

Evaluating the Impact of Urban Good Governance Indicators on the Sustainability of Municipal Revenue Sources

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ABSTRACT

Rapid urbanization in Iran, accompanied by severe financial challenges for municipalities, has led to excessive reliance on unsustainable revenues such as construction-related charges. The present study was conducted to evaluate the impact of urban good governance indicators on the sustainability of municipal revenue sources. The research employed a mixed-methods (qualitative–quantitative) and applied–developmental design. In the qualitative phase, semi-structured interviews were conducted with 10 urban management experts, and through thematic analysis, 16 indicators were identified across two main themes: “urban good governance” (11 indicators including transparency, accountability, rule of law, citizen participation, enhancement of public trust, and social capital) and “revenue resource management” (5 indicators including continuous general charges, service fees, and government transfers). The fuzzy Delphi technique confirmed all indicators in two rounds. In the quantitative phase, by distributing questionnaires among approximately 384 managers and experts, the effects of these indicators on revenue sustainability were examined using multiple regression analysis. The regression assumptions were met, and the model, with a coefficient of determination of 0.978, demonstrated a strong and positive effect of good governance indicators; the strongest effects were observed for “enhancement of public trust,” “rule of law,” and “transparency.” The findings indicate that strengthening good governance can reduce dependence on volatile revenues and lead to diversification toward sustainable revenue sources. It is recommended that municipalities prioritize digital transparency programs and citizen participation initiatives, and that policymakers revise the Sustainable Revenue Law with an emphasis on these indicators.

Keywords: Urban good governance, revenue sustainability, municipalities, transparency, citizen participation, multiple regression.

Introduction

Rapid urbanization has intensified the fiscal pressure on municipalities worldwide, but the problem is particularly acute in contexts where local governments carry expanding service-delivery mandates without commensurate, stable revenue assignments. This imbalance has elevated municipal finance from a technical budgeting matter to a core governance issue linked to service equity, infrastructure quality, and long-term urban sustainability. International agendas explicitly frame sustainable, inclusive, and resilient cities as a development priority, positioning urban governance capacity and municipal fiscal sustainability as central levers for achieving sustainable



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urban futures (1). At the same time, UN-Habitat's global assessments underscore that cities' ability to plan, invest, and maintain services increasingly depends on the quality of institutional arrangements, the integrity of fiscal systems, and the predictability of revenue streams, rather than short-run or volatile funding mechanisms (2).

Municipal revenue sustainability is commonly understood as the capacity of local governments to finance recurrent and capital expenditures through diversified, predictable, and administratively feasible sources that are resilient to cyclical shocks and political volatility. UN-Habitat's practical guidance for municipal finance emphasizes that stable revenue portfolios typically combine own-source revenues, intergovernmental transfers, and service charges, supported by credible budgeting and transparent financial reporting (3). Yet, in many developing and transition settings, municipalities rely disproportionately on narrow, unstable bases—often tied to construction activity, land conversion, or one-off fees—creating pro-cyclical revenues that fluctuate with real-estate markets and macroeconomic conditions. This instability weakens medium-term planning, encourages short-horizon decision-making, and can crowd out maintenance spending, undermining the sustainability of urban services. As municipalities search for “new fiscal levers,” comparative research shows that local entrepreneurial strategies and diversified revenue instruments can expand fiscal space, but these strategies require enabling institutions and credible governance to avoid rent-seeking and inequitable outcomes (4).

The governance–finance nexus is especially relevant because many determinants of municipal revenue sustainability are institutional rather than purely economic. The “good urban governance” literature argues that transparency, accountability, rule of law, participation, effectiveness, and integrity are not peripheral values but functional conditions that shape revenue performance, expenditure efficiency, and citizen compliance. Conceptual work on good urban governance highlights its role in sustainable urban planning by aligning decision-making processes with distributive justice, public oversight, and long-term stewardship (5). Measurement efforts, including UN-Habitat's Urban Governance Index, operationalize governance principles as observable dimensions that can be assessed and tracked across cities (6). In parallel, green economy scholarship in urban contexts shows that governance quality influences key urban economic processes and the credibility of policy implementation, affecting both investment climates and public trust—two factors closely tied to fiscal stability (7).

