confirmed by compare the square roots of AVEs to the inter-construct correlation coefficients to evaluate the magnitude of the relationship between the construct, confirming the formers were higher than the latter [30]. On the other hand, we further used the HTMT ratio method and the result indicated that all the HTMT ratio values were less than the threshold of 0.85.

2) PATH MODEL ANALYSES

We employed two approaches to evaluate the validity of discrimination, and the results are summarized in Table 3. Firstly, discriminant validity was affirmed by comparing the square roots of the AVEs with the inter-construct correlation coefficients. This comparison disclosed that the square roots of the AVEs were more significant than the inter-construct correlation coefficients, thereby validating the distinctiveness of the constructs as recommended.

The outcomes of the path model are illustrated in Table 4. Regarding the impact of barriers on resist intention, all four barriers posed positive effects, supporting hypotheses H1a, H2a, H3a, and H4a. In terms of the effects of obstacles on trust, only the value barrier (H2b: $\beta = -0.152$, $p < 0.005$) and risk barrier (H3b: $\beta = -0.499$, $p < 0.001$) are significantly related to UAM resist intention, thereby supporting H2b and H3b. Additionally, autonomous vehicle (AV) experience is positively (H5a: $\beta = 0.092$, $p < 0.05$) and negatively (H5b: $\beta = -0.258$, $p < 0.001$) correlated with trust and UAM resist intention respectively, supporting hypotheses H5a and H5b. Lastly, trust (H6: $\beta = -0.18$, $p < 0.005$)is indicated to affect UAM resist intentions negatively, supporting H6.

C. FUSSY SET QUALITATIVE COMPARATIVE ANALYSIS (FSQCA)

We employed fsQCA to conduct configuration analyses of causal antecedents using fuzzy set theory and fuzzy logic [52]. FsQCA was utilized to address the limitation of linear and symmetrical PLS-SEM and analyze each construct's net effect [53]. The SEM-fsQCA model can offer analyses featuring asymmetry, equifinality, multi-finality,

TABLE 2. Reliability and convergent validity.

Construct	Item	Factor loading	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Usage barrier	UB1	0.868	0.756	0.816	0.854	0.663
	UB2	0.692				
	UB3	0.871				
Value barrier	VB1	0.932	0.849	0.849	0.930	0.869
	VB2	0.935				
Risk barrier	RB1	0.873	0.817	0.853	0.877	0.647
	RB2	0.864				
	RB3	0.727				
	RB4	0.731				
Tradition barrier	TB1	0.882	0.750	0.845	0.843	0.653
	TB2	0.698				
	TB3	0.829				
AV experience	AV1	0.703	0.729	0.744	0.848	0.652
	AV2	0.868				
	AV3	0.842				
Trust	TRU1	0.775	0.843	0.847	0.888	0.614
	TRU2	0.793				
	TRU3	0.810				
	TRU4	0.796				
	TRU5	0.742				
URI	URI1	0.796	0.679	0.676	0.823	0.608
	URI2	0.741				
	URI3	0.801				

TABLE 3. Discriminant Validity of HTMT ratio.

	AV	URI	VB	RB	TB	TRU	UB
AVexp	***0.807***						
UAM Resist intention	0.468	***0.780***					
Value barrier	0.161	0.241	***0.932***				
Risk barrier	0.304	0.761	0.113	***0.804***			
Tradition barrier	0.228	0.309	0.116	0.211	***0.809***		
Trust	0.520	0.674	0.227	0.688	0.139	***0.784***	
Usage barrier	0.281	0.680	0.048	0.594	0.196	0.440	***0.814***

Note: The bold and italicized elements are the square roots of the AVE values, and other elements are the correlations among the constructs.

TABLE 4. Hypotheses examination.

Hypothesis	Path	Estimates	T statistics	P values	Supported?
H1a	UB -> URI	0.217***	4.600	0	Yes
H1b	UB -> TRU	-0.079	1.401	0.161	No
H2a	VB-> URI	0.112**	2.723	0.006	Yes
H2b	VB-> TRU	-0.152**	3.460	0.001	Yes
H3a	RB -> URI	0.383***	6.826	0	Yes
H3b	RB -> TRU	-0.499***	8.830	0	Yes
H4a	TB -> URI	0.159***	3.973	0	Yes
H4b	TB -> TRU	-0.022	0.466	0.641	No
H5a	AV -> URI	-0.092*	2.176	0.030	Yes
H5b	AV -> TRU	0.258***	5.239	0	Yes
H6	TRU -> URI	-0.180**	3.357	0.001	Yes

Note(s): usage barrier=UB; value barrier==VB; risk barrier=RB; tradition barrier=TB; AV experience=AV; trust==TRU; UAM resist intention=URI. *p<0.05, **p<0.01, ***p<0.001

and conjunctural causation [54]. There are three steps in fsQCA: namely, fuzzy set calibration, necessary condition analyses, and truth table analyses.

