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Article

The impact of multilevel governance on urban public services—A perspective based on institutions, policies, and public participation

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Abstract: This academic paper explores the impact of multi-entity cooperation on the effectiveness of public service provision in China. It examines the social governance pattern proposed by the 19th National Congress of the CCP and the emphasis on co-building, co-governing, and sharing. The paper highlights the need for collaboration among various entities and the transition from sole government provision to improve urban public services. It aims to investigate the moderating effects of institutions, policies, and public participation. The study will involve quantitative and qualitative phases in three cities in Guangdong Province and target governmental departments, commercial organizations, non-profit social organizations, and local residents. The research aims to provide policy recommendations, innovate institutional policies, enhance public engagement, and improve multi-party cooperation and urban public services. It seeks to contribute practical models and measures for effective government public management and service implementation.

Keywords: China's development; social governance; public service; multi-entity cooperation; urban public services

1. Introduction

China's journey through developmental stages has culminated in an era characterized by the fusion of public ownership with market economics, fostering unprecedented economic vigor. However, this dynamism has not been without its challenges, particularly in the realm of urban public services, where traditional governance methods may no longer align with the complex demands of contemporary society.

In response to these evolving needs, the 19th National Congress of the Chinese Communist Party (CCP) introduced a paradigm shift in social governance, advocating for a model rooted in co-building, co-governing, and co-sharing. While these concepts serve as foundational principles, the crux of our inquiry lies in understanding the real-world implications of this framework within China's urban landscape. Specifically, we seek to elucidate the pressing issues confronting urban public services and the state of social governance, with a critical eye towards whether the existing toolkit of governance instruments is adequate or if a reconfiguration is necessary to enhance the delivery of public services.

The 20th National Congress further underscored the urgency of addressing the disparities between citizens' aspirations for improved living standards and the unevenness of development across the nation. In this context, the imperative to refine public services becomes paramount, not only to align with the aspirations of a

burgeoning middle class but also to sustain high-quality development and enrich the lived experiences of all urban dwellers. The emergence of "high-quality development cities" and "smart cities" in economically vibrant regions exemplifies the transformative potential of urban infrastructure and services. Yet, the efficacy of these initiatives hinges on the quality and accessibility of basic urban public services, which directly influence resident satisfaction, happiness, and the long-term viability of economic growth.

This study endeavors to dissect the intricate interplay between multiple stakeholders—including governmental bodies, private enterprises, non-profit organizations, and community members—in shaping the effectiveness of service provision. We posit that institutional frameworks, policy directives, and grassroots participation act as pivotal moderators in this dynamic. Through a mixed-methods approach, involving surveys and case studies across three cities in Guangdong Province, we aim to construct a comprehensive research model that not only illuminates the current state of urban public services but also offers actionable insights for policy refinement. Our ultimate goal is to contribute to the evolution of governance practices that foster greater collaboration among diverse actors, thereby elevating the standard of urban public services and providing a blueprint for effective public management in China's cities.

2. Literature review

2.1. Public service theory

Public service refers to collective choice behaviors that contribute to social cohesion and are regulated by the government. It includes various interpretations such as goods, interest, subject, value, content, and functional interpretations. Public services are divided into public administrative services and general basic public services in China, involving government, enterprises, social organizations, and citizens. Basic public services are essential for people's survival and development, determined by their sense of obtainment, happiness, and security. The government primarily provides these services but can involve market entities and social organizations. The scope of basic public services expands with socioeconomic development.

In the past, governments were the main providers of public services, but private sectors now play a more significant role. Outsourcing to private entities addresses challenges but may lead to free-riding behavior. Collaborative multi-party models have emerged, shifting from government-centric approaches to enhance service provision satisfaction. Third-party providers have emerged due to inefficiencies of sole government provision. Technological advancements and changing demands have led to interactive cooperation between providers and users, emphasizing service quality and effectiveness.

A service-oriented government focuses on serving citizens and community-centric ideals. It emphasizes publicness, responsiveness, responsibility, and participation. China introduced the concept in 2005 and has made progress through initiatives focused on streamlining administration, delegating power, improving services, and enhancing governance capacity. Public service provisions now involve

collaboration between providers and users, prioritizing service quality and effectiveness.

2.2. Administrative institutional theory

Administrative management systems establish agreements on administrative bodies, authority allocation, procedures, and working methods. Institutions stabilize interactions in an uncertain world. Local governments coordinate development through legislation, administration, and finance. Institutions and policies are distinct; policies become complete legal systems once issued. Administrative institutional innovation focuses on problem-oriented tasks and aims to equip institutions with the capacity to address similar problems continuously. Adjustments in institutions and policies aim to reform transaction costs and promote the development of public services. Proper handling of relationships between government, social organizations, businesses, and citizens is crucial for institutionalized governance. It transforms the institutional capacity of the governance system into effective power.

2.3. Public policy theory

Public policy is a large-scale plan containing goals, values, and strategies. It aims to solve public issues and safeguard public interests through government intervention. It involves selecting and distributing guidelines to guide industry development and address societal issues. Effectiveness refers to the actual performance of a system and its ability to satisfy the basic functions of the government and power groups. It measures the extent to which a system affects individual and collective behavior. Policy effectiveness is determined by its impact on the corresponding industry or sector, aligning with public objectives.