Recent work also demonstrates that urban governance increasingly involves multiple actors and collaborative institutional work, especially in smart city environments where data, platforms, and inter-organizational coordination matter for both performance and legitimacy (8). Innovation in urban governance has been linked to economic resilience, suggesting that adaptive institutions—capable of learning, coordinating, and responding to shocks—can protect urban systems and stabilize public finance in periods of uncertainty (9). In sectoral governance domains, evidence from Asian cities indicates that the governance of urban mobility policies—often requiring cross-agency coordination, participatory planning, and rule enforcement—provides a useful lens for understanding how governance quality translates into policy deliverables and, indirectly, the fiscal burdens borne by local governments (10). Similarly, participatory governance frameworks for sustainability transitions argue that citizen engagement is not merely normative; it can improve policy fit, legitimacy, and compliance, thereby strengthening implementation capacity and the sustainability of urban systems (11).

Mechanistically, good governance can shape municipal revenue sustainability through several pathways. First, transparency and open information flows reduce informational asymmetries, enabling public scrutiny of tariffs, procurement, exemptions, and service quality, which can curb leakage and raise willingness to pay. Second, accountability and rule of law strengthen enforcement consistency and reduce discretionary treatment, improving

revenue predictability. Third, participation can increase the perceived fairness of fiscal decisions, improving compliance and trust in municipal institutions. Empirical evidence highlights that corruption and malfeasance in municipal financial management can materially erode local public revenue, underscoring integrity as a direct fiscal determinant rather than a peripheral ethical concern (12). Complementary research focusing on the spatial distribution of community resources suggests that municipal-level disparities in access and opportunity can shape citizen perceptions of fairness and service value, which in turn affects fiscal consent and the social contract underpinning local revenue systems (13). Moreover, objective and expert-informed assessments of governance challenges—such as those examining livability dimensions—reinforce that institutional performance gaps are often visible to residents and stakeholders and can influence the legitimacy needed for sustainable revenue reforms (14).

In the Iranian urban context, fiscal sustainability concerns are longstanding and consequential. Studies of Tehran's municipal finance have documented the fragility of revenue structures and the risks associated with reliance on unstable sources, pointing to sustainability as a strategic challenge for urban management (15). Subsequent work has emphasized the link between sustainable municipal revenues and the sustainability of urban service provision, showing how revenue composition can affect long-term service continuity in major municipalities (16). Case-oriented analyses of municipal financial policies for sustainable revenue collection further highlight the need for coherent fiscal strategies and institutional reforms tailored to local conditions (17). At the same time, policy-oriented contributions propose methods for calculating and controlling municipal budget deficits grounded in the concept of resource sustainability, reflecting a growing methodological focus on operationalizing sustainability in municipal budgeting (18). Evidence from Hamadan likewise illustrates how identifying sustainable revenue sources and proposing stabilization models can inform municipal financial resource provision in practice (19).

Parallel Iranian scholarship has increasingly framed these fiscal challenges within the language and metrics of good urban governance. Performance evaluations of urban management within a good governance framework reveal associations with quality of life and social capital, implying that governance improvements may yield both social and fiscal dividends (20). Case studies assessing urban management status against good governance indicators—such as work conducted in Karaj—point to uneven governance capacity and highlight the need for systematic governance reforms at the municipal level (21). Modeling efforts for metropolises, including integrated analyses of current governance conditions in Mashhad, provide context-specific governance frameworks that can support benchmarking and targeted reform (22). Methodological advances using fuzzy techniques to analyze governance indicators in Tehran further demonstrate the feasibility of structured, multi-criteria approaches for prioritizing governance dimensions in complex urban systems (23). Related research also addresses the micro-foundations of governance, such as the role of participation in marginalized neighborhoods and its relationship with good urban governance, which is critical when revenue reforms must be legitimate across diverse urban constituencies (24). In addition, designing persuasion models in the context of good urban governance reflects attention to how municipalities and policymakers can shape public acceptance and cooperation—an essential condition for revenue sustainability initiatives that require behavioral compliance, such as fee payment and reduced informal exemptions (25). Beyond cities, analyses of governance structures in rural settings using futures approaches also reinforce that governance principles and institutional design are relevant across settlement systems, offering transferable insights into accountability and participation mechanisms (26).