Calibration. In fsQCA, the data should be transformed into a fuzzy set with membership scores ranging from 0 to 1. Since each construct was measured by 2 - 5 items with 5 - Likert scales, we averaged the values of the items of each construct into a single score to represent the constructed value [55]. Then following Ragin [21], we set 0.05, 0.50, and 0.95 as the breakpoint values of full membership, cross-over point, and full non membership and [21]. Expressly, we set the minimum value of 1 as the full non - membership, the average value of a construct as the cross-over point value, and the maximum value of 5 as the full membership value. Subsequently, we employed the calibration function to obtain the fuzzy set. Additionally, we added a constant of 0.001 to all 0.50 fuzzy values since the fuzzy value of 0.50 represents the crossover or maximum ambiguity point.

Necessity conditions analysis. After the calibration, a necessity analysis was conducted to examine whether each of the six factors is necessary for UAM resistance. A condition is identified as ‘‘necessary’’ when the consistency score exceeds 0.90 [31]. As presented in Table 5, all the consistency scores of URI ranged from 0.606 to 0.779, and the consistency scores of ∼URI ranged from 0.532 to 0.872, all of which are below the threshold of 0.90. This indicates that there is no single antecedent condition sufficient for predicting URI or ∼URI [31].

Sufficient condition analysis. Subsequently, we computed the truth table for to test if any of the causal conditions

TABLE 5. The result of necessary conditions analysis.

Condition	URI		~URI	
	Consistency	Coverage	Consistency	Coverage
TB	0.742	0.757	0.650	0.643
~TB	0.650	0.657	0.755	0.739
RB	0.779	0.856	0.532	0.567
~RB	0.606	0.572	0.865	0.791
AV	0.702	0.647	0.819	0.732
~AV	0.709	0.801	0.605	0.663
VB	0.717	0.710	0.672	0.645
~VB	0.642	0.669	0.698	0.705
TRU	0.664	0.606	0.872	0.772
~TRU	0.750	0.858	0.555	0.616
UB	0.756	0.812	0.564	0.588
~UB	0.616	0.593	0.820	0.765

can be considered as necessary for the URI or ∼URI. Here, we set the frequency threshold of 3 because the size of 295 samples was considered large (>150; [52]. We also set the cutoff point at 0.80 ([21], [52]. As for the consistency and the minimum proportional reduction in consistency (PRI), we used the thresholds of 0.90 and 0.75 [52], respectively. The standard fsQCA true table analyses provide three types of solutions, i.e. the complex, the intermediate, and the parsimonious ones [21]. Based on the parsimonious and intermediate solutions, we drew the core-periphery figure as shown in table 6, demonstrating the configuration results of URI and ∼URI, respectively. Totally, there are six configurations that would lead to a high URI, with consistency values between 0.952 and 0.974, and raw coverage values between 0.349 and 0.72, respectively.

Furthermore, five configurations would lead to a high ∼URI in table 7, with consistency values ranging from 0.949 to 0.967 and raw coverage values ranging from 0.423 to 0.524. Overall, these solutions are highly consistent in predicting the outcomes, as the solution consistency values are reported at 0.933 for URI and 0.932 for ∼URI [55]. Moreover, the overall solution coverage values are reported at 0.714 for URI and 0.661 for ∼URI, indicating that a substantial proportion of URI and ∼URI are covered by the solutions obtained [55]. As shown in table 6, We further created the core-periphery table for URI and ∼URI.

As shown in table 6 and table 7, the black square (■) and the white square (□) represent a high and a low level of core conditions respectively. Where the black circle (●) and the white circle (○) represent a high and a low level of peripheral conditions respectively. With six intermediate solutions found, it is observed that risk barrier (RB), tradition barrier (TB), value barrier (VB), and usage barrier (UB) are all the core causal conditions for URI because they are part of the parsimonious solution [21]. It is noted that RB is common for 5 of 6 solutions, highlighting the importance of RB in predicting URI.

TABLE 6. Configurations for URI.

Conditions	URI					
	Risk-awareness group					pragmati-awareness group
	A1	A2	B1	B2	B3	C
UB	■			■	○	■
VB		■	○	○	■	■
RB	■	■	■	■	■	
TB			■	■	■	
TRU	□	□				□
AV		□	●		□	□
Raw coverage	0.572	0.462	0.408	0.420	0.349	0.441
Unique coverage	0.075	0.012	0.023	0.008	0.008	0.026
Consistency	0.952	0.960	0.969	0.974	0.971	0.958
Solution coverage	0.714					
Solution consistency	0.933					

Note: ■=Core causal condition present □=Core causal condition absent ●=Peripheral causal condition present ○= Peripheral causal condition absent

TABLE 7. Configurations for ∼URI.

Conditions	~URI				
	1	2	3	4	5
UB	□	□	□	□	
VB	□	□	□		□
RB	□	□		□	□
TB	□	□	□	□	□
TRU		■	■	■	■
AV	■		■	■	■
Raw coverage	0.423	0.436	0.476	0.524	0.444
Unique coverage	0.012	0.025	0.066	0.113	0.034
Consistency	0.967	0.967	0.956	0.949	0.966
Solution coverage	0.661				
Solution consistency	0.932				

Note: ■=Core causal condition present □=Core causal condition absent ●=Peripheral causal condition present ○= Peripheral causal condition absent

V. DISCUSSION

A. DISCUSSION OF PLS-SEM ANALYSIS

Overall, this study has examined the antecedents of URI using PLS-SEM and the sufficient configurations leading to URI using fsQCA methods. Some notable findings have been obtained, and they are discussed below.

Firstly, it is found that the risk barrier exerts the most significant influencing impacts on trust and URI, which is in line with the previous studies of [23], [35], [43], and [45]. It is postulated that consumers who highly value aviation safety and cybersecurity in low-altitude air flights will be reluctant to take UAM [56]. This is because they perceive a higher threat of potential accidents to people on board or the ground [16], leading to distrust in technological innovation and resistance to UAM.

Secondly, it is also reported that the usage barrier significantly facilitates UAM resistance, supporting H2a. This result is consistent with the studies of [35], [36], [37], and [38]. Regarding UAM, the specialized take-off and landing infrastructures are still in their infancy in terms of both technology and quantity. On the one hand, compared with air flights in public transportation, consumers always perceive insufficiency and inconvenience in the connection and transfer between the UAM system and other existing urban transportation modes [46]. On the other hand, compared to mature ground transportation, flying at low altitudes is perceived to be risky in terms of performance uncertainty, cybersecurity, or privacy protection [56]. This indicates that consumers may resist the innovative UAM system if they perceive it as complex, inconvenient, and/or confusing.

Thirdly, it is discovered that the value barrier is significantly related to both trust and the intention of UAM resistance, supporting H2a and H2b. The results are in alignment with the previous research [23], [40]. These studies have shown that consumers tend to distrust an innovation if they perceive its price to be unreasonably high compared to its alternatives. This implies that consumers would not trust the UAM system and service unless it is economical and affordable to the public. For instance, the price for airlines in general aviation appears to be two times or more compared to that of the high-speed railway with the same route [46]. Hence, consumers would resist the UAM system and service if dissatisfied with the pricing. Therefore, if consumers perceive the UAM system as offering lower value with higher prices than other urban transportation options, they are unlikely to accept, use, or recommend it.

Fourth, it was found that the traditional barrier positively impacts URI, thereby supporting H4b. This finding is in line with studies that have identified a negative association between the conventional barrier and adoption intention in industries and services such as e-commerce, food delivery services, tourism, and hospitality [23], [43], [44]. The result implies that due to the nascent stage of UAM, consumers are unfamiliar with low-altitude flights overhead and may perceive UAM innovation as an intrusion into their daily lives, leading to a lack of trust in the new UAM compared to the existing transportation modes. This is because the shift from the current urban transportation (e.g., car driving, high-speed railway, and public aviation) to UAM would bring about numerous uncertainties, stress, and distrust as it is a fledgling innovation. Furthermore, with the development of high-speed rail, public aviation, subways, shared vehicles, and taxis, consumers are already accustomed to and satisfied with these daily transportation modes, thereby resisting the UAM system. Hence, from this perspective, consumers with a habit of current ground transportation will resist UAM.

Lastly, the AV experience significantly influences trust and URI at the significance levels of 1‰ and 3%, respectively, supporting H5a and H5b. The results are consistent with previous studies [28], [47], indicating that consumers with positive experiences with AVs would hold positive attitudes toward UAM. In this case, consumers who have had positive experiences with autonomous vehicles would highly regard their self-efficacy in knowledge, control ability, and innovative tendency toward innovative autonomous vehicles. Subsequently, this positive perception of self-efficacy in behavioural control would lead to a positive perception of UAM innovation, increasing the trust level and reducing the resistance intention.

B. DISCUSSION OF FSQCA ANALYSIS

The PLS-SEM results indicated that four types of barriers (usage, value, risk, and tradition), trust, and AV experience are all significant antecedents of URI. However, the results from the fsQCA analysis provided complementary findings with those of the PLS-SEM. In general, there were six sufficient solutions, which were divided into two groups: the first group (A1, A2, B1, B2, and B3) was called the risk-awareness group and the second one (C) was named pragmatism-awareness.

1) DISCUSSION OF THE RISK-AWARENESS GROUP

In the risk-awareness group, the existence of the risk barrier serves as the crucial indicator for URI. This finding can be substantiated by the expectancy theory [33] and loss aversion theory [57]. We categorized the solutions into three subgroups based on the involved core conditions. Subgroup A comprises A1 and A2, subgroup B consists of B1 and B2, and the remaining solution C constitutes subgroup C.

Firstly, solutions A1 and A2 in subgroup A showcase a combination of the core conditions of the presence of the risk barrier and the negation of trust. Specifically, solution A1 demonstrates a simultaneous combination of the risk, usage barrier, and the negation of trust as variables influencing URI. The presence of both the usage and risk barriers indicates consumers' scepticism regarding the convenience and safety control of the UAM system. This can be justified by the risk aversion theory, which posits that consumers prefer to evade risky conditions for safety [12], [56], [57]. This tendency subsequently impacts consumers' behavioral intention towards an innovation. Solution A2 demonstrates a simultaneous combination of the presence of the risk barrier, the value barrier, the negation of trust, and the AV experience as variables influencing URI. The loss aversion theory can justify the addition of the value barrier [57], as consumers always value a unit of loss more than that of a gain. This tendency further influences consumers' URI. Therefore, consumers' tendency to be skeptical of the inconvenience, difficulty, and perceived risk inherent in UAM would lead them to prefer URI to accept UAM [32], [55].

Second, risk barrier and tradition barrier were the core conditions in solution group B. The combination of risk barrier and tradition barrier all attributed to consumers' doubts about UAM when compared with their perceptions of their traditions or habits in transportation [53]. The tradition and risk barriers indicated consumers' satisfaction with the status quo and a tendency to be conservative. Therefore, they were reluctant to abandon their routine transportation modes and would resist the nascent UAM system [10]. Consumers preferred familiar services and products to avoid disrupting traditions [12], [19]. These two conditions, along with the presence of AV experience and the negation of the value barrier (B1), the presence of the usage barrier and the negation of the value barrier (B2), and the presence of the value barrier and the negation of the usage barrier and AV experience (B3), also led to UAM resistance.

C. DISCUSSION OF THE PRAGMATISM-AWARENESS GROUP

Here, solution C indicated that the combination of the presence of the usage and value barriers, along with the negation of trust and AV experience, also led to URI. This solution emphasized consumers' pragmatism in their behavioral decisions. When consumers perceive the disparities between their expectations and the potential cost of the innovation, they would be reluctant to adopt the UAM innovation. This phenomenon can also be interpreted by the loss aversion theory [57], in which consumers weigh a unit of loss more than a unit of gain. When they perceive UAM as uneconomical and inefficient, they will develop negative attitudes such as skepticism and behaviors such as inertia [53], which resulted in UAM resistance behavior.

Furthermore, the six configurations all revealed that even without trust and AV experience, combinations of the four types of barriers are sufficient to promote resistance. This also demonstrated that trust and AV experience are not core conditions in predicting URI and act as complementary factors in URI prediction. The weak impact of these two factors is a complementary explanation to the PLS-SEM analyses. In PLS-SEM, AV and trust had significant implications on URI; however, when these two conditions are combined with the four barriers, the importance of AV and trust decreases to become peripheral causal conditions instead of core conditions.

VI. IMPLICATIONS, LIMITATIONS, AND FUTURE RESEARCH

This study also provided theoretical and practical contributions.

A. THEORETICAL IMPLICATIONS

There are three potential academic implications. Firstly, it enriches the literature on the Innovation Resistance Theory (IRT) by exploring the relationship between barriers and URI through the mediating effect of trust. To the best of our knowledge, this study is one of the first attempts to empirically investigate consumers' UAM behavioral decisions from the perspective of innovation resistance. Secondly, although UAM has attracted attention in research on consumer behavior and policymaking toward transportation innovation, previous studies have mainly focused on the facilitators of innovation diffusion while neglecting the inhibitors. However, customers do not always favor new technologies, they may sometimes resist and refuse them [19]. Thus, this study offers a novel perspective of innovation resistance to examine consumers' attitudes and resistance intentions towards UAM. It may provide a perspective for future research on consumer behavioral decisions in transportation innovations. This study put forward the significance of the consumers' psychologically resistance perceptions of barriers (i.e., risk, value, usage, and traditon barriers) when it comes to adopting with UAM in the near future.

In addition, the PLS-SEM and fsQCA results present some interesting findings. First, regarding the effects of four types of barriers on UAM resistance intention. The results of PLS-SEM indicates that all these four types of barriers contribute to URI significantly and respectively. However, the results of fsQCA provide more specific and detailed information. The results show that none of the four types barriers can lead to URI solely. They should combine with each other to make the impact effect applicable. There are 6 solutions of combinations of barriers could lead to URI, such as the combination of usage and risk barrier, the value and risk barrier, the risk and tradition, the usage, risk, and tradition barriers, the value, risk, and tradition barriers, and the usage and value barriers. Second, the results of PLS-SEM indicates that AV experience can influence UAM resistance directly and through the mediating of trust. While effects of fsQCA reveals that when confronted with any of the four barriers, AV experience do not lead to URI.

Therefore, the study further confirmed that the bybrid of PLS-SEM and fsQCA could provide deeper and more comprehensive explorations and results. That is, the PLS-SEM provides with key factors which can influence URI respectively, while the fsQCA further provide the effects of each combined factors and configurations. Hence, the combined effects of PLS-SEM and fsQCA could produce more comprehensive insights into how factors in innovation resistance theory cooperate with each to influence consumers' resistance behavioural intention or behaviours.

B. PRACTICAL IMPLICATIONS

The study provides several practical implications for practitioners, enabling them to comprehend why consumers resist

UAM and discover sufficient strategies/configurations to mitigate the effects of barriers. Firstly, the results indicate that six solutions might explain the resistance to the UAM system, and the risk barrier is identified as the most influential condition. Consequently, the UAM stakeholders should undertake measures to alleviate these barriers. For example, as the risk barrier is recognized as the most influential condition both in fsQCA (solution A1, A2, B1, B2, and B3) and PLS-SEM, the manufacturers, government, and the operators should try to alleviate consumers' risk perception. As for the manufacturers, should develop the technology to ensure flight safety and cybersecurity [56], such as Joby aviation employs hydrogen battery as power. The government should formulate laws and regulations to guarantee privacy protection and provide insurance for those on the flight and on the ground. In China, low-altitude airline design, and eVTOL taking and landing port construction are key factors in low-altitude economy development. Therefore, the Civil Aviation Administration of China and the China Civil Airports Association have issued several standards and regulation to guide the development of UAM, such as "the technical requirements for electric vertical takeoff and landing (eVTOL) aircraft takeoff and landing sites", and the "Regulations on training and management of agricultural unmanned aerial vehicle operators", to guide and governance UAM development and to reduce consumers' consumers' risk perception and resistance intention. Secondly, with the usage (solutions A1, B2, and C) and value barriers (A2, B3, and C), practitioners are encouraged to offer convenient UAM services and enhance the cost-effectiveness of UAM. They can meticulously design the connection between the UAM and other on-ground transportation modes and provide more promotions during the trial operation period. According to reports, when compared to conventional civil aviation, subways, and railways, the cost and the ticket price of eVTOLs are still high, and the location of the eVTOL ports are inconvenient. Therefore, improving the convenience and reducing the price of UAM are essential in UAM development. Thirdly, regarding the traditional barrier (solutions B1, B2, and B3), UAM marketers should strive to break urban transportation routines through intensive media publicity and improve the connectivity between UAM and other urban transportation modes. For example, the government and the operation companies should implement popular science propaganda of UAM and trial flight in low-altitude industry park.

C. LIMITATIONS AND FUTURE RESEARCH

In addition to the contributions, this study has certain limitations. Firstly, the data appeared to be small and were collected only in China, which limits the generalization of the findings to other countries. Thus, further research should be conducted in other countries to identify the common conditions. Secondly, this study only investigated the impact of various barriers on trust and UAM resistance. However, individuals may have both positive and negative attitudes towards an innovation. Future research should examine the facilitators and inhibitors of UAM adoption and clarify their combined effects. Thirdly, this study only surveyed and examined consumers' intentions to resist UAM. Considering the significant difference between intention and behaviour, further research should explore the relationship between intentions and actual behaviours. Lastly, this study did not distinguish between different types of prior experience, different types of experience (positive vs. negative, duration and frequency), as well as other measurement dimensions like self-efficacy and perceived control. Future research should examine the effects of different types of previous experience on resistance intention, such as consumers' positive, neutral, and negative experiences, different levels of experience, the presence or absence of experience, self-efficacy and perceived control, among others.

AUTHOR CONTRIBUTIONS STATEMENT

Chuanhui Liao contributed to the design, analysis, and draft development. Siqi Wang contributed to the questionnaire survey, data processing, and draft development. Rengang Guo contributed to the design and funding. Shuang Line contributed to design and data processing.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

ACKNOWLEDGMENT

The authors would like to thank the anonymous reviewers for giving constructive comments on the manuscript.

REFERENCES

[1] A. Christodoulou and P. Christidis, "Evaluating congestion in urban areas: The case of seville," *Res. Transp. Bus. Manage.*, vol. 39, Jun. 2021, Art. no. 100577.

[2] T. Biehle, "Social sustainable urban air mobility in Europe," *Sustainability*, vol. 14, no. 15, p. 9312, Jul. 2022.

[3] Y. W. Kim, C. Lim, and Y. G. Ji, "Exploring the user acceptance of urban air mobility: Extending the technology acceptance model with trust and service quality factors," *Int. J. Hum.-Comput. Interact.*, vol. 39, no. 14, pp. 2893–2904, Aug. 2023.

[4] J. Holden and N. Goel, "Fast-forwarding to a future of on-demand urban air transportation," Tech. Rep., 2016.

[5] T. Maheshwari and K. W. Axhausen, "How will the technological shift in transportation impact cities? A review of quantitative studies on the impacts of new transportation technologies," *Sustainability*, vol. 13, no. 6, p. 3013, Mar. 2021.

[6] S. Corwin, N. Jameson, D. M. Pankratz, and P. Willigmann, "The future of mobility: What's next?" Tech. Rep., 2016.

[7] Y. Liu and C. Gao, "Assessing electric vertical take-off and landing for urban air taxi services: Key parameters and future transportation impact," *Sustainability*, vol. 16, no. 11, p. 4732, Jun. 2024.

[8] H. Eißfeldt, "Sustainable urban air mobility supported with participatory noise sensing," *Sustainability*, vol. 12, no. 8, p. 3320, Apr. 2020.

[9] J. Kim, "Assessment of the DRT system based on an optimal routing strategy," *Sustainability*, vol. 12, no. 2, p. 714, Jan. 2020.

[10] T. Laukkanen, "Consumer adoption versus rejection decisions in seemingly similar service innovations: The case of the internet and mobile banking," *J. Bus. Res.*, vol. 69, no. 7, pp. 2432–2439, Jul. 2016.

[11] C. Lee, B. Bae, Y. L. Lee, and T.-Y. Pak, "Societal acceptance of urban air mobility based on the technology adoption framework," *Technological Forecasting Social Change*, vol. 196, Nov. 2023, Art. no. 122807.

[12] V. Joachim, P. Spieth, and S. Heidenreich, "Active innovation resistance: An empirical study on functional and psychological barriers to innovation adoption in different contexts," *Ind. Marketing Manage.*, vol. 71, pp. 95–107, May 2018.

[13] A. Shankar and A. Nigam, "Explaining resistance intention towards mobile HRM application: The dark side of technology adoption," *Int. J. Manpower*, vol. 43, no. 1, pp. 206–225, Apr. 2022.

[14] D. Huang, X. Jin, and A. Coghlan, "Advances in consumer innovation resistance research: A review and research agenda," *Technological Forecasting Social Change*, vol. 166, May 2021, Art. no. 120594.

[15] J. Castle, C. Fornaro, D. Genovesi, E. Lin, D. E. Strauss, T. Waldewitz, and D. Edridge, "Flying solo—How far are we down the path towards pilotless planes?" Tech. Rep., Aug. 2017.

[16] S. Kalakou, C. Marques, D. Prazeres, and V. Agouridas, "Citizens' attitudes towards technological innovations: The case of urban air mobility," *Technological Forecasting Social Change*, vol. 187, Feb. 2023, Art. no. 122200.

[17] S. Heidenreich and M. Handrich, "What about passive innovation resistance? Investigating adoption-related behavior from a resistance perspective," *J. Product Innov. Manage.*, vol. 32, no. 6, pp. 878–903, Nov. 2015.

[18] H. Seth, S. Talwar, A. Bhatia, A. Saxena, and A. Dhir, "Consumer resistance and inertia of retail investors: Development of the resistance adoption inertia continuance (RAIC) framework," *J. Retailing Consum. Services*, vol. 55, Jul. 2020, Art. no. 102071.

[19] W. Chaouali and N. Souiden, "The role of cognitive age in explaining mobile banking resistance among elderly people," *J. Retailing Consum. Services*, vol. 50, pp. 342–350, Sep. 2019.

[20] S. Ram and J. N. Sheth, "Consumer resistance to innovations: The marketing problem and its solutions," *J. Consum. Marketing*, vol. 6, no. 2, pp. 5–14, Feb. 1989.

[21] C. C. Ragin, *Redesigning Social Inquiry: Fuzzy Sets and Beyond*. Chicago, IL, USA: Univ. Chicago Press, 2008.

[22] S. Ram, "A model of innovation resistance," *Adv. Consumer Res.*, vol. 14, pp. 208–212, Jan. 1987.

[23] P. Kaur, A. Dhir, A. Ray, P. K. Bala, and A. Khalil, "Innovation resistance theory perspective on the use of food delivery applications," *J. Enterprise Inf. Manage.*, vol. 34, no. 6, pp. 1746–1768, Nov. 2021.

[24] J. Aschemann-Witzel and S. Zielke, "Can't buy me green? A review of consumer perceptions of and behavior toward the price of organic food," *J. Consum. Affairs*, vol. 51, no. 1, pp. 211–251, Mar. 2017.

[25] A. M. Abubakar and M. Ilkan, "Impact of online WOM on destination trust and intention to travel: A medical tourism perspective," *J. Destination Marketing Manage.*, vol. 5, no. 3, pp. 192–201, Sep. 2016.

[26] N. Meilatinova, "Social commerce: Factors affecting customer repurchase and word-of-mouth intentions," *Int. J. Inf. Manage.*, vol. 57, Apr. 2021, Art. no. 102300.

[27] H.-Y.-S. Tsai, M. Jiang, S. Alhabash, R. LaRose, N. J. Rifon, and S. R. Cotten, "Understanding online safety behaviors: A protection motivation theory perspective," *Comput. Secur.*, vol. 59, pp. 138–150, Jun. 2016.

[28] J. Y. L. Thong, S.-J. Hong, and K. Y. Tam, "The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance," *Int. J. Hum.-Comput. Stud.*, vol. 64, no. 9, pp. 799–810, Sep. 2006.

[29] G. Bansal, F. M. Zahedi, and D. Gefen, "Do context and personality matter? Trust and privacy concerns in disclosing private information online," *Inf. Manage.*, vol. 53, no. 1, pp. 1–21, Jan. 2016.

[30] A. Khalil, A. Shankar, R. Bodhi, A. Behl, and A. Ferraris, "Why do people resist drone food delivery services? An innovation resistance theory perspective," *IEEE Trans. Eng. Manag.*, vol. 71, pp. 13038–13048, 2022.

[31] S. Chen and J. Ye, "Understanding consumers' intentions to purchase smart clothing using PLS-SEM and fsQCA," *PLoS ONE*, vol. 18, no. 9, Sep. 2023, Art. no. e0291870.

[32] Z. Mani and I. Chouk, "Consumer resistance to innovation in services: Challenges and barriers in the Internet of Things era," *J. Product Innov. Manage.*, vol. 35, no. 5, pp. 780–807, Sep. 2018.

[33] F. D. Davis, R. P. Bagozzi, and P. R. Warshaw, "User acceptance of computer technology: A comparison of two theoretical models," *Manage. Sci.*, vol. 35, no. 8, pp. 982–1003, Aug. 1989.

[34] L. F. Rodrigues, A. Oliveira, and C. J. Costa, "Does ease-of-use contributes to the perception of enjoyment? A case of gamification in e-banking," *Comput. Hum. Behav.*, vol. 61, pp. 114–126, Aug. 2016.

[35] K. Moorthy, C. S. Ling, Y. W. Fatt, C. M. Yee, E. C. K. Yin, K. S. Yee, and L. K. Wei, "Barriers of mobile commerce adoption intention: Perceptions of generation X in Malaysia," *J. Theor. Appl. Electron. Commerce Res.*, vol. 12, no. 2, pp. 37–53, Apr. 2017.

[36] M. Kim and H. Qu, "Travelers' behavioral intention toward hotel self-service kiosks usage," *Int. J. Contemp. Hospitality Manage.*, vol. 26, no. 2, pp. 225–245, Feb. 2014.

[37] S. Wolff and R. Madlener, "Driven by change: Commercial drivers' acceptance and efficiency perceptions of light-duty electric vehicle usage in Germany," *Transp. Res. C, Emerg. Technol.*, vol. 105, pp. 262–282, Aug. 2019.

[38] J. Lee, D. Lee, Y. Park, S. Lee, and T. Ha, "Autonomous vehicles can be shared, but a feeling of ownership is important: Examination of the influential factors for intention to use autonomous vehicles," *Transp. Res. C, Emerg. Technol.*, vol. 107, pp. 411–422, Oct. 2019.

[39] M. Fassnacht and S. Unterhuber, "Consumer response to online/offline price differentiation," *J. Retailing Consum. Services*, vol. 28, pp. 137–148, Jan. 2016.

[40] K. Choi, Y. Wang, and B. Sparks, "Travel app users' continued use intentions: It's a matter of value and trust," *J. Travel Tourism Marketing*, vol. 36, no. 1, pp. 131–143, Jan. 2019.

[41] C. Al Haddad, E. Chaniotakis, A. Straubinger, K. Plötner, and C. Antoniou, "Factors affecting the adoption and use of urban air mobility," *Transp. Res. A, Policy Pract.*, vol. 132, pp. 696–712, Feb. 2020.

[42] R. Rothfeld, M. Fu, M. Balać, and C. Antoniou, "Potential urban air mobility travel time savings: An exploratory analysis of munich, paris, and san Francisco," *Sustainability*, vol. 13, no. 4, p. 2217, Feb. 2021.

[43] F. Liébana-Cabanillas, V. Marinković, and Z. Kalinić, "A SEM-neural network approach for predicting antecedents of m-commerce acceptance," *Int. J. Inf. Manage.*, vol. 37, no. 2, pp. 14–24, Apr. 2017.

[44] S. Sarkar, S. Chauhan, and A. Khare, "A meta-analysis of antecedents and consequences of trust in mobile commerce," *Int. J. Inf. Manage.*, vol. 50, pp. 286–301, Feb. 2020.

[45] E. C. Anania, S. Rice, N. W. Walters, M. Pierce, S. R. Winter, and M. N. Milner, "The effects of positive and negative information on consumers' willingness to ride in a driverless vehicle," *Transp. Policy*, vol. 72, pp. 218–224, Dec. 2018.

[46] A. Straubinger, R. Rothfeld, M. Shamiyeh, K.-D. Büchter, J. Kaiser, and K. O. Plötner, "An overview of current research and developments in urban air mobility—Setting the scene for UAM introduction," *J. Air Transp. Manage.*, vol. 87, Aug. 2020, Art. no. 101852.

[47] F. Z. Xu, Y. Zhang, T. Zhang, and J. Wang, "Facial recognition check-in services at hotels," *J. Hospitality Marketing Manage.*, vol. 30, no. 3, pp. 373–393, Apr. 2021.

[48] A. Sharma, V. E. D. Motta, J.-G. Choi, and N. S. Altman, "Economic production in hospitality and tourism industry: How do we compare to other services?" *Int. J. Contemp. Hospitality Manage.*, vol. 28, no. 5, pp. 1026–1050, May 2016.

[49] Z. Xu, K. Zhang, H. Min, Z. Wang, X. Zhao, and P. Liu, "What drives people to accept automated vehicles? Findings from a field experiment," *Transp. Res. C, Emerg. Technol.*, vol. 95, pp. 320–334, Oct. 2018.

[50] T. Zhang, D. Tao, X. Qu, X. Zhang, R. Lin, and W. Zhang, "The roles of initial trust and perceived risk in public's acceptance of automated vehicles," *Transp. Res. C, Emerg. Technol.*, vol. 98, pp. 207–220, Jan. 2019.

[51] S. Shi and W. S. Chow, "Trust development and transfer in social commerce: Prior experience as moderator," *Ind. Manage. Data Syst.*, vol. 115, no. 7, pp. 1182–1203, Aug. 2015.

[52] P. C. Fiss, "Building better causal theories: A fuzzy set approach to typologies in organization research," *Acad. Manage. J.*, vol. 54, no. 2, pp. 393–420, Apr. 2011.

[53] X.-M. Loh, V.-H. Lee, L.-Y. Leong, E. C.-X. Aw, T.-H. Cham, Y.-C. Tang, and J.-J. Hew, "Understanding consumers' resistance to pay with cryptocurrency in the sharing economy: A hybrid SEM-fsQCA approach," *J. Bus. Res.*, vol. 159, Apr. 2023, Art. no. 113726.

[54] E. C.-X. Aw, "Understanding consumers' paths to webrooming: A complexity approach," *J. Retailing Consum. Services*, vol. 53, Mar. 2020, Art. no. 101991.

[55] J.-J. Hew, V.-H. Lee, and L.-Y. Leong, ''Why do mobile consumers resist mobile commerce applications? A hybrid fsQCA-ANN analysis,'' *J. Retailing Consum. Services*, vol. 75, Nov. 2023, Art. no. 103526.
[56] J. Yang, Y. Wang, X. Hang, and D. Delahaye, ''A review on airspace design and risk assessment for urban air mobility,'' *IEEE Access*, vol. 12, pp. 157599–157611, 2024.
[57] D. Kahneman and A. Tversky, ''Prospect theory: An analysis of decision under risk,'' *Econometrica*, vol. 47, no. 2, pp. 263–391, Mar. 1979.

CHUANHUI LIAO received the Ph.D. degree in business administration from the University of Science and Technology of China. She is currently the Vice-Dean and a Professor with the Civil Aviation Flight University of China. Her primary research interests include behavior science, crisis management, and civil aviation operation and management.

SIQI WANG received the B.S. degree in data science and big data technology from Jincheng College, Sichuan University, Chengdu, China, in 2023. She is currently pursuing the master's degree in management science and engineering with the Civil Aviation Flight University of China, Guanghan, Sichuan. In terms of academic research, she has shown a keen interest, especially in areas such as public opinion analysis, risk management, and sentiment analysis, where she is dedicated to exploring cutting-edge knowledge and technologies related to these fields.

RENGANG GUO received the B.S. degree in aircraft design from Northwestern Polytechnical University, in 1995, and the M.S. degree in business administration from Liaoning University, China. From 1995 to 2021, he was with the Civil Aviation Administration of China, where he became the Deputy Director, in 2018. He is currently the Dean of the Civil Aviation Administration of China Academy. His primary research interest includes transportations operations and management.

SHUANG LIN received the master's degree in business administration from the University of Maryland, USA. Currently, he is a Lecturer with the Civil Aviation Flight University of China. His primary research interests include management science and financial engineering.