

Research on the Promotion of Trust-Based Property Management Model and Residents' Acceptance Intention: Based on Structural Equation Model and Grey Relational Analysis

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Abstract. Based on the Unified Theory of Acceptance and Use of Technology (UTAUT), this study constructs a multivariate structural equation model, incorporating "community environment", "effort expectancy", and "facilitating conditions" into the core variable system. Combined with the grey relational analysis model, it explores the influencing mechanism of community residents' acceptance of the trust-based property management model. A total of 752 valid questionnaire samples used in the study have passed reliability and validity tests, meeting the data quality standards for empirical research. The results show that: social influence can significantly improve the social cognition of the trust-based property management model and exert a direct positive impact on residents' acceptance intention; effort expectancy and facilitating conditions play a promoting role through indirect transmission paths, constituting the core improvement directions for optimizing the trust-based model. This study provides theoretical basis and practical guidance for the optimization and upgrading of the trust-based property management model, the effective stimulation of community residents' participation enthusiasm, and the construction of a community governance pattern featuring co-construction, sharing and co-governance.

Keywords: UTAUT, AMOS Structural Equation Modeling, Grey Relational Analysis, Community Governance.

1. Introduction

With the advancement of the new-type urbanization strategy, the process of urbanization in China has accelerated significantly. According to data released by the National Bureau of Statistics on January 17, 2025, China's permanent urban population stood at 943.5 million, with the urbanization rate reaching 67%. By the end of 2020, there were 244,000 registered and existing property service enterprises across the country, managing a total area of 33.08 billion square meters, covering nearly all fields of real estate management.

However, the traditional community governance model has also exposed many problems, such as uneven service quality, opaque financial information, low owner participation, and lack of supervision mechanisms. These issues have led to frequent property disputes. The 2023 China Property Management Market Report points out that approximately 70% of conflicts occur between property owners and property management companies.

This paper collects data through questionnaires, uses AMOS Structural Equation Model and Grey Relational Analysis, and focuses on improving residents' willingness to adopt the model. It explores the feasibility and advantages of the trust-based property management

model, providing theoretical support and practical suggestions for the optimization and promotion of this model.

2. Literature Review

At the current stage, a large number of scholars have conducted extensive discussions on the trending topic of innovation and optimization of property management models. Sun [1] discussed in detail the conceptual care and institutional design of the trust-based property management model, and on the basis of this concept, innovatively introduced Party building leadership as a multi-stakeholder force to further enhance its adaptability and feasibility. Ye [2] summarized the main problems existing in communities, analyzed the causes of property management conflicts under different stages and relationships among multiple stakeholders, and categorized property management models into four types. Zhang [3] focused on the tense trust relationships caused by low transparency in property management, proposed the adoption of trust-based management methods, and ultimately constructed a "decentralized" property management model for residential communities. From

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three perspectives—fiduciary emotion, digital technology and collaborative networks—Zhang [4] constructed and interpreted a triangular logical framework that explains the underlying logic of trust-based property management. Based on the shortcomings of traditional community governance in stimulating public participation and promoting government responsiveness, Jin [5] explored the implementation path of the digital community governance model through big data from government service hotlines, promoting the transformation of community governance models toward digitalization. Wang [6] based on the development status of Beijing's property management industry, analyzed the problems encountered in the "intelligent" development of Beijing's property management industry from three dimensions: opportunities, relevant policies, and the five competitive forces, and put forward corresponding countermeasures and measures. Zhang [7] conducted a dual investigation into the evolution process of property management models from both macro and micro perspectives, and explored the adaptability and limitations of different models by analyzing specific cases. By analyzing the property management evolution history of a courtyard community in Chengdu, Yang [8] provided a brand-new theoretical plan for the renovation of old residential communities based on the trust-based model. From the unique perspective of policy implementation, Wu [9] discussed how to effectively promote the implementation of policies related to trust-based property management, thereby enhancing the public's acceptance and recognition of this new property management model. Liu [10] elaborated on the necessity of government involvement in community property management from the aspects of the construction of the property management market, community self-governance, and community public services, and put forward a series of feasible paths.

In conclusion, current research mainly focuses on the renovation of old communities, government supervision and guidance, the construction of information-based and intelligent property management platforms, as well as the preliminary elaboration and exploration of the concept of trust-based property management. However, it neglects the promotion and implementation of new property management models. With the core goal of improving residents' willingness to adopt the model, this paper further enhances the feasibility of implementing the trust-based property management model.

3. Sampling and Questionnaire Survey

To investigate residents' acceptance of the trust-based property management model, this study adopted a

questionnaire survey approach, targeting long-term resident homeowners in Wuhan. To ensure data objectivity, authenticity, and survey feasibility, the research scope was finally determined to seven districts of Wuhan—Qingshan District, Hongshan District, Wuchang District, Qiaokou District, Jiangxia District, Hanyang District, and Caidian District—based on the economic development level and main functional positioning of each administrative region.

In terms of sampling method, a three-stage sampling technique was employed. Stage 1 adopted stratified sampling: Wuhan's administrative regions were divided into seven strata (i.e., the aforementioned seven districts) according to their economic development level and main functional positioning.

Stage 2 combined cluster sampling and proportional sampling. The number of sub-districts (towns) selected from each district was determined based on the proportion of the district's population to Wuhan's total population. A total of 20 sub-districts were chosen as clusters across the seven strata, with 2, 4, 4, 2, 3, 3, and 2 clusters sampled from Qingshan, Hongshan, Wuchang, Qiaokou, Jiangxia, Hanyang, and Caidian Districts, respectively.

Stage 3 used simple random sampling: 38 residents from the communities under each of the 20 selected sub-districts were randomly surveyed.

To ensure questionnaire quality, the collected data were sorted and invalid questionnaires were excluded. Valid questionnaire data were imported into SPSS software, followed by verification and random sampling checks—each check covering approximately 10%-15% of the total valid samples. Discrepancies between questionnaire results and software data were corrected, and repeated checks were conducted until full consistency was achieved. Ultimately, 950 questionnaires were distributed, 891 were retrieved, and 752 were valid, resulting in an effective response rate of 84.39% with comprehensive coverage.

4. Empirical Analysis

4.1 Descriptive Statistics

Below are the descriptive statistical results of the questionnaire scale items. The mean values of all indicators range from 3.6 to 3.7, indicating that the attitudes of respondents towards the trust-based property management model generally show a positive tendency. The variances are between 1.5 and 1.7, suggesting that the questionnaire data distribution exhibits a certain degree of dispersion, reflecting individual differences among residents.

Table 1 Results of Descriptive Statistics

Indicator Name	Sample Size	Mean	Variance	Maximum	Minimum
Community Environment	752	3.6660	1.5649	1	5
Performance Expectancy	752	3.6642	1.6504	1	5
Effort Expectancy	752	3.6405	1.6450	1	5
Social Influence	752	3.6724	1.5366	1	5
Facilitating Conditions	752	3.6933	1.6025	1	5
Behavioral Intention	752	3.6400	1.5540	1	5

4.2 Reliability and Validity Tests

To assess the quality of the questionnaire, this study employs Cronbach's α coefficient to test the internal consistency of the scale. The results of reliability analysis indicate that the overall Cronbach's α coefficient of the questionnaire is 0.902. In line with the evaluation criteria

proposed by Hair (2017), this demonstrates that the overall internal consistency of the scale is at an excellent level. Additionally, the Cronbach's α coefficient of each dimension exceeds the threshold value of 0.7, meeting the basic requirements for scale reliability in academic research. The scale thus exhibits high reliability and stability, and is suitable for subsequent empirical analysis.

Table 2 Questionnaire Reliability

Indicator Name	Cronbach's α	Item Count	Reliability Evaluation
Community Environment	.865	5	Good
Performance Expectancy	.835	4	Good
Effort Expectancy	.801	3	Good
Social Influence	.788	3	Acceptable
Facilitating Conditions	.841	3	Good
Behavioral Intention	.848	3	Good

In academic research, exploratory factor analysis (EFA) is commonly employed to test the construct validity of questionnaire data. Prior to factor analysis, the Kaiser-Meyer-Olkin (KMO) sampling adequacy test and Bartlett's test of sphericity are conducted to assess the suitability of the questionnaire data for such analysis. The results indicate that all KMO values of the indicators in

this study exceed 0.7, demonstrating a high level of validity for factor analysis. Furthermore, the p-values of Bartlett's test are all 0.000, which is far less than 0.05, indicating that the selected variables are suitable for factor analysis.

Table 3 Questionnaire Validity

Indicator Name	KMO	Validity Evaluation	Bartlett's Test		
			Approximate Chi-Square	Degrees of Freedom	Significance
Community Environment	.877	Relatively Suitable	1591.067	10	.000
Performance Expectancy	.810	Relatively Suitable	1111.689	6	.000
Effort Expectancy	.712	Acceptable	705.164	6	.000
Social Influence	.708	Acceptable	684.992	10	.000
Facilitating Conditions	.700	Acceptable	613.764	3	.000
Behavioral Intention	.705	Acceptable	628.670	3	.000

5. Model Introduction

5.1 UTAUT Model

The Unified Theory of Acceptance and Use of Technology (UTAUT) was proposed by Venkatesh, Morris et al. (2003) based on a systematic review of previous years' Technology Acceptance Model (TAM)-related studies, aiming to explore the "cognitive factors influencing users' acceptance of technology". Its core lies in proposing that users' adoption of new technologies is affected by four key constructs: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. Among these, Performance Expectancy, Effort Expectancy, and Social Influence exert a direct impact on users' behavioral intention; while behavioral intention and Facilitating Conditions jointly determine users' actual usage behavior. Additionally, gender, age, voluntariness of use, and experience exert a moderating effect on the relationships between behavioral intention and usage behavior. This model provides theoretical support for researchers to better understand users' technology acceptance and usage behaviors, thereby facilitating technology design and accelerating its promotion.

5.2 AMOS Structural Equation Model

The AMOS-based Structural Equation Model (SEM) is a multivariate statistical analysis method with the covariance matrix of variables as its core analytical framework. As a key tool for handling complex data relationships, its core mechanism lies in the indirect measurement of abstract latent constructs through quantifiable observed variables. The model consists of two fundamental components: the measurement model and the structural model. The former establishes the connections between observed indicators and latent variables, while the latter depicts the causal relationship network among latent variables. The specific model is presented as follows:

$$X = \Lambda_X \xi + \sigma \quad (1)$$

$$Y = \Lambda_Y \xi + \varepsilon \quad (2)$$

$$\eta = B\eta + \gamma\xi + \zeta \quad (3)$$

Among them, X and Y denote exogenous and endogenous latent variables, respectively; δ and ε represent the measurement error terms of X and Y; Λ_X and Λ_Y stand for the factor loading matrices. The third equation is the structural equation, where η denotes the endogenous latent variable and ξ denotes the exogenous latent variable; B and γ are the path coefficient matrices, and ζ is the error vector. This equation reflects the relationships between exogenous latent variables and endogenous latent variables.

Based on the aforementioned analytical framework, this study constructs a schematic diagram of the influence paths of initial variables and tests this diagram using the AMOS structural equation model, aiming to identify how

indicators affect the implementation of the trust mechanism and residents' acceptance intention.

5.3 Grey Relational Analysis

As the core analytical method of grey system theory, grey relational analysis (GRA) aims to quantify the correlation intensity between each influencing factor and the target variable within a system. The steps are as follows:

- 1) Determine the reference sequence and comparison objects

To explore the grey correlation between each indicator and usage intention, we take the most critical factor of usage intention as the reference sequence $X_0 = \{x_0(k) | k=1,2,\dots,n\}$, and 13 questions related to the indicators (covering 5 dimensions: performance expectation, effort expectation, facilitating conditions, social influence, and community environment) as the comparison sequences $X_i = \{X_i(k) | k=1,2,\dots,n, i=1,2,\dots,m\}$.

- 2) Perform dimensionless processing on the reference sequence and comparison sequences

Due to the different physical meanings of each indicator in the system, the dimensions of the data may not be consistent. Thus, it is necessary to conduct dimensionless data processing when performing grey relational analysis.

- 3) Calculate the grey relational coefficients between the reference sequence and comparison sequences

The grey relational coefficient $\xi(X_i)$ between each comparison sequence and the reference sequence at each moment (i.e., each point in the curve) can be calculated by the following formula: where ρ is the distinguishing coefficient, usually set to $\rho=0.5$, $\min(s)\min(t)|X_0(t)-X_s(t)|$ 、 $\max(s)\max(t)|X_0(t)-X_s(t)|$ represent the two-level minimum difference and two-level maximum difference, respectively.

$$\xi(X_i) = \frac{\min(s)\min(t)|X_0(t)-X_s(t)| + \rho \max(s)\max(t)|X_0(t)-X_s(t)|}{|X_0(k)-X_i(k)| + \rho \max(s)\max(t)|X_0(t)-X_s(t)|} \quad (4)$$

- 4) Calculate the grey relational degree

Concentrate the grey relational coefficients at each moment (i.e., each point in the curve) into a single value by taking their average, which serves as a quantitative expression of the correlation degree between the comparison sequence and the reference sequence. The formula for the relational degree r_i is as follows:

$$r_i = \frac{1}{N} \sum_{k=1}^1 \xi(X_i) \quad (5)$$

Model Results

Analysis of AMOS Structural Equation Model Results

To test the model's fit, this study employed multiple goodness-of-fit indices for evaluation, including absolute fit indices (CMIN/DF, GFI, AGFI, RMR, RMSEA), incremental fit indices (IFI, TLI, NFI, CFI), and parsimonious fit indices (PNFI, PCFI, PGFI). The fitting results show that CMIN/DF is 1.356, which meets the acceptable criterion of being less than 3; GFI (0.977), AGFI (0.969), IFI (0.995), TLI (0.993), NFI (0.980), and CFI (0.995) all exceed 0.9, reaching the good fit standard;

RMR (0.034) and RMSEA (0.021) also comply with the reference criteria; PNFI (0.771), PCFI (0.783), and PGFI (0.684) are all greater than 0.05, indicating a good balance between model complexity and fit. In summary, the model

meets high fitting standards across all indices and can effectively explain the structural relationships among variables.

Table 4 Goodness-of-Fit Results

Goodness-of-Fit Indices	Fit Referrnce Criteria		Fit Results
	Acceptable	Good	
Absolute Fit Indices	CMIN/DF	<3	1.356
	GFI	0.7-0.9	0.977
	AGFI	0.7-0.9	0.969
	RMR	<0.05	0.034
	RMSEA	<0.08	0.021
Incremental Fit Indices	IFI	>0.9	0.995
	TLI	>0.9	0.993
	NFI	>0.9	0.980
	CFI	>0.9	0.995
	PNFI	>0.05	0.771
Parsimonious Fit Indices	PCFI	>0.05	0.783
	PGFI	>0.05	0.684

It can be seen from the path coefficient table that social influence (standardized path coefficient = 0.694, $p < 0.1$) has a significant positive impact on residents' willingness to use, indicating that the positive guidance of social groups can enhance the acceptance of the promotion of this governance model. However, effort expectation (standardized path coefficient = 0.596) does not reach the significance level, which suggests that this path has no significant impact. From the perspective of the internal relationships among indicators, facilitating conditions (standardized path coefficient = 0.989, $p < 0.05$) are

conducive to improving residents' expectation level of this model, reflecting that the support from national policies and new technologies can indirectly affect the willingness to use; effort expectation (standardized path coefficient = 0.966, $p < 0.05$) also has a promoting effect on the implementation degree, indicating the important role of moderately lowering the threshold for residents to participate in community governance, attracting residents' participation, and building a community of co-construction, sharing, and co-governance in the promotion of new governance models.

Table 5 Standardized Path Coefficients

Path Relationship	Estimate	P-value	
Performance Expectation	Effort Expectation	0.959	**
Social Influence	Facilitating Conditions	0.967	**
Social Influence	Performance Expectation	0.563	0.35
Usage Intention	Social Influence	0.694	0.033
Usage Intention	Effort Expectation	0.596	0.474
Emotional Feedback	Performance Expectation	0.99	
Helpfulness Performance	Performance Expectation	0.964	**
Adaptability Effort Expectatoin	Effort Expectation	0.957	
Implementation Degree	Effort Expectation	0.966	**
Policy Promotion	Facilitating Conditions	0.963	
Management Service	Community Enviroment	0.969	
Cultural Environment	Community Enviroment	0.951	**
Infrastructure Community	Community Enviroment	0.984	**
Community Participation	Social Influence	0.989	
Ideological Perspective	Social Influence	0.954	**
Cognitive Environment	Social Influence	0.966	**
Personal Preference	Usage Intention	0.949	
Learning Intention	Usage Intention	0.967	**
Response Degree	Usage Intention	0.956	**
Technical Support	Facilitating Conditions	0.984	**
Future Expectation	Facilitating Conditions	0.976	**

5.4 Analysis of Grey Relational Analysis Results

Through grey relational analysis (GRA), the impact degree of each evaluation indicator on usage intention is

quantified and ranked based on the relational degree values. The larger the relational degree value, the stronger the correlation between the indicator and the reference sequence, and the more significant the corresponding evaluation result.

Table 6 Grey Relational Analysis Results

Evaluation Item	Indicating Dimension	Relational Degree	Rank
Cognitive Environment	Social Influence	0.923	1
Adaptability	Effort Expectation	0.918	2
Emotional Feedback	Performance Expectation	0.892	3
Ideological Perspective	Social Influence	0.892	4
Implementation Convenience	Effort Expectation	0.851	5
Technical Support	Facilitating Conditions	0.829	6
Helpfulness Performance	Performance Expectation	0.805	7
Future Expectation	Facilitating Conditions	0.793	8
Community Participation	Social Influence	0.772	9
Policy Promotion	Facilitating Conditions	0.764	10
Infrastructure	Community Environment	0.71	11
Cultural Environment	Community Environment	0.702	12
Social Environment	Community Environment	0.691	13

Although the overall results of this study are good, given the significant differences in the relational degrees among the evaluation indicators, the interpretation of the grey relational analysis results should prioritize identifying key influencing factors and conducting in-depth analysis. Due to the relatively large span between the evaluation indicators of the social influence dimension and those of other indicator domains, the analysis of social influence will focus on the cognitive environment and ideological perspective, while the community participation indicator with a relatively weak relational degree will be temporarily excluded.

Overall, the ranking of the influencing degrees of each indicator on usage intention is: Social Influence > Effort Expectation > Performance Expectation > Facilitating Conditions > Community Environment.

6. Conclusions and Recommendations

6.1 Conclusions

Through AMOS Structural Equation Model and Grey Relational Analysis, we found that the promotion effect of the trust-based property management model is closely related to social opinion orientation and public cognitive level. As core soft power factors influencing the model's dissemination, positive social opinions can reduce residents' cognitive barriers and trust risks toward the new model. Meanwhile, the cultivation of scientific and systematic public cognition helps residents gain a clearer understanding of the new model's advantages (such as transparent rights and responsibilities, and fund security). The synergistic effect of these two factors can significantly improve the efficiency and coverage of the model's promotion.

The external support system (e.g., the application of new technologies and the provision of new policies) can help residents establish positive future expectations, thereby

indirectly enhancing their acceptance of the trust-based property management model. The application of digital management technologies (e.g., smart community platforms) can optimize the efficiency of service responses, while policy support such as tax incentives and financial subsidies can reduce the model's operating costs. By strengthening residents' expectations regarding the model's sustainability and practicality, these external conditions are transformed into residents' active acceptance and recognition of the trust-based property management model.

Reasonably lowering the threshold for residents to participate in community governance helps stimulate residents' enthusiasm for participation, expand the scope of public participation, and facilitate the construction of a community characterized by joint construction, shared benefits, and co-governance. Reducing the participation threshold by simplifying participation procedures and establishing incentive mechanisms can effectively resolve the dilemma where residents "want to participate but find it difficult to do so," fully mobilize their enthusiasm for participation, and lay a solid public foundation for the long-term operation of the trust-based property management model.

6.2 Recommendations

Establish a multi-stakeholder collaborative public opinion guidance and cognitive cultivation system: Governments should take the lead in joining hands with mainstream media, communities, and industry associations to build an official information dissemination matrix, disseminate the core advantages of the model through various online and offline channels, and eliminate cognitive biases; leverage community education resources to conduct hierarchical and classified training, so as to strengthen the public's understanding of the model's operation mechanism and interest protection mechanism.

Strengthen the external support system: Promote the iteration and upgrading of smart community platforms, integrate technologies such as the Internet of Things (IoT) and big data to realize real-time disclosure and traceability of information; formulate targeted policies, including providing financial subsidies, tax reductions and exemptions for pilot communities, simplifying approval procedures, and establishing a dynamic evaluation and adjustment mechanism for policy implementation. Optimize the residents' participation mechanism: Construct multi-level and convenient participation channels and streamline participation processes; establish a long-term incentive mechanism combining material and spiritual rewards, improve the closed-loop mechanism for handling and responding to residents' opinions, and promote the formation of a new pattern of community governance featuring co-construction, shared benefits, and co-governance.

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