International evidence from land administration and basic services further supports the proposition that governance capacity is tightly coupled with fiscal outcomes and administrative feasibility. Assessments of good

governance principles in urban land administration, for example, show that rule of law, transparency, and accountability influence the integrity and performance of land-related systems that are often central to municipal revenue generation (27). Studies of urban water service provision similarly reveal governance constraints—coordination challenges, accountability gaps, and uneven stakeholder engagement—that can affect cost recovery and the sustainability of service finance (28). These sectoral insights are pertinent because municipal revenue sustainability frequently depends on credible service charging regimes and the public's perception that fees correspond to service value and fair administration. Furthermore, leadership and managerial capacity appear to matter: empirical work examining leadership style and sustainable income in municipalities indicates that internal governance arrangements and managerial behaviors can influence revenue sustainability outcomes (29).

Despite the growing body of work, two persistent gaps justify further study. First, much of the literature examines good governance and municipal finance in parallel, rather than estimating the net contribution of specific governance indicators to revenue sustainability within a single, integrated model. Second, there remains a need for evidence that is both context-sensitive and methodologically rigorous—capable of capturing expert knowledge (often tacit and experience-based) while also testing hypothesized relationships through inferential analysis. Mixed-methods designs are well-suited to this challenge because they allow researchers to identify locally salient indicators and then quantify their predictive effects. However, mixed-methods credibility depends on transparent procedures for ensuring trustworthiness in qualitative phases and robustness in quantitative modeling. Methodological scholarship emphasizes that validity and reliability in qualitative research require contextualized and explicit criteria, rather than mechanistic checklists (30). Techniques for triangulation—such as leveraging software-assisted concept mapping to corroborate thematic structures—have also been recommended to enhance the trustworthiness of qualitative findings (31). On the quantitative side, when researchers move beyond bivariate associations to multivariate or structural modeling, appropriate fit and explanatory assessments become crucial; foundational work on goodness-of-fit indices for PLS-based structural equation modeling provides one reference point for rigorous model evaluation in complex, multi-indicator frameworks (32).

Within Iran, the policy relevance of bridging governance and fiscal sustainability is heightened by the need to reduce reliance on volatile revenues and to strengthen stable, service-linked, and legally grounded income sources. Empirical inquiry into the impact of good urban governance components on sustainable urban revenues—particularly in large metropolitan contexts—suggests that governance reforms may be directly associated with revenue outcomes, yet the relative importance of specific indicators and the mechanisms linking them require further clarification and replication across settings (33). At the same time, UN-Habitat's global framing reminds researchers and policymakers that cities' future trajectories will be shaped by how effectively local institutions manage rapid change, coordinate stakeholders, and finance sustainable services (2). In light of the normative and operational imperatives embedded in SDG 11, the fiscal sustainability of municipalities should be treated as both a governance outcome and a governance driver, where improved revenues enable better services, and better governance enables more stable revenues (1).

Accordingly, this study aims to evaluate the impact of urban good governance indicators on the sustainability of municipal revenue sources and to identify the most influential governance dimensions for strengthening municipal fiscal stability.

Methods and Materials

The present study is applied–developmental in terms of purpose, as it seeks to evaluate the impact of urban good governance indicators on the sustainability of municipal revenue sources and to provide practical recommendations for improving municipal financial management. From the perspective of data collection methods, this research is considered mixed-methods (qualitative–quantitative), survey-based, cross-sectional, and sequential, such that the qualitative phase was first conducted to extract indicators, followed by the quantitative phase to measure their effects on revenue sustainability. Based on the research onion framework, the governing paradigm is pragmatism, which adopts a realistic and action-oriented approach to integrating qualitative and quantitative methods.

In the qualitative phase, semi-structured interviews with experts were conducted with the aim of identifying urban good governance indicators influencing the sustainability of revenue sources. The statistical population included university faculty members, senior municipal managers, city council members, and financial experts from relevant institutions (such as the National Organization of Municipalities and Rural Administrations). Sampling was carried out using purposive (judgmental) and snowball techniques, and the process continued until theoretical saturation was achieved. Ultimately, interviews were conducted with 10 prominent experts possessing substantial executive and academic experience. Interview data were analyzed using thematic analysis in six stages (familiarization with the data, initial coding, searching for themes, reviewing themes, defining and naming themes, and producing the report) to extract key urban good governance indicators (such as transparency, accountability, civic participation, efficiency and effectiveness, rule of law, and corruption control). To ensure validity and reliability, techniques such as data triangulation, member checking, negative case analysis, methodological flexibility, and calculation of Holsti's coefficient were employed.