2.4. Theory of polycentric governance

Governance and government are distinct, with governance referring to effective management mechanisms and government to activities aligned with common goals. Public governance addresses deficiencies in government and market regulation of social affairs, advocating diverse public management entities with the government as meta-governor. Interpretations of governance encompass various management activities, such as minimal state, corporate, new public, good governance, social control systems, and self-organizing networks. Meta-governance theory emphasizes the government's role in multi-actor cooperation, involving the devolution of power and integration of resources, directions, and goals. It is a response to governance failures in hierarchical, market, and self-organizing governance.

2.5. Relationship governance theory

Relationship governance is a mechanism that uses trust, commitment, cooperation, and joint problem-solving to protect collaborative assets, maintain cooperative relationships, and regulate member behavior. It aims to coordinate member objectives through interpersonal relationships, trust, group identity, and reputation mechanisms.

2.6. Analysis of research status

Research on the impact of multiple governance on urban public services is a relatively new field. Existing studies focus on themes such as basic public services, economic development, and government effectiveness. Some explore market-oriented and social supply of public services, while others discuss the value and significance of diversified supply. However, there is a scarcity of research from the perspective of institutions and policies. This research holds contemporary practical significance and theoretical importance given China's development priorities and the need for high-quality public service management.

2.7. Hypotheses development

Based on the literature review, the following hypotheses are developed:

(1) Hypothesis 1: The interactive behavior of multiple entities has a positive impact on relationship quality.
   - Hypothesis 1a: Communication processes have a positive impact on relationship quality.
   - Hypothesis 1b: Reciprocal exchange has a positive impact on relationship quality.
   - Hypothesis 1c: Cooperative experiences have a positive impact on relationship quality.

(2) Hypothesis 2: Relationship quality has a positive impact on the quality of urban public services.
   - Hypothesis 2a: Cooperativeness has a positive impact on the quality of public services.
   - Hypothesis 2b: Adaptability has a positive impact on the quality of public services.

(3) Hypothesis 3: Interactive behavior has a positive impact on the effectiveness of urban public services.
   - Hypothesis 3a: Communication processes have a positive impact on the effectiveness of public services.
   - Hypothesis 3b: Reciprocal exchange has a positive impact on the effectiveness of public services.
   - Hypothesis 3c: Cooperative experiences have a positive impact on the effectiveness of public services.

(4) Hypothesis 4: Relationship quality serves as a mediator between interactive behavior and the effectiveness of public services.
   - Hypothesis 4a: Cooperativeness serves as a mediator between interactive behavior and the effectiveness of public services.
   - Hypothesis 4b: Adaptability serves as a mediator between interactive behavior and the effectiveness of public services.

(5) Hypothesis 5: The external environment regulates the relationship quality and effectiveness of public services among multiple entities.
   - Hypothesis 5a: Superior support regulates the relationship quality and effectiveness of public services.
   - Hypothesis 5b: Regulations and policies regulate the relationship quality

and effectiveness of public services.

- Hypothesis 5c: Public participation regulates the relationship quality and effectiveness of public services.

2.8. Definitions of relevant concepts

- Public Service: Provision of goods or services by the government to meet the basic needs of citizens.
- Theory of Public Governance: Advocates for a public action system with diverse management entities, with the government playing a role of "meta-governance."
- Institution: Normative provisions regarding administrative powers, operational procedures, and working methods of state administrative organs.
- Public Policy: Government intervention in various fields, involving the formulation of guidelines and behaviors based on social development requirements.
- Effectiveness of Public Services: The extent to which services satisfy the needs of recipients, including explicit and implicit demands.
- Interactive Behavior: Mutual responses and interactions among multiple entities participating in the provision of public services.
- Relationship Quality: The cooperative nature and depth of the relationship among entities participating in public service provision.
- External Environment: External factors influencing the production and supply of public services through multi-entity cooperation.

3. Research methodology

This chapter consists primarily of research content, research methods, and research design. It mainly describes the selection of research subjects, specific methods of research methods, specific steps of the research process, and focuses on elaborating the dimensions of research variables, as well as the content and sources of measurement variables and observational variables. Additionally, it provides detailed discussions on the adaptation of scales for moderating variables.

3.1. Research content

To improve the effectiveness of urban public services, this study focuses on institutional reforms, policy formulation, and policy adjustments. Three cities in Guangdong Province, including two with populations over 10 million and one known for China's reform and opening-up policy, will be selected. The quantitative study will include 450 randomly selected samples, while the qualitative study will involve 65 samples. In-depth interviews will be conducted with approximately 50 individuals from various urban sectors, including government, social organizations, market organizations, educational organizations, and research institutes. Focus group interviews will be conducted if feasible. The sample selection will be based on occupation, position, and representativeness. Additionally, approximately 450 interview samples will be selected for questionnaire interviews, primarily based on industry and age.

3.2. Research methods

The qualitative research utilized literature review and in-depth interviews. In-depth interviews involved approximately 35 participants from various sectors, selected based on their positions, representativeness, and professional backgrounds. Focus group interviews were also conducted. Data collection and theory extraction were conducted iteratively, with two rounds of individual interviews and adjustments to theoretical categories based on new findings. For the quantitative research, a questionnaire survey method was primarily used. Cluster sampling and stratified sampling were employed for sample selection. The southern coastal area of China was divided into three categories based on economic development, and one city was selected from each category for cluster sampling. Stratified sampling was used to select a certain number of participants from each stratum. The research subjects included government employees, industry representatives, social organization staff, and individual citizens. Approximately 25–28 samples were selected from each stratum for questionnaire distribution.

3.3. The establishment of theoretical model

Carry out qualitative research by conducting extensive literature reading and drafting open-ended interview guidelines. The guidelines cover topics such as communication between the government and various entities in public service projects, cooperation among different entities, methods to deepen cooperation, challenges faced by entities participating in public services, and the effectiveness of government measures. Determine the research model variables and moderating variables, adapting the measurement scale of the external environment. The sources of factors and indicators for each variable will be identified.

3.3.1. Setting of variables

The variable setting in this study is proposed according to the existing literature research basis (as shown in **Table 1**).

Table 1. Review of variable setting research.

Variables	Measurement of unit of variable	Sources
1. Dependent variable- the effect of public services	Universal benefit, equalization, convenient	"Guidelines for Evaluation Models and Methods of Public Service Effects" GB/T 37229-2018. Published by the State Administration for Market Regulation and the National Standardization Management Committee
2. Independent variable- Interaction behavior	1. Communication process 2. Mutual exchange 3. Cooperation experience	Crosby, L. A., Evans, K. R., & Cowles, D. (1990). Relationship Quality in Services Selling: An Interpersonal Influence Perspective. Journal of Marketing, 54(3), 68–81. Gemuenden, H. G., & Lechler, T. (1997). Success factors of project management: the critical few—An empirical investigation. In: Innovation in Technology Management-The Key to Global Leadership. PICMET97: Portland International Conference on Management and Technology. IEEE. pp. 375-377. Su, Q., Song, Y., Li, Z., et al. (2008). The impact of supply chain relationship quality on cooperative strategy. Journal of Purchasing and Supply Management, 14(4), 263–272. Roberts, K., Varki, S., & Brodie, R. (2003). Measuring the quality of relationships in consumer services: an empirical study. European Journal of Marketing, 37(1/2), 169–196. Woo, K., & Ennew, C. T. (2004). Business-to-business relationship quality. European Journal of Marketing, 38(9/10), 1252–1271.

Table 1. (*Continued*).

Variables	Measurement of unit of variable	Sources
3. Intermediate variable-Relationship quality	1. Cooperativeness 2. Adaptability	Mulhern, F. J. (1999). Customer profitability analysis: Measurement, concentration, and research directions. Journal of Interactive Marketing, 13(1), 25-40. Blattberg and Deighton; Steuer; Cho and Leckenby; Andranovich G. (1995); Andranovich Johnson GJ, ets. (2006); Xue K., Huang J., Yu M. Y. (2012)
4. Regulatory variable-External environment	1. Superior support (Variable adaptation required) 2. Regulations	Mattessich, P., Monsey, B. R. (2007). Innovative Collaboration: What makes it work. Amherst H. Wilder Foundation. Agranoff, R., & McGuire, M. (2001). Big questions in public network management research. Journal of Public Administration Research and Theory, 11(3), 295-326. Goldsmith, S., & Eggers, W. D. (2005). Govern by Network: The New Shape of the Public Sector. Brookings Institution Press.

(1) Dependent variable—Effectiveness of public services;
(2) Independent variable—Interactive behavior;
(3) Mediating variable—Relationship quality;
(4) Moderating variable—External environment.

3.3.2. Observational variables for each variable

(1) Dependent variable:

Observational variables for public service effectiveness include wide coverage or adequate provision of basic public services, equalization, and convenience. Each variable has specific indicators:

A. Wide coverage or adequate provision of basic public services:
- Coverage rate of public service infrastructure
- Adequacy of public service personnel
- Supply-demand match of public services
- Satisfaction with universal public services

B. Equalization:
- Coverage rate of public service infrastructure
- Adequacy of public service personnel
- Supply-demand match of public services
- Satisfaction with universal public services

C. Convenience:
- Economic cost of obtaining public services
- Time cost of obtaining public services
- Convenience of obtaining public services
- Satisfaction with the convenience of public services

(2) Independent variable:

Interaction behavior. The observational variables for interaction behavior are based on the indicators in **Table 1** and include the following observational variables:
- CP1: We often communicate about our cooperation content.
- CP2: We can respond to their ideas and needs in a timely manner.
- CP3: The exchange of information between us is very sufficient.
- CP4: Our communication can effectively resolve conflicts.
- ME1: I obtained a lot of relevant resources and information.

- ME2: The resources and information obtained in the cooperation have helped me a lot. If a partner encounters difficulties, I am willing to provide help within his ability.
- ME3 and ME4: I am willing to share resources with my partners.
- CE1: We cooperate with each other more often and are relatively stable.
- CE2: We have had a more pleasant cooperation experience.
- CE3: We have achieved great collaboration.

(3) Mediating variable: Relationship quality.

Observational variables for relationship quality include effective conflict resolution, consideration of each other's interests, joint problem-solving, complementary resources, investment in cooperation, and active cooperation with partners.

(4) Moderating variable: External environment.

Observational variables for the external environment include clear definition of responsibilities, guarantee of rights and interests, protection of weaker parties' rights, sufficient financial support from superior departments, relatively sufficient policy support from superior departments (adaptation required), willingness of superior departments to understand needs and ideas, public enthusiasm for participation in public services, establishment of effective information channels, and maturity of community residents' autonomous organization.

3.3.3. Variable model diagram

Based on the theoretical analysis in section 2.8.2 and qualitative research, which includes extensive literature research and expert interviews, this paper presents the following variable model diagram:

This model examines the interactive behavior of collaborating entities as the independent variable, the relationship quality as the mediating variable between interactive behavior and public service effectiveness, and the external environment as the moderating variable. The study innovatively establishes a model equation (SEM) to analyze the mediating effects of relationship variables and the moderating effects of the external environment. The dependent variable is the quality of public services, as defined by the "Guidelines for the Evaluation Model and Methods of Public Service Effectiveness" published jointly by the State Administration for Market Regulation and the National Standardization Administration of China.

3.3.4. Theoretical foundation model of the relationships between variables.

Tang (2015) proposed a research model (**Figure 1**) with three independent variables (relationship variables, interactive behavior, and external environment) and one dependent variable (effectiveness of cooperative provision of public services). The dimensions for each variable were identified. Empirical data analysis revealed significant influence of the independent variables on the dependent variable.

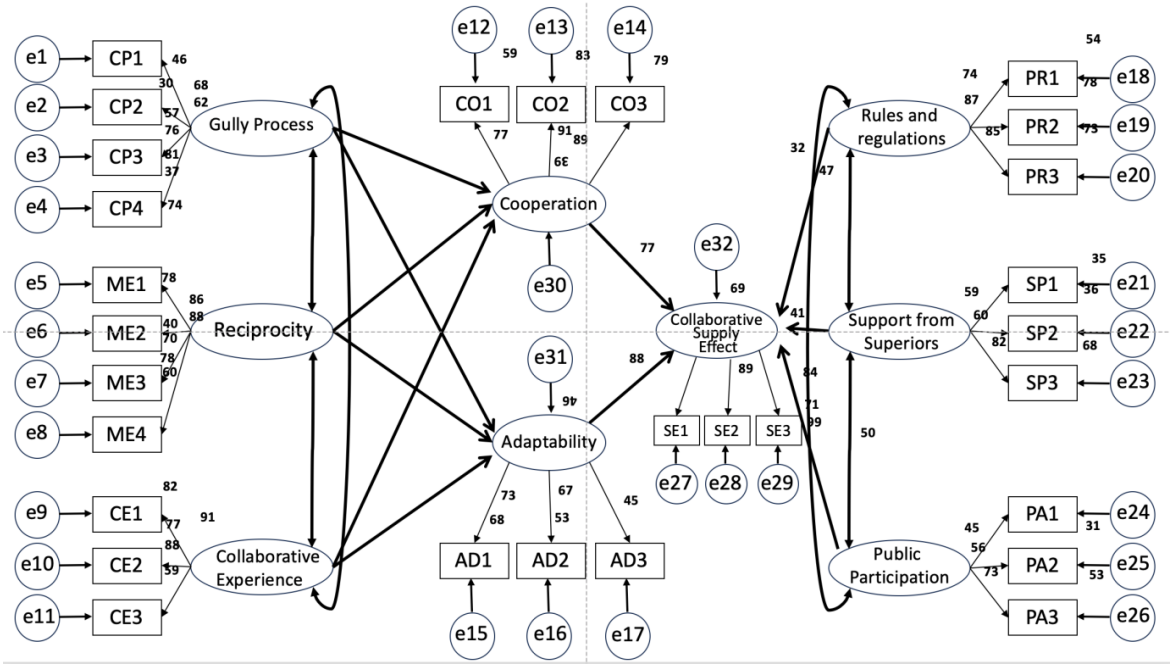

Figure 1. Research model with three independent variables and one dependent variable.

Source of Information: Tang Minzi's "Factors Influencing the Provision of Community Sports Public Services under Polycentric Governance: A Case Study of Luyang District, Hefei City."

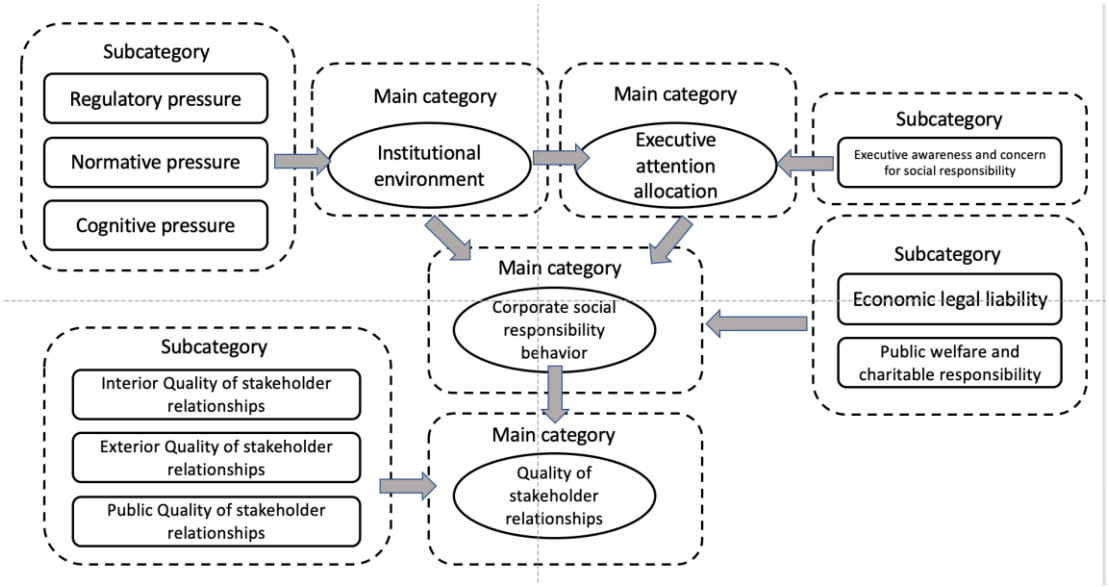

Figure 2. Theoretical foundation model diagram of examine the relationships between the variables.

Source of Information: Yu Fei's "Research on the Relationship between Institutional Environment, Corporate Social Responsibility Behavior, and Stakeholder Relationship Quality."

Figures 1 and **2** are theoretical foundation models that examine the relationships between the variables in this study. As shown in **Figure 3**, Tang Minzi verified the correlation between interactive behavior, relationship quality, and the effectiveness of public service provision. The external environment was identified as a moderating variable, and its correlation with relationship quality and the effectiveness of public service provision requires further investigation. The correlation between the external environment and relationship quality is an important innovation of this study. The observed variables for the external environment are institutional environment, policy,

and public participation. Previous research suggests theoretical correlations between public participation and relationship quality. Quantitatively verifying this relationship is an innovative aspect of this study.

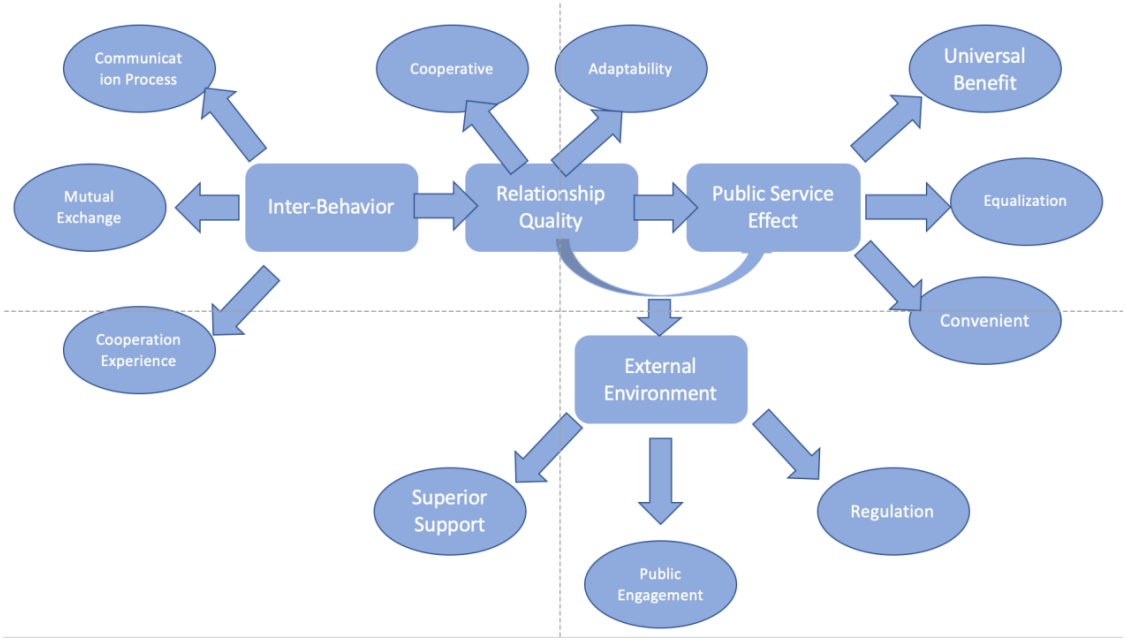

Figure 3. The correlation between interactive behavior, relationship quality, and the effectiveness of public service provision.

3.4. Questionnaire design

(1) Designing questionnaire items: The questionnaire items were designed based on mature scales for the independent variable, mediating variable, and dependent variable. However, for the moderating variable, changes were made to the scale and item design based on the needs of this research, as indicated in **Tables 2** and **3** using mature scales from the literature.

Table 2. Basic model of questionnaire.

Basic Models	Model Details
Economic Model	Productivity Model
Economic Model	Efficiency Model
Occupational Model	Peer Review Model
Effectiveness Model	Goal Achievement Model
Effectiveness Model	Side-effect Model
Effectiveness Model	Results-Without-Goals Model
Effectiveness Model	System Unit-Comprehensive Evaluation Model
Effectiveness Model	Customer-oriented Model
Effectiveness Model	Stakeholder Model

Table 3. Survey scale design.

Policy Process	Evaluation Criteria	Evaluation Focus
Policy formulation	Rationality	Whether policy goals can serve and promote the efficient operation of the innovation system Appropriateness of policy tools
Policy formulation	Coherence	Coherence between policy content Coherence between policy tools
Policy formulation	Feasibility	Feasibility of policy content (coordinated with national conditions and policy goals) Feasibility of policy implementation (including technological, political, economic, and financial feasibility)
Policy formulation	Coordination	Ensuring the financial, material, and personnel resources for policy implementation Government execution capacity (examination of implementing agencies, personnel, and execution mechanisms) Coordination and cooperation among policy entities at different levels and with different functions
Policy implementation	Systematicity	Whether effective interaction mechanisms are established among policy system elements (long-term promotion mechanisms, supervision mechanisms, information collection and feedback mechanisms)
Policy implementation	Responsiveness	Examination of stakeholders' reflections and feedback on policy implementation
Policy implementation	Adequacy	Examination of whether policies are sufficiently implemented
Policy implementation	Influence	Degree of alignment between innovative policy content and the innovation process Examination of public awareness of policies and their impact on society
Policy effects	Effectiveness (performance)	Measurement of the effectiveness of the operation of the innovation system Measurement of innovation capability
Policy effects	Efficiency	Comparative analysis and evaluation of policy inputs and outputs

Source: Zhao Xiaoli, "Research on Theoretical Methods for Evaluating Innovation Policies - Based on the Perspective of the Logical Framework of Public Policy Evaluation".

In order to adapt the moderating variable, the evaluation indicators of the external environment, the necessity of adapting the moderating variable evaluation indicators, the construction process of the adapted moderating variable evaluation system, and the results and verification of the adapted moderating variable evaluation system will be analyzed. In order to adapt the evaluation indicators of the moderating variable, Tang Minzi's observed variables for the external environment need clarification and refinement. The author proposes adapting the indicator systems of scholars Veton and Zhao Lixiao by conducting literature research and expert interviews. The construction process involves creating a short questionnaire with approximately 15 items using an expert panel and Analytic Hierarchy Process (AHP). Stratified sampling and statistical analysis methods like exploratory factor analysis are used. Results and verification are conducted through confirmatory factor analysis, revising the questionnaire, and conducting an overall model fit test. The fit indices of the confirmatory factor analysis model need to meet the test criteria to be used as measurement variables in the measurement model.

The designed questionnaire needs to be evaluated by experts in the relevant field. Brainstorming or anonymous evaluation methods can be used to collect opinions. Based on the collected opinions, modifications can be made to the questionnaire items. Then, a pilot test of the questionnaire can be conducted by distributing approximately twenty copies. The collected questionnaires can be analyzed to understand the distribution of answers and interviews can be conducted with the participants to gain insights into their responses and determine if there are any ambiguities or uncertainties in understanding the questionnaire items. Based on the issues identified during the pilot test, further adjustments can be made in a subsequent iteration.

3.5. Distribution of the questionnaire

Three cities in Guangdong Province, China will be selected: Guangzhou, the provincial capital; Dongguan, a new first-tier city in China; and Zhongshan, a city known for overseas Chinese settlements and reform and opening-up. These cities will serve as the research subjects for the survey.

In these three cities, the following groups will be selected: (1) typical government agencies or departments responsible for basic public services in the city, (2) business organizations or companies that have collaborated with these typical government agencies or departments in the past, currently, or will collaborate in the future, (3) social organizations (non-profit organizations) that have collaborated with these typical government agencies or departments in the past, currently, or will collaborate in the future, and (4) local residents.

Approximately 150 questionnaires will be distributed in each city, totaling 450 questionnaires.

3.6. Collection of questionnaires and data analysis

First, valid questionnaires will be selected based on criteria such as the number of unanswered questions, consistency of positive and negative items, uniformity of selected options, regular patterns in options, and non-multiple-choice questions. Next, the selected questionnaires will be entered into data analysis software. Structural equation modeling (SEM) using SPSS and Mplus 8.0 will be employed for hypothesis testing. This includes confirmatory factor analysis (CFA) to assess reliability and validity, structural model and fit testing, path analysis and regression analysis for direct and mediating effects, and use of PROCESS v3.5 for SPSS to analyze moderating variables and obtain influence coefficients. The contents of the questionnaire is presented in the Appendix.

4. Results

The descriptive analysis of the data collected by the questionnaire is shown in **Table 4**.

Table 4. The descriptive analysis of the data.

Descriptive statistics about the sample		**Percentage (%)**
Gender	male	51.8
	female	48.2
Age	<25	10.3
	26–35	22.6
	36–45	35.2
	46–55	22.8
	>55	9.1
Educational level	High school and below	26.3
	Bachelor degree	59.5
	Postgraduate degree	14.2

Before conducting exploratory factor analysis, the present study first performed KMO and Bartlett's test of sphericity on the total scale. The specific results are shown in the table below. The KMO coefficient is 0.821, and the significance coefficient of Bartlett's test of sphericity is 0.000, meeting the validity criteria. This indicates that the sample data is suitable for factor analysis.

Further exploratory factor analysis was conducted to test the construct validity. Following the default extraction criterion of principal component analysis, which considers eigenvalues greater than 1, the **Tables 5** and **6** shows that factor extraction was performed on the collected questionnaire data. A total of 3 common factors were extracted, with a cumulative variance contribution rate of 75.779%, surpassing the 60% threshold. This indicates a good level of explanatory power for the extracted factors, suggesting favorable factor effects.

Table 5. KMO and Bartlett's test of sphericity KMO measure of sampling adequacy.

Mean	**0.821**
Bartlett's Sphericity Test	
Approximate Chi-Square	672.628
DF (Degrees of Freedom)	78
Sig. (Significance)	0

Table 6. Explanation of total variance.

Component	**Initial Eigenvalue**	**Variance Percentage**	**Cumulative %**	**Extracted Loadings Sum**	**Variance Percentage**	**Cumulative %**
1	5.449	41.916	41.916	5.449	41.916	41.916
2	2.732	21.018	62.935	2.732	21.018	62.935
3	1.67	12.844	75.779	1.67	12.844	75.779
4	0.952	7.319	83.098			
5	0.479	3.684	86.782			
6	0.386	2.966	89.748			
7	0.299	2.303	92.051			
8	0.232	1.784	93.835			
9	0.209	1.609	95.444			
10	0.181	1.396	96.84			
11	0.17	1.308	98.149			
12	0.125	0.959	99.108			
13	0.116	0.892	100			

To establish the factor loading matrix, the correlation between the original variables and factors was reflected. An orthogonal rotation using the varimax method was performed to interpret and name each major factor accurately. The criterion for retaining or removing measurement items was based on the size of factor loading values. As shown in the **Table 7**, factor loading A13, which was less than 0.5, was removed from the established factor loading matrix. The items in the same column were grouped into the same category. The factor analysis yielded favorable results, with each indicator passing the KMO and Bartlett's test and explaining over 60% of

the variance in factor extraction. All factor loadings were above 0.5, indicating distinct dimensionality and item consistency within the same dimension. These results met the requirements, demonstrating good data validity.

Table 7. Orthogonal rotated component matrix of the scale.

Item	1	2	3
A1	0.166	0.902	0.015
A2	0.228	0.881	0.209
A3	0.126	0.91	0.1
A4	−0.052	0.061	0.866
A5	−0.033	0.15	0.834
A6	−0.01	0.041	0.889
A7	0.895	−0.249	−0.079
A8	0.795	0.434	−0.066
A9	0.817	0.367	0.015
A10	0.864	0.274	−0.141
A11	0.831	0.346	0.026
A12	0.807	0.258	−0.121
A13	0.319	−0.109	0.148

Based on exploratory factor analysis, the next section will examine the convergent validity of the scale. In order to further validate whether the proposed model structure aligns with the obtained data, AMOS 23.0 was used to conduct confirmatory factor analysis for validity testing, the test results are shown in **Table 8**. The fit indices were distributed as follows: $\chi 2/df = 1.908$, which is less than 3; RMSEA = 0.069, which is less than 0.08; CFI = 0.970; IFI = 0.970; NFI = 0.939, all of which are greater than 0.9. This indicates a good fit of the model.

Table 8. Table of overall model fit indices.

Fit Index	Acceptable Range	Measurement Value
CMIN/DF	<3	1.908
RMSEA	<0.08	0.069
IFI	>0.9	0.97
NFI	>0.9	0.939
TLI	>0.9	0.961
CFI	>0.9	0.97

From the **Table 9** below, it can be seen that the factor coefficients corresponding to each item are all above 0.5, indicating that each latent variable has a certain representativeness for the corresponding item. Additionally, the average variance extracted (AVE) for each factor is greater than 0.5, and the composite reliability (CR) is greater than 0.7, indicating that the convergent validity of each factor is ideal.

Table 9. Convergent validity.

Variable	Item	Factor Loading	Average Variance Extracted	Composite Reliability
Dimension 1	A1	0.754	0.631	0.837
	A2	0.829		
	A3	0.798		
Dimension 2	A4	0.829	0.672	0.86
	A5	0.883		
	A6	0.742		
Dimension 3	A7	0.859	0.716	0.938
	A8	0.813		
	A9	0.821		
	A10	0.822		
	A11	0.878		
	A12	0.881		

The confirmatory factor analysis revealed no negative error variances and factor loadings ranging from 0.83 to 0.95, meeting fit test requirements. The overall model fit test results are presented in **Table 7**. The evaluation of the three-factor standard model for constructing administrative ethical systems and the 12 measurement scales yielded favorable results. The factor loadings for the 12 items are ideal, with path coefficients for Factor 1 ranging from 0.754 to 0.829, Factor 2 from 0.829 to 0.883, and Factor 3 from 0.813 to 0.881. The basic fit indices of the confirmatory factor analysis model meet the criteria, indicating good fit for the three-factor evaluation criteria and the measurement scale model. The overall model fit test results also meet acceptable standards, demonstrating good fit of the survey data.

5. Discussion and conclusion

In this study, we aimed to explore the factor structure of a questionnaire designed to assess various dimensions of administrative ethical systems. We began by conducting an exploratory factor analysis (EFA) to determine the underlying factors that explain the variance in the observed variables. The KMO (Kaiser-Meyer-Olkin) measure of sampling adequacy and Bartlett's test of sphericity provided evidence of the appropriateness of the factor analysis, with both tests supporting the validity of the factor extraction.

The EFA revealed three common factors, which accounted for a substantial portion of the variance (75.779%), indicating that these factors are representative of the underlying dimensions of the administrative ethical system. The factor loadings ranged from 0.5 to 0.9, which suggests that the items have moderate to strong associations with their respective factors. However, one item (A13) did not meet the threshold for factor loading and was excluded from further analysis.

Following the EFA, we conducted confirmatory factor analysis (CFA) to test the hypothesized factor structure against the observed data. The CFA results supported the three-factor model, with all factor loadings exceeding 0.5 and the fit indices indicating a well-fitting model. The composite reliability (CR) and average variance

extracted (AVE) for each factor further confirmed the internal consistency and convergent validity of the scale.

The results of this study contribute to our understanding of the multidimensional nature of administrative ethical systems. The three factors identified—ethical awareness, ethical behavior, and ethical leadership—align with existing literature on ethical leadership and organizational ethics. The findings also provide practical implications for developing educational programs and interventions that aim to improve the ethical climate within organizations.

However, there are limitations to consider. The sample size may not be sufficiently large to generalize the findings to all types of organizations. Additionally, the self-report nature of the data may introduce bias, as respondents may not accurately report their own behavior or perceptions. Future research could benefit from a larger, more diverse sample and could explore the relationship between these factors and other organizational outcomes, such as job satisfaction and organizational commitment.

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Appendix

Below is the preliminary design of the questionnaire based on the measurement items of the independent variable, intermediate variable, and dependent variable (excluding one dimension of the regulatory variable: measurement items for superior support). According to the Likert scale, assign scores of 5, 4, 3, 2, 1 to the five dimensions of strongly disagree, disagree, neutral, agree, and strongly agree, respectively.

Questions 1–9 are the observed variable items for the independent variable:

Table A1. Questionnaire items.

Questions	Options
1) Do you think that diverse stakeholders of public services often communicate about cooperation content?	A. 5 B.4 C. 3 D. 2 E. 1
2) Can diverse stakeholders of public services promptly respond to each other's ideas and needs during cooperation?	A. 5 B. 4 C. 3 D. 2 E. 1
3) Is the information exchange among diverse stakeholders of public services very thorough during cooperation?	A. 5 B. 4 C. 3 D. 2 E. 1
4) Can communication during cooperation effectively resolve conflicts among diverse stakeholders?	A. 5 B. 4 C. 3 D. 2 E. 1
5) In cooperation, do different stakeholders obtain many relevant resources and information?	A. 5 B. 4 C. 3 D. 2 E. 1
6) The resources and information obtained in cooperation are of great help to different stakeholders.	A. 5 B. 4 C. 3 D. 2 E. 1
7) If a partner encounters difficulties, each party is willing to provide assistance to the best of their ability.	A. 5 B. 4 C. 3 D. 2 E. 1
8) In cooperation, each party is willing to share resources with their partners.	A. 5 B. 4 C. 3 D. 2 E. 1
9) In cooperation, there is a higher frequency and stability of cooperation among diverse stakeholders.	A. 5 B. 4 C. 3 D. 2 E. 1
10) In cooperation, the cooperation experience among diverse stakeholders is pleasant.	A. 5 B. 4 C. 3 D. 2 E. 1
11) In cooperation, the cooperation between us is very pleasant.	A. 5 B. 4 C. 3 D. 2 E. 1
12) In cooperation, we can handle conflicts between each other well.	A. 5 B. 4 C. 3 D. 2 E. 1
13) In cooperation, we both consider each other's interests.	A. 5 B. 4 C. 3 D. 2 E. 1
14) In cooperation, no matter which party encounters a problem, we will solve it together.	A. 5 B. 4 C. 3 D. 2 E. 1
15) In cooperation, the degree of complementarity of resources we possess is high.	A. 5 B. 4 C. 3 D. 2 E. 1
16) In cooperation, we have invested a lot of financial, material, and human resources.	A. 5 B. 4 C. 3 D. 2 E. 1
17) In cooperation, we actively coordinate with the actions of our partners.	A. 5 B. 4 C. 3 D. 2 E. 1
18) Are you satisfied with the clauses or regulations in the relevant system that define the responsibilities of all parties involved in the cooperation of public service supply?	A. 5 B. 4 C. 3 D. 2 E. 1
19) Are you satisfied with the regulations that ensure the rights and interests of participating parties in the relevant system?	A. 5 B. 4 C. 3 D. 2 E. 1
20) In cooperation, the interests of the weaker or several parties are guaranteed by the corresponding system.	A. 5 B. 4 C. 3 D. 2 E. 1
21) In cooperation, there is a high level of public participation in public service provision.	A. 5 B. 4 C. 3 D. 2 E. 1
22) In cooperation, effective information channels have been established between the cooperative suppliers and the public.	A. 5 B. 4 C. 3 D. 2 E. 1
23) In cooperation, the community residents' self-governing organizations are relatively mature.	A. 5 B. 4 C. 3 D. 2 E. 1
24) The satisfaction level with the adequacy of public service facilities, equipment, and basic public service provision is high.	A. 5 B. 4 C. 3 D. 2 E. 1
25) Do you find the service provided by public service personnel satisfying your needs?	A. 5 B. 4 C. 3 D. 2 E. 1

Table A1. (*Continued*).

Questions	Options
26) The degree of satisfaction with the provision of public services meeting the needs, fitting the needs, and suiting the needs is high.	A. 5 B. 4 C. 3 D. 2 E. 1
27) The satisfaction level of residents regarding the adequacy of basic public services is relatively high.	A. 5 B. 4 C. 3 D. 2 E. 1
28) People of different types have equal opportunities to access public services (including different income levels, geographic regions, cultures, and identities).	A. 5 B. 4 C. 3 D. 2 E. 1
29) The satisfaction level with the equality of basic public service provision is relatively high.	A. 5 B. 4 C. 3 D. 2 E. 1
30) The price and cost of public services are proportional to the payment capacity of the audience (appropriate, equivalent).	A. 5 B. 4 C. 3 D. 2 E. 1
31) There are various ways and channels to obtain public service information.	A. 5 B. 4 C. 3 D. 2 E. 1