

# Analysis of Factors Affecting the Willingness to Use Urban Air Mobility Passenger Services

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## Abstract

Urban air mobility passenger services represent a new frontier in low-altitude aviation development. However, societal acceptance of such services varies significantly due to various constraints, such as safety, technology, and conceptual barriers. In the current context of low-altitude aviation development, the emergence of new unmanned eVTOLs that carry passengers has made research into public willingness to use urban air mobility services a focal point of attention across all sectors. Drawing on traffic organization behavior theory, this paper analyzes and evaluates public willingness to use urban air mobility passenger services. We establish an improved TAM-ITM model system to systematically analyze the factors influencing public willingness to use urban air mobility passenger services, along with structural model and mediating effect calculations. The results indicate that Perceived Usefulness, Familiarity, Institutional Guarantee, Subjective Norms, Initial Trust, Usage Attitude, and Social Image significantly impact willingness to use positively, while Perceived Safety Risks significantly impact willingness to use negatively. Trust Propensity, Perceived Enjoyment, and Price Evaluation show no significant impact.

## Keywords

Low-Altitude Economy, Urban Air Transportation, Usage Intention, Structural Equation Model

## 1. Introduction

Urban Air Mobility (UAM) refers to efficient, convenient, and environmentally friendly passenger transportation services provided within and around cities. These services are also known as urban air taxis. China previously offered urban air commuting taxi services using helicopters as the transportation vehicles. For

example, there was a short-haul charter flight route between Zhuhai, Guangzhou, and Shenzhen in 2015. However, these services were offered as general aviation short-haul charter services, resulting in low public participation and awareness. Recently, interest in urban air taxi services has once again become a focal point of attention across various sectors, particularly with the development of the low-altitude economy and the emergence of passenger-carrying unmanned eVTOLs. The commercialization and operation of urban air taxis are key issues requiring careful consideration in developing low-altitude economies.

Therefore, this paper takes the analysis of willingness to use urban air transportation as its starting point, using an assessment of willingness to use to evaluate public acceptance and demand for urban air transportation, thereby providing reference for the development of low-altitude economies, particularly the advancement of urban air transportation, across various regions. In November 2018, the U.S. National Aeronautics and Space Administration (NASA) released a market research report on urban air mobility [1], which identified “safety, privacy, employment, environment, noise, and visual impact” as the primary factors influencing the public’s willingness to use urban air mobility. In March 2021, the European Aviation Safety Agency (EASA) released a report [2] on European society’s acceptance of urban air mobility systems, which also indicated that safety, noise, and cultural preservation are the primary factors influencing public acceptance of urban air mobility in Europe. Other theoretical research findings on this issue primarily focus on the construction of evaluation models for the willingness to use urban air mobility. The evaluation models proposed in existing research include polynomial and ordered logit discrete choice models [3], the extended Technology Acceptance Model (TAM3) [4], the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Initial Trust Model (ITM) integrated framework [5], among others. Regarding the study of influencing factors, existing literature primarily identifies trust and safety risks as important influencing factors [6] [7]. Additionally, the concept of “face” (*i.e.*, social image), which embodies Chinese cultural values, has been shown to positively influence willingness to use [8]. This study investigates the factors influencing the willingness to use urban air mobility passenger services, primarily from the user’s perspective. It integrates the Initial Trust Model (ITM) and the Technology Acceptance Model (TAM), incorporating external factors, and employs empirical research methods to comprehensively explore the factors influencing the willingness to use urban air mobility passenger services. This research aims to provide references for the commercial operation of urban air mobility passenger services and the assessment of future market demand.

## 2. Research Hypotheses and Model Construction

### 2.1. Model Construction

This paper integrates the Technology Acceptance Model (TAM) and the Initial Trust Model (ITM) to improve the model’s variables: Usage Intention, Usage At-

titude, Initial Trust, Perceived Usefulness, Perceived Safety Risk, Trust Propensity, Familiarity, Institutional Guarantee and subjective norms. Additionally, three external variables related to the characteristics of urban air taxi service systems have been added: Social Image, Perceived Enjoyment and Price Evaluation. A theoretical model of factors influencing the willingness to use urban air transportation passenger services based on the above 12 potential variables was constructed—the improved TAM-ITM model.

## 2.2. Variables and Assumptions

In the TAM model, the factors determining whether a technology is adopted by users include perceived usefulness, perceived ease of use, usage attitude, and usage intention. However, according to the recommendations proposed by Al Haddad *et al.*: In urban air mobility passenger services, UAM serves as a highly automated passenger transport service where users participate in the service process solely as passengers, without direct contact or operation of the flight control system. Users only need to book flights and board the aircraft. Therefore, the perceived “usability” of the system does not constitute a significant antecedent variable influencing behavioral intent. Consequently, perceived usability is unrelated to usage intention and should be removed from the model [3].

1) Usage Intention refers to users’ willingness to choose urban air transportation passenger services as their mode of transportation. Usage intention is the core variable of the study and is directly or indirectly influenced by other variables in the model.

2) Usage Attitude refers to users’ subjective perceptions of urban air transportation passenger services, including both positive and negative perceptions, as a mode of transportation. Numerous studies have shown that users who have a positive attitude toward technology are more willing to use it. Therefore, we propose the following hypothesis: H1: Users’ attitude toward using urban air transportation passenger services positively influences their willingness to use it.

3) Urban air mobility passenger services are a mobility service that emphasizes the user experience. The perceptions formed by users when they first choose urban air mobility passenger services are crucial in determining whether they will continue to use the service in the future. Initial Trust refers to the level of trust users develop toward urban air mobility passenger services based on their own cognition and judgment during their first use of such services. Numerous scholars have demonstrated that initial trust is a direct factor positively influencing usage attitudes [6]-[19]. Therefore, we propose the following hypothesis: H11: Users’ initial trust in urban air mobility passenger services positively influences their usage attitudes.

4) Perceived Usefulness refers to the degree to which users perceive urban air transportation services to be useful for improving travel efficiency. Not only does perceived usefulness play an important role in the development of initial trust, it is also an important factor influencing users’ attitudes toward and willingness to

use such services. Therefore, the following hypothesis is proposed: H2: Users' perceived usefulness of urban air transportation passenger services positively influences their attitudes toward using them. H3: Users' perceived usefulness of urban air mobility passenger services positively influences their willingness to use them. H4: Perceived usefulness of urban air mobility passenger services positively influences initial trust.

5) Perceived Safety Risk refers to the negative outcomes users may experience when choosing urban air transportation services. [5]-[21] and others have identified perceived safety as a factor that influences initial trust. Their results indicate that perceived safety significantly impacts initial trust negatively. Therefore, the following hypothesis is proposed: H5: The perceived safety risk of urban air transportation passenger services negatively impacts initial trust.

6) Trust Propensity is closely related to whether users will trust new things or strangers, as well as the depth of that trust [22]. As a new mode of transportation, urban air taxi services present significant uncertainty and risk to most users. Those with a higher trust propensity and a spirit of innovation are more likely to establish initial trust. Therefore, we propose the following hypothesis: H6: Trust propensity positively influences users' initial trust in urban air taxi services.

7) Familiarity refers to the extent to which users are familiar with urban air mobility passenger services via social media, official websites, and word of mouth. Familiarity is particularly important in the trust research model and increases willingness to use [23] [24]. Therefore, we propose the following hypothesis: H7: Users' familiarity with urban air mobility passenger services positively influences initial trust.

8) Institutional Guarantee is a trust variable based on institutional factors. As an emerging technology in the transportation sector, urban air mobility passenger services face significant uncertainty. Users are more likely to trust urban air mobility passenger services if they are safe and secure. Therefore, the following hypothesis is proposed: H8: Institutional Guarantee positively influences users' initial trust in urban air mobility passenger services.

9) Subjective Norms refer to a user's perception of whether people who are important to them believe they should or should not use urban air mobility passenger services. Both [4] and [25] found that subjective norms strongly influence the intention to use urban air mobility, including direct and indirect influences. Additionally, [26] found that subjective norms influence trust. Therefore, the following hypotheses are proposed: H9: Subjective norms positively influence users' initial trust in urban air mobility passenger services. H10: Subjective norms positively influence users' intention to use urban air mobility passenger services.

10) Social Image is defined as the extent to which users perceive that using a specific information technology enhances their status within a social system. Due to the high operational costs and stringent regulatory requirements associated with urban air mobility passenger services, these services are positioned at the top of the market during their early development stages. This makes them a unique

and expensive premium mode of transportation. In such cases, social image also serves as an important factor influencing usage intent, a finding supported by the research of other scholars [8]-[27]. Therefore, the following hypothesis is proposed: H12: Social image positively influences users' willingness to use urban air transportation passenger services.

11) Perceived Enjoyment is defined as the pleasantness of using a specific system, regardless of performance consequences. According to a survey by [28], the positive impact of perceived enjoyment on usage attitudes has been confirmed. Therefore, the following hypothesis is proposed: H13: Users' perceived enjoyment of urban air transportation passenger services positively influences their usage attitudes.

12) Price Evaluation describes users' subjective assessment of the benefits of a service relative to its cost [29] [30] found that price is the most critical factor influencing the intention to use air taxis. Based on this finding, the following hypothesis is proposed: H14: Users' price evaluation of urban air transportation passenger services positively influences their attitude toward using them.

### 3. Data Acquisition

To ensure effective measurement of each latent variable, the design of the measurement scale drew on research findings regarding factors influencing usage intent in urban air mobility and autonomous vehicles. Mature measurement scales related to each latent variable in the theoretical model were identified, and certain measurement items were adjusted to better align with the operational context of urban air mobility passenger services, thereby enhancing the model's explanatory precision in the complex operational environment of such services. The correspondence between each latent variable and the measurement items is shown in **Table 1**.

**Table 1.** Measurement scales.

latent variables	Indicator coding	Measurement questions	Scale source
Perceived usefulness	PU1	Using UAM saves me time.	[4]
	PU2	Using UAM will make my travel more flexible and convenient.	
	PU3	Overall, I think using UAM is useful.	
Perceived safety risk	PSR1	I am afraid that the aircraft will malfunction when using UAM.	[19] [31]
	PSR2	I am concerned that external interference during the use of UAM may cause accidents.	
	PSR3	Overall, I believe UAM is dangerous.	
Trust propensity	TP1	Usually, I tend to trust people and things easily.	[32]
	TP2	I usually trust people unless they have deceived me.	
	TP3	Overall, I think people are trustworthy.	
Familiarity	FM1	I learned about UAM through the internet.	[5] [33]

**Continued**

	FM2	I learned about UAM through my daily social interactions.	
	FM3	Overall, I am quite familiar with UAM.	
Institutional guarantee	IG1	I believe that the policies and regulations introduced by the state can ensure the healthy development of this industry.	
	IG2	I believe that UAM operators can ensure safety.	[5] [34]
	IG3	I think the industry will establish clear accident handling and compensation policies.	
Subjective norms	SN1	The opinions of people who are important to me about UAM will influence my attitude toward UAM.	
	SN2	The opinions of people whose opinions I value will influence my attitude toward UAM.	[4] [5]
	SN3	If my family or friends are using UAM, I would be more willing to try it too.	
Initial trust	IT1	I believe UAM is reliable.	
	IT2	I don't feel nervous or anxious about using UAM.	[5]
	IT3	Overall, I believe that UAM is trustworthy.	
Social image	SI1	Using UAM can leave a good impression on others.	
	SI2	Using UAM allows me to gain the recognition of those around me.	[8] [27]
	SI3	Using UAM for transportation will bring me a certain amount of prestige.	
Perceived enjoyment	PJ1	I think using UAM will be enjoyable.	
	PJ2	I think using UAM would be fun.	[4]
	PJ3	I believe that using UAM will improve my quality of life.	
Price evaluation,	PE1	I think using UAM is a great value for money.	
	PE2	Objectively speaking, I think it is reasonable to spend more money to enjoy the benefits of UAM.	[4]
	PE3	Subjectively speaking, I think it is worth spending more money to enjoy the benefits of UAM.	
Usage attitude	UA1	I am positive about the use of UAM.	
	UA2	I think using UAM is a good idea.	[4] [6]
	UA3	I am optimistic that UAM will be quickly accepted by the market.	
Usage intention	UI1	I would like to experience UAM.	
	UI2	With the development of UAM, I would choose UAM as my mode of transportation.	[6] [34]
	UI3	As UAM develops, I will recommend my family and friends to use it.	

The survey questionnaire on factors influencing the willingness to use urban air transportation passenger services is divided into two parts: 1) basic information about the survey participants (including gender, age, education level, monthly income, main mode of transportation, etc.); 2) 33 indicator questions on 12 potential variables using a 5-point Likert scale, where “1 - 5 points” represent “strongly

disagree,” “somewhat disagree,” “neutral,” “somewhat agree,” and “strongly agree,” respectively.

This study uses a mixed-methods approach to improve the integrity of the sample structure. The primary method involves administering online surveys via digital platforms like Wenjuanxing, while adhering to the GB/T 43390-2023 guidelines for “Market, Public Opinion, and Social Surveys: Guidelines for Mobile Surveys.” The survey is divided into two phases: a pre-survey and a formal survey. The pre-survey distributed physical questionnaires in crowded areas, such as airports and train stations, yielding 75 responses. After cleaning the data, 63 valid responses were retained, all of which passed reliability and validity tests. Based on the results of the pre-survey and respondent feedback, the questionnaire was refined by optimizing the wording, streamlining redundant measurement items, and adjusting the page layout. This resulted in a finalized questionnaire. The formal survey was conducted from July to August 2024. It was distributed online and received a total of 311 responses from different cities across China. After cleaning the data, 30 invalid questionnaires were excluded, leaving 281 valid responses and resulting in a validity rate of 90.3%. As shown in **Table 2**, the sample demonstrated good population coverage, rich diversity, and strong representativeness, ensuring the broad applicability of the research results.

**Table 2.** Sample information.

project	Category	frequency	percentage	project	Category	frequency	percentage
gender	male	179	63.70	Monthly income	Below 4000	109	38.79
	female	102	36.30		4000 - 8000	37	13.17
age	under 18	1	0.36		8000 - 10,000	106	37.72
	18 - 25	137	48.75		10,000 - 20,000	19	6.76
	26 - 35	61	21.71		20,000 - 50,000	10	3.56
	36 - 45	47	16.73		Main modes of transportation	Walking	76
	46 - 55	28	9.96	bicycle, electric bike, or shared bike		27	9.61
55 and above	7	2.49	small car	61		21.71	
educational background	Junior high school and below	1	0.36	About traffic accidents	public transportation	81	28.83
	High school/vocational school	42	14.95		taxi	36	12.81
	Junior college	29	10.32		Never experienced	155	55.16
	Bachelor’s degree	153	54.45	Experienced it, but it had no impact.	67	23.84	
	Graduate degree and above		56	19.93	Having experienced it, it will reduce my trust.	59	21.00

## 4. Model Calculation and Analysis

### 4.1. Reliability and Validity Analysis

Before conducting structural equation and mediating effect analyses on the theoretical hypothesis model of willingness to use the urban air transportation passenger service that has been constructed, it is necessary to test the reliability and validity of the measured data to ensure that the data used for model validation is applicable.

This study utilized SPSS 27.0 to conduct reliability analysis and exploratory factor analysis (EFA) on the questionnaire data. The analysis results indicated that the overall Cronbach's  $\alpha$  coefficient for reliability analysis was 0.877, with Cronbach's  $\alpha$  coefficients for all dimensions exceeding 0.7 (see **Table 3**), indicating good reliability of the data across all dimensions. The overall KMO value for exploratory factor analysis was 0.819, and the approximate chi-square value for Bartlett's sphericity test was 5754.502, with degrees of freedom (df) of 630 and significance (Sig.) = 0.000 (highly significant), indicating that the data are suitable for factor analysis. Additionally, principal component analysis was conducted using the maximum variance orthogonal rotation method, yielding a factor loading matrix with 12 factors explaining 78.825% of the variance, exceeding 60%. All variables had loadings on the relevant factors that were significantly higher than the cross-loadings on other factors (see **Table 4**), indicating that the questionnaire design was effective and reasonable.

**Table 3.** Reliability and convergent validity tests.

latent variables	Question item coding	number of items	Cronbach's $\alpha$	Estimate	AVE	CR
Perceived usefulness	PU1	3	0.885	0.843	0.718	0.884
	PU2			0.818		
	PU3			0.880		
Perceived safety risk	PSR1	3	0.837	0.870	0.644	0.843
	PSR2			0.853		
	PSR3			0.669		
Trust propensity	TP1	3	0.822	0.804	0.610	0.824
	TP2			0.742		
	TP3			0.795		
Familiarity	FM1	3	0.831	0.758	0.624	0.832
	FM2			0.804		
	FM3			0.806		
Institutional guarantee	IG1	3	0.908	0.912	0.773	0.910
	IG2			0.803		
	IG3			0.917		

**Continued**

Subjective norms	SN1			0.668		
	SN2	3	0.794	0.842	0.571	0.798
	SN3			0.747		
Initial trust	IT1			0.879		
	IT2	3	0.866	0.794	0.689	0.869
	IT3			0.814		
Social image	SI1			0.755		
	SI2	3	0.770	0.742	0.531	0.773
	SI3			0.688		
Perceived enjoyment	PJ1			0.898		
	PJ2	3	0.877	0.775	0.709	0.879
	PJ3			0.848		
Price evaluation	PE1			0.819		
	PE2	3	0.830	0.797	0.621	0.831
	PE3			0.747		
Usage attitude	UA1			0.897		
	UA2	3	0.882	0.913	0.727	0.888
	UA3			0.737		
Usage intention	UI1			0.816		
	UI2	3	0.855	0.798	0.663	0.855
	UI3			0.829		

**Table 4.** Rotated factor loading matrix.

factor	1	2	3	4	5	6	7	8	9	10	11	12
IG3	0.896											
IG1	0.881											
IG2	0.869											
UA1		0.885										
UA3		0.847										
UA2		0.834										
PU1			0.872									
PU2			0.853									
PU3			0.785									
PJ2				0.848								
PJ1				0.844								
PJ3				0.827								
UI2					0.822							

**Continued**

UI3	0.813		
UI1	0.802		
PSR2	0.882		
PSR1	0.859		
PSR3	0.795		
FM3	0.867		
FM2	0.851		
FM1	0.822		
IT3	0.810		
IT1	0.789		
IT2	0.760		
PE3	0.830		
PE1	0.816		
PE2	0.790		
TP3	0.855		
TP2	0.823		
TP1	0.805		
SN2	0.847		
SN1	0.812		
SN3	0.778		
SI2	0.807		
SI1	0.803		
SI3	0.653		

To further verify whether the factor loadings of each observed variable in the exploratory factor analysis results are significant in the structural equation model, and to examine the reliability and validity of the measurement model of latent variables, this study conducted confirmatory factor analysis using Amos 24.0, including structural validity analysis, convergent validity analysis, and discriminant validity analysis. As shown in **Table 5**, the model has good structural validity, with all indicators within the ideal range. The indicators for convergent validity include standardized regression coefficients, AVE, and CR, with critical standards of greater than 0.5, 0.5, and 0.7, respectively. As shown in **Table 3**, all indicators meet the standards. Distinctive validity of the measurement model was tested by comparing the correlation coefficients of variables with the square root of the average extracted variance (AVE). The results are shown in **Table 6**, where the absolute values of correlation coefficients are all less than 0.5, and the square roots of AVE are all greater than the correlation coefficients between factors, indicating that the measurement model has good distinctive validity.

**Table 5.** Structural validity test.

indicator	Applicable standards or thresholds	Model validation data	Compatibility assessment
CMIN/DF	<3	1.478	Yes
RMSEA	<0.05 Excellent, <0.08 Good	0.042	Yes
GFI	>0.9 Excellent, >0.7 Good	0.866	acceptable
CFI	>0.9	0.952	Yes
IFI	>0.9	0.953	Yes
TLI	>0.9	0.943	Yes

**Table 6.** Discrimination validity test.

	IT	SI	PJ	PE	UA	SN	IG	FM	TP	PSR	PU	UI
IT	0.689											
SI	0.295**	0.531										
PJ	0.413**	0.408**	0.709									
PE	0.425**	0.409**	0.426**	0.621								
UA	0.455**	0.120	0.090	0.157**	0.727							
SN	0.272**	0.363**	0.278**	0.291**	0.027	0.571						
IG	0.390**	0.208**	0.360**	0.238**	0.099	0.340**	0.773					
FM	0.253**	0.224**	0.086	0.168**	0.002	0.119	0.103	0.624				
TP	0.072	0.369**	0.213**	0.085	-0.085	0.203**	0.137**	0.236**	0.610			
PSR	-0.146**	0.183**	0.205**	-0.067	-0.018	0.076	0.162**	-0.111	0.289**	0.644		
PU	0.452**	0.310**	0.322**	0.307**	0.507**	0.168**	0.299**	0.113	0.127	-0.009	0.718	
UI	0.437**	0.490**	0.383**	0.356**	0.317**	0.326**	0.226**	0.032	0.328**	-0.005	0.429**	0.663
AVE square root	0.830	0.729	0.842	0.788	0.853	0.756	0.879	0.790	0.781	0.802	0.847	0.814

Note: \*\*\*indicates  $P < 0.001$ ; \*\*indicates  $P < 0.01$ ; \*indicates  $P < 0.05$ , and the same applies below.

## 4.2. Common Method Bias Test

To address the issue that cross-sectional survey research from a single source may result in inflated correlation coefficients for individual participants, leading to common method bias and affecting data quality and analysis results, this study employed a single-factor common method bias test. The results indicated poor model fit, with CMIN/DF = 7.363, RMSEA = 0.151, GFI = 0.493, CFI = 0.300, and IFI = 0.305. TLI = 0.258. Therefore, there is no severe common method bias issue.

## 4.3. Analysis Based on Structural Equation Modeling

Based on the validity and reliability tests and common method bias tests conducted earlier, the results demonstrate that the measurement model and sample

data are suitable for conducting structural equation modeling and mediation effect analysis to test theoretical hypotheses. Using Amos 24.0 statistical software, a structural equation model was constructed to examine the factors influencing the willingness to use urban air transportation passenger services. The “maximum likelihood estimation method” was employed to estimate the relevant parameters, analyze the model paths and interpretability of the research model, and verify the causal relationships among the latent variables through estimation and significance testing of the model path coefficients.

First, the model fit was assessed, and the results showed that all indicators met the fit criteria: CMIN/DF = 1.557, RMSEA = 0.045, GFI = 0.856, CFI = 0.944, IFI = 0.945, and TLI = 0.935. This indicates that the model fit is good. Further testing was conducted to verify the validity of the 12 hypothesized relationships among the latent variables proposed in this study. The path testing results are shown in **Table 7**. Among the 14 hypotheses, 11 met the significance criteria at different levels (C.R. absolute value greater than 1.96, P-value less than 0.05), indicating that the hypotheses are valid. Specific details are as follows:

1) Perceived Usefulness ( $\beta = 0.326^{***}$ ), Familiarity ( $\beta = 0.122^*$ ), Institutional Guarantee ( $\beta = 0.206^*$ ), Subjective Norms ( $\beta = 0.160^*$ ) all have a significant positive impact on initial trust. That is, when users perceive the usefulness of urban air transportation passenger services to be stronger, have higher levels of trust, have a deeper understanding of the service, perceive the industry to provide more comprehensive safeguards, and are more influenced by others' behavior and decision-making, their initial trust in the service will be higher. Perceived Safety Risk ( $\beta = -0.162^*$ ) have a significant negative impact on initial trust, meaning that the higher the perceived risk level, the lower the trust in urban air taxi services. However, trust propensity ( $P = 0.589$ ) does not significantly influence initial trust, possibly due to significant heterogeneity in trust propensity among survey participants, making it difficult for trust propensity to exhibit significant influence on initial trust at the overall level.

2) Perceived Usefulness ( $\beta = 0.421^{***}$ ) and Initial Trust ( $\beta = 0.364^{***}$ ) have a significant positive impact on attitude toward use, which is consistent with technological theory; Perceived enjoyment ( $\beta = -0.145$ ) has a significant negative impact on usage attitude, differing from the initial hypothesis, thus the hypothesis test results are not valid. This may be due to users balancing safety and enjoyment; even if urban air mobility has some appeal in terms of enjoyment, safety concerns may lead to a negative impact on usage attitude; Price Evaluation ( $P = 0.520$ ) has no significant effect on usage attitude. This may be because urban air mobility is currently in its early stages of development, and users lack sufficient information about its pricing, making it difficult for them to form an opinion.

3) Usage Attitude ( $\beta = 0.170^*$ ), Perceived Usefulness ( $\beta = 0.231^{**}$ ), Subjective Norms ( $\beta = 0.219^*$ ), and Social Image ( $\beta = 0.480^{***}$ ) all have a significant positive impact on usage intention and are key factors influencing users' continued usage intention.

**Table 7.** Hypothesis test results.

Assumption	path	non-standard coefficient	standardization coefficient	S.E.	C.R.	P	significance test	Hypothesis testing results
H1	Usage attitude→ Usage intention	0.170	0.162	0.072	2.368	*	significant	Establishment
H2	Perceived usefulness → Usage attitude	0.421	0.419	0.072	5.816	***	significant	Establishment
H3	Perceived usefulness → Usage intention	0.231	0.219	0.079	2.932	**	significant	Establishment
H4	Perceived usefulness → Initial trust	0.326	0.360	0.057	5.691	***	significant	Establishment
H5	Perceived safety risk→ Initial trust	-0.162	-0.160	0.066	-2.453	*	significant	Establishment
H6	Trust propensity→ Initial trust	-0.034	-0.037	0.063	-0.540	0.589	Not significant	Establishment
H7	Familiarity→ Initial trust	0.122	0.163	0.048	2.548	*	significant	Establishment
H8	Institutional guarantee→ Initial trust	0.206	0.245	0.054	3.784	*	significant	Establishment
H9	Subjective norms→ Initial trust	0.160	0.146	0.073	2.193	*	significant	Establishment
H10	Subjective norms→ Usage intention	0.219	0.172	0.087	2.523	*	significant	Establishment
H11	Initial trust→ Usage attitude	0.364	0.328	0.075	4.824	***	significant	Establishment
H12	Social image→ Usage intention	0.480	0.357	0.103	4.684	***	significant	Establishment
H13	Perceived enjoyment → Usage attitude	-0.145	-0.160	0.060	-2.422	*	significant	Not Establishment
H14	Price evaluation→ Usage attitude	-0.047	-0.044	0.073	-0.644	0.520	Not significant	Not Establishment

#### 4.4. Testing for Mediating Effects

Structural equation modeling analysis can only test the direct effects between latent variables, while mediation effect analysis can delve deeper into the indirect effects between latent variables, providing a comprehensive analysis of the mechanisms by which different variables influence usage intent. This study employed Bootstrap testing with 2000 repeated samples, a confidence level of 95%, and a confidence interval of 95%. If the confidence interval does not include 0, the mediation effect is significant. The test results are shown in **Table 8**.

The results indicate that in the relationship between trust propensity and usage intention, the mediating effects of initial trust and usage attitude are not significant; similarly, in the relationship between perceived enjoyment, price evaluation, and usage intention, usage attitude also fails to produce a significant mediating

**Table 8.** Testing for mediating effects.

path	effect value	SE	Bias-corrected 95% CI			mediation effect
			Lower	Upper	P	
PU-UI	0.231	0.092	0.056	0.420	**	support
PU-UA-UI	0.072	0.034	0.019	0.157	**	support
PU-IT-UA-UI	0.020	0.011	0.005	0.050	**	support
IT-UA-UI	0.062	0.033	0.014	0.150	*	support
PSR-IT-UA-UI	-0.010	0.007	-0.031	-0.001	*	support
TP-IT-UA-UI	-0.002	0.005	-0.016	0.005	*	Not support
FM-IT-UA-UI	0.008	0.005	0.001	0.025	*	support
IG-IT-UA-UI	0.013	0.008	0.003	0.034	**	support
SN-UI	0.219	0.097	0.028	0.419	*	support
SN-IT-UA-UI	0.010	0.008	0.001	0.035	*	support
PJ-UA-UI	-0.025	0.015	-0.066	-0.004	*	Not support
PE-UA-UI	-0.008	0.015	-0.057	0.013	*	Not support
SI-UI	0.480	0.121	0.238	0.717	**	support

effect. These results align with the findings of the structural equation model analysis, which indicated that there were no significant correlations between trust propensity and initial trust, perceived enjoyment and usage attitude, or price evaluation and usage attitude. Therefore, the mediating variables could not produce significant mediating effects. In the relationships between other variables and usage intention, the mediating effects were all significant.

## 5. Conclusions and Recommendations

### 5.1. Conclusions

The questionnaire data were analyzed using structural equation modeling and mediation effect testing to identify the intrinsic mechanisms of interaction between the various influencing factors and willingness to use. The results of the study indicate that:

1) Perceived usefulness has a positive impact on willingness to use and initial trust. If users believe that urban air transportation passenger services can reduce travel time, improve travel efficiency, lower relative costs, and provide door-to-door service or reduce the number of transfers, they are more likely to choose this mode of transportation and develop trust in it.

2) Initial trust plays a significant role in shaping willingness to use urban air mobility passenger services. Perceived usefulness, perceived safety risks, subjective norms, familiarity, and institutional guarantee all have a significant impact on initial trust, which in turn indirectly influences travelers' willingness to use urban air mobility passenger services.

3) Institutional guarantees have a significant positive impact on initial trust and

indirectly influence willingness to use the service through initial trust and attitude toward use. As an emerging mode of transportation, urban air transportation passenger services require policy support during the initial promotion phase to enhance public awareness and acceptance. At the same time, addressing uncertainties in service pricing and insurance mechanisms through policy regulation can help enhance service reliability and user trust.

4) Familiarity has a significant positive impact on initial trust and indirectly influences willingness to use through initial trust and attitude toward use. Familiarity can reduce fear and uncertainty about new technologies. As information about urban air transportation passenger services becomes more widespread, travelers' understanding of this mode of transportation increases, thereby improving acceptance.

5) Perceived safety risks have a significant negative impact on initial trust and indirectly influence willingness to use through initial trust and attitude toward use. As an emerging technology, travelers are cautious about the performance and reliability of urban air transportation passenger services, possibly due to a lack of understanding of urban air transportation technology and operational processes, which may cause anxiety. This information asymmetry increases perceived risk.

6) Subjective norms have a positive impact on usage intention and initial trust. If users believe that using urban air transportation passenger services is socially acceptable and encouraged, they are more likely to try it. The attitudes and behaviors of friends and family have a significant impact on an individual's usage intention, and positive feedback from the group can promote usage intention.

7) Among external variables, the social image of Chinese culture can positively influence willingness to use advanced transportation methods, which are seen as symbols of status and image. This sense of face can drive travelers to choose urban air transportation passenger services to enhance their personal social status.

## 5.2. Research Limitations and Future Directions

This study has several limitations. First, the data were obtained from a sample of volunteers within China, which may limit the cultural generalizability of the study findings. Second, the use of an online questionnaire may have introduced self-selection bias, as individuals with strong interests or opinions regarding urban air mobility may have been more likely to participate in the survey, potentially failing to fully represent the views of a broader population. Future research could include samples from more diverse cultural backgrounds for cross-cultural comparisons and employ more randomized sampling methods to mitigate self-selection bias, thereby validating and expanding upon the findings of this study.

## 5.3. Recommendations

According to an analysis of factors influencing the willingness to use urban air mobility (UAM) services, the development of UAM in China requires not only increased publicity to raise public awareness of UAM, but also the establishment

of an effective low-altitude flight safety system to enhance public acceptance of UAM.

1) Improve the policy and regulatory framework. Accelerate the improvement of the low-altitude policy and regulatory framework to adapt to new demands and technological developments. Specifically, accelerate the construction of an intelligent regulatory framework that aligns with the characteristics of the new low-altitude economy, and change the current practice of using the civil aviation regulatory system for low-altitude flight approvals to address future scenarios involving large-scale, high-density urban air traffic. Relevant agencies should accelerate the formulation of standards for liability in urban air traffic accidents to alleviate users' concerns about legal risks associated with urban air traffic.

2) Strengthen publicity efforts for urban air transportation. Relevant departments should intensify publicity efforts for urban air transportation, disseminate related information, and enhance public awareness. Offline experiential activities such as free test drives can be organized to allow the public to gain firsthand experience and understanding of urban air transportation. Regarding the potential variable of social image, a social image rooted in Chinese cultural characteristics can positively influence usage intent. Operators should emphasize in their product promotions that using urban air mobility can serve as a potential strategy to help users gain recognition and status within their social circles. By leveraging this sense of prestige, travelers may choose urban air mobility to enhance their personal social standing, thereby further strengthening their willingness to use the service.

3) Perceived safety risks have a significant negative impact on initial trust and indirectly influence usage intent through the relationship between initial trust and usage attitude. This indicates that reducing perceived safety risks is critical to enhancing usage intent. The operational safety level of UAM is a key constraint on industry development. To ensure safe and stable operations, it is necessary to establish a safety operation system adapted to urban scenarios, promoting the evolution of safety mechanisms from low-density, isolated environments with manual "air-ground" safety chains and human-machine decision-making toward "air-ground-air" collaboration and the autonomous generation of multi-type safety chains. This will enable the intelligentization of equipment, comprehensive enhancement of service capabilities, and maturation of the technical system, supporting large-scale applications in high-density, high-complexity operational scenarios under integrated airspace, and ensuring the safe and healthy development of the UAM industry.

4) Establish a low-altitude air traffic management system. An efficient low-altitude air traffic management system means shorter flight times, fewer control delays, and more reasonable air traffic flow distribution, which can enhance the public's perception of the usefulness of urban air traffic. It is recommended to strengthen low-altitude airspace planning and resource management, introduce advanced communication, navigation, and surveillance technologies, establish an advanced

flight scheduling system, enhance the operational efficiency and reliability of urban air traffic, strengthen travelers' perception of its usefulness, and thereby promote increased willingness to use it.

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### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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