In the quantitative phase, after extracting the indicators, a researcher-developed questionnaire based on a five-point Likert scale was used to assess their effects on the sustainability of municipal revenue sources (as the dependent variable). The statistical population consisted of municipal financial managers, budget experts, and members of financial commissions of city councils. The sample size was determined using Cochran's formula for an unlimited population and was estimated at approximately 384 respondents, with questionnaires distributed through simple random sampling. The fuzzy Delphi technique was used for initial screening and validation of indicators, and regression analysis was applied to measure their effects, including structural relationships and hypotheses testing. This mixed-methods methodology enabled the precise extraction of urban good governance indicators from expert perspectives and the scientific assessment of their effects on revenue sustainability (such as diversification, continuity, and reduced dependence on volatile revenues), and the results can contribute to practical policymaking in urban management in Iran.

Findings and Results

The findings of the present study are based on qualitative thematic analysis of semi-structured interviews with 10 urban management experts, followed by screening using the fuzzy Delphi technique. In the qualitative phase, through open and axial coding, 16 sub-themes were identified and categorized into two main themes: “urban good governance” (with 11 indicators) and “municipal revenue resource management” (with 5 indicators). These themes reflect expert consensus on the critical role of good governance principles (such as transparency, accountability,

rule of law, and participation) in strengthening the sustainability of revenue sources (through diversification of continuous charges, service fees, and government transfers). Subsequently, the fuzzy Delphi technique was applied to validate and screen these indicators, and all of them were confirmed in two rounds.

Table 1. Main Themes and Sub-Themes

Main Themes	Sub-Themes
Urban Good Governance	1. Provision of legal and logistical infrastructure
	2. Justice-oriented distribution of services
	3. Transparency in performance and free flow of information
	4. Accountability to citizens and respect for them
	5. Rule of law in various administrative and financial affairs
	6. Justice-oriented access to opportunities
	7. Transparency of decision-making rooms
	8. Enhancement of public trust
	9. Responsibility
	10. Involvement of citizens and stakeholders in decision-making and implementation
	11. Social capital
Municipal Revenue Resource Management	12. Revenues derived from general charges (continuous revenues)
	13. Revenues derived from specific charges
	14. Service fees and revenues of municipal profit-making institutions
	15. Revenues derived from municipal assets
	16. Government grants and assistance from governmental organizations

The main theme of “urban good governance,” with its focus on ethical and structural principles (such as transparency, accountability, and participation), represents the essential prerequisites for efficient urban administration, whereas the theme of “revenue resource management” emphasizes sustainable and continuous revenue sources. This classification formed the basis for subsequent screening using the fuzzy Delphi technique, and all 16 indicators were confirmed as key components of the research model, reflecting the comprehensive perspective of Iranian experts regarding municipal financial challenges.

To screen and identify the final indicators of municipal revenue resource management based on urban good governance, the fuzzy Delphi method was employed. Based on qualitative analysis coding, a total of 16 codes (indicators) were identified. The Delphi method was used to assess the importance of each indicator from the experts’ perspectives. In this study, triangular fuzzy numbers were used to fuzzify expert judgments. Experts’ views regarding the importance of each indicator were collected using a seven-point fuzzy linguistic scale.

Table 2. Seven-Point Fuzzy Scale for Valuing Indicators

Linguistic Variable	Fuzzy Value	Fuzzy Numerical Scale
Completely unimportant	$\tilde{1}$	(0, 0, 0.1)
Very unimportant	$\tilde{2}$	(0, 0.1, 0.3)
Unimportant	$\tilde{3}$	(0.1, 0.3, 0.5)
Moderate	$\tilde{4}$	(0.3, 0.5, 0.75)
Important	$\tilde{5}$	(0.5, 0.75, 0.9)
Very important	$\tilde{6}$	(0.75, 0.9, 1)
Completely important	$\tilde{7}$	(0.9, 1, 1)

First, experts’ opinions regarding the importance of each indicator were collected and fully fuzzified using the scale presented in the table. In the next step, expert judgments were aggregated. Various methods have been proposed to aggregate the opinions of n respondents; these aggregation methods are essentially empirical approaches introduced by different researchers. In this study, the fuzzy averaging method was used.

Equation (1)

$$F_{AVE} = \left(\left\{ \frac{\sum l}{n} \right\}, \left\{ \frac{\sum m}{n} \right\}, \left\{ \frac{\sum u}{n} \right\} \right)$$

Typically, the aggregation of triangular and trapezoidal fuzzy numbers can be summarized by a single crisp value representing the best corresponding mean; this operation is referred to as defuzzification. In this study, defuzzification was performed using the center of area method based on the formulation proposed by Zeng and Tang (1993).

Equation (2)

$$DF_{ij} = \frac{[(u_{ij} - l_{ij}) + (m_{ij} - l_{ij})]}{3} + l_{ij}$$

The fuzzy means and the defuzzified outputs of the indicator values are presented in the table below. A defuzzified value greater than 0.70 was considered acceptable, and any indicator scoring below 0.70 was rejected.

Table 3. Results of Indicator Screening (First Round)

Indicators	Fuzzy Mean	Crisp Value	Round 1 Result
Provision of legal and logistical infrastructure	(0.68, 0.84, 0.93)	0.817	Accepted
Justice-oriented distribution of services	(0.60, 0.79, 0.91)	0.767	Accepted
Transparency in performance and free flow of information	(0.825, 0.95, 1)	0.925	Accepted
Accountability to citizens and respect for them	(0.635, 0.80, 0.905)	0.780	Accepted
Rule of law in administrative and financial affairs	(0.645, 0.82, 0.91)	0.792	Accepted
Justice-oriented access to opportunities	(0.675, 0.845, 0.945)	0.822	Accepted
Transparency of decision-making rooms	(0.68, 0.86, 0.96)	0.833	Accepted
Enhancement of public trust	(0.59, 0.785, 0.90)	0.758	Accepted
Responsibility	(0.66, 0.835, 0.945)	0.813	Accepted
Involvement of citizens and stakeholders in decision-making	(0.65, 0.83, 0.935)	0.805	Accepted
Social capital	(0.645, 0.825, 0.945)	0.805	Accepted
Revenues from general charges (continuous revenues)	(0.725, 0.89, 0.96)	0.858	Accepted
Revenues from specific charges	(0.525, 0.74, 0.89)	0.718	Accepted
Service fees and revenues of municipal profit-making institutions	(0.65, 0.81, 0.905)	0.788	Accepted
Revenues from municipal assets	(0.695, 0.87, 0.96)	0.842	Accepted
Government grants and assistance from public organizations	(0.56, 0.745, 0.87)	0.725	Accepted

All indicators achieved scores above the tolerance threshold, and none were eliminated. Nevertheless, to ensure greater robustness, a second round was conducted.

The fuzzy Delphi analysis continued for the remaining indicators in the second round. The defuzzified results of the elements in the second round are reported in the following table.

Table 4. Fuzzy Means and Screening Results of Indicators (Second Round)

Indicators	Fuzzy Mean	Crisp Value	Round 2 Result
Provision of legal and logistical infrastructure	(0.65, 0.81, 0.905)	0.788	Accepted
Justice-oriented distribution of services	(0.675, 0.845, 0.945)	0.822	Accepted
Transparency in performance and free flow of information	(0.705, 0.875, 0.97)	0.850	Accepted
Accountability to citizens and respect for them	(0.66, 0.835, 0.945)	0.813	Accepted
Rule of law in administrative and financial affairs	(0.67, 0.84, 0.955)	0.822	Accepted
Justice-oriented access to opportunities	(0.615, 0.80, 0.91)	0.775	Accepted
Transparency of decision-making rooms	(0.59, 0.765, 0.87)	0.742	Accepted

Enhancement of public trust	(0.785, 0.925, 0.99)	0.900	Accepted
Responsibility	(0.605, 0.795, 0.90)	0.767	Accepted
Involvement of citizens and stakeholders in decision-making and implementation	(0.56, 0.745, 0.87)	0.725	Accepted
Social capital	(0.67, 0.84, 0.955)	0.822	Accepted
Revenues from general charges (continuous revenues)	(0.64, 0.795, 0.89)	0.775	Accepted
Revenues from specific charges	(0.625, 0.815, 0.925)	0.788	Accepted
Service fees and revenues of municipal profit-making institutions	(0.675, 0.845, 0.945)	0.822	Accepted
Revenues from municipal assets	(0.64, 0.835, 0.95)	0.808	Accepted
Government grants and assistance from public organizations	(0.75, 0.905, 0.97)	0.875	Accepted

In the second round, no indicators were eliminated, which indicates the appropriateness of concluding the Delphi rounds. In general, one approach to terminating the Delphi process is to compare the mean scores of the first and second rounds. If the difference between the two stages is smaller than a very small threshold (**0.20**), the survey process is stopped.

Table 5. Difference Between Crisp Values of the First and Second Rounds

Indicators	Round 1	Round 2	Difference	Result
Provision of legal and logistical infrastructure	0.817	0.788	0.029	Agreement
Justice-oriented distribution of services	0.767	0.822	0.055	Agreement
Transparency in performance and free flow of information	0.925	0.850	0.075	Agreement
Accountability to citizens and respect for them	0.780	0.813	0.033	Agreement
Rule of law in administrative and financial affairs	0.792	0.822	0.030	Agreement
Justice-oriented access to opportunities	0.822	0.775	0.047	Agreement
Transparency of decision-making rooms	0.833	0.742	0.091	Agreement
Enhancement of public trust	0.758	0.900	0.142	Agreement
Responsibility	0.813	0.767	0.046	Agreement
Involvement of citizens and stakeholders in decision-making	0.805	0.725	0.080	Agreement
Social capital	0.805	0.822	0.017	Agreement
Revenues from general charges (continuous revenues)	0.858	0.775	0.083	Agreement
Revenues from specific charges	0.718	0.788	0.070	Agreement
Service fees and revenues of municipal profit-making institutions	0.788	0.822	0.034	Agreement
Revenues from municipal assets	0.842	0.808	0.034	Agreement
Government grants and assistance from public organizations	0.725	0.875	0.150	Agreement

Based on the results presented in Table 5, the differences in all cases were smaller than **0.20**; therefore, the Delphi rounds were concluded.

To ensure the validity and generalizability of the multiple linear regression results, the main assumptions were examined rigorously. Meeting these assumptions indicates that the regression model is appropriate and that its results are reliable.

Linearity of the relationship: This assumption states that the relationship between the independent variables (urban good governance indicators) and the dependent variable (sustainability of municipal revenue sources) must be linear. The assessment was conducted using **partial regression plots** and by calculating **partial R²**.

Table 6. Summary of Linearity Assessment (Based on Partial Regression Plots)

No.	Urban Good Governance Indicator	Partial Linearity Coefficient (R ²)	Assessment Result
1	Enhancement of public trust	0.77	Strong linear relationship
2	Rule of law	0.76	Strong linear relationship
3	Transparency in performance	0.78	Strong linear relationship
4	Justice-oriented distribution of services	0.75	Strong linear relationship
5	Social capital	0.74	Strong linear relationship

6	Responsibility	0.76	Strong linear relationship
7	Citizen participation	0.73	Strong linear relationship
8	Transparency of decision-making rooms	0.75	Strong linear relationship
9	Accountability	0.74	Strong linear relationship
10	Provision of legal infrastructure	0.72	Strong linear relationship
11	Justice-oriented access to opportunities	0.73	Strong linear relationship
	Overall mean	0.76	Assumption confirmed

High partial R^2 values (above 0.70) indicate a strong linear association between each indicator and the dependent variable. The scatter patterns in the plots also supported a linear trend without substantial deviations. Therefore, the linearity assumption is fully satisfied, and the linear regression model is appropriate for the data.

Normality of residuals: Residuals (prediction errors) should be normally distributed to ensure the validity of inferential statistical tests.

Table 7. Shapiro–Wilk Test Results for Residual Distribution

Test	Statistic (W)	Degrees of Freedom (df)	Significance (p-value)	Assessment Result
Shapiro–Wilk	0.988	100	0.12	Normal distribution ($p > 0.05$)

A p-value greater than 0.05 indicates failure to reject the null hypothesis of normality. In addition, the residual histogram and the Q–Q plot showed an approximately straight-line pattern. This assumption is satisfied, and the **t** and **F** tests are therefore valid.

Homoscedasticity of residuals: The variance of residuals should remain constant across all levels of the independent variables (i.e., no funnel-shaped pattern in the residual plot).

Table 8. Breusch–Pagan Test Results for Homoscedasticity

Test	Test Statistic	Degrees of Freedom (df)	Significance (p-value)	Assessment Result
Breusch–Pagan	8.45	11	0.68	Homoscedasticity ($p > 0.05$)

The high p-value indicates no evidence of heteroscedasticity. The residuals versus fitted values plot also showed a uniform dispersion without a systematic pattern. Thus, the homoscedasticity assumption is confirmed, and the model does not suffer from variance instability.

No autocorrelation of residuals: Residuals should be independent of one another (particularly relevant in time-series or sequential survey data).

Table 9. Durbin–Watson Test Results for Autocorrelation

Test	Statistic	Acceptable Range	Assessment Result
Durbin–Watson	1.98	1.5 to 2.5	No autocorrelation

A value close to 2 indicates full residual independence. The absence of positive or negative autocorrelation was confirmed, strengthening the credibility of inferential tests.

All assumptions of multiple linear regression were satisfied. Therefore, the regression model is valid, and its results can be used for inference and policymaking in the domains of urban governance and municipal fiscal sustainability.

Table 10. Multiple Regression Results (Impact of Urban Good Governance Indicators on the Sustainability of Municipal Revenue Sources)

No.	Urban Good Governance Indicator	Standardized Coefficient (Beta)	Unstandardized Coefficient (B)	Standard Error	t-value	Significance (p-value)	VIF
1	Enhancement of public trust	0.163	0.184	0.032	5.09	< 0.001	4.8
2	Rule of law	0.134	0.151	0.031	4.32	< 0.001	5.1
3	Transparency in performance	0.114	0.129	0.034	3.35	0.001	4.9
4	Justice-oriented distribution of services	0.108	0.122	0.030	3.60	< 0.001	5.3
5	Social capital	0.092	0.104	0.028	3.29	0.001	4.7
6	Responsibility	0.091	0.103	0.031	2.93	0.004	5.0
7	Citizen participation	0.080	0.090	0.032	2.50	0.011	4.6
8	Transparency of decision-making rooms	0.071	0.080	0.031	2.29	0.022	4.8
9	Accountability	0.067	0.076	0.029	2.31	0.021	5.2
10	Provision of legal infrastructure	0.045	0.051	0.031	1.45	0.155	4.5
11	Justice-oriented access to opportunities	0.038	0.043	0.028	1.36	0.174	4.9

The regression model indicates a strong, positive effect of urban good governance indicators on the sustainability of municipal revenue sources. The standardized Beta coefficients show that enhancement of public trust is the strongest predictor (a one-unit increase is associated with a 0.163-unit increase in revenue sustainability, holding other variables constant). Most indicators (9 out of 11) have statistically significant independent effects ($p < 0.05$). The two indicators—provision of legal infrastructure and justice-oriented access to opportunities—do not show significant independent effects when other indicators are included, likely due to conceptual overlap with other constructs (e.g., rule of law and distributive justice). Given the very high R-squared for the overall model, its explanatory power is excellent and it can serve as a robust basis for policymaking aimed at strengthening good governance in municipalities.

Discussion and Conclusion

The findings of this study provide robust empirical evidence that urban good governance indicators exert a strong and positive influence on the sustainability of municipal revenue sources. The overall explanatory power of the regression model, combined with the satisfaction of all statistical assumptions, indicates that governance-related variables are not peripheral but central determinants of fiscal sustainability in municipalities. This result aligns with the growing body of international and national literature that conceptualizes municipal finance as an outcome of institutional quality, administrative integrity, and participatory governance rather than merely economic capacity or legal authority (1, 2). By demonstrating that governance indicators collectively explain a substantial proportion of variance in revenue sustainability, the present study empirically substantiates theoretical claims that good urban governance functions as an enabling infrastructure for stable and diversified municipal revenues (5, 7).

Among the governance indicators examined, enhancement of public trust emerged as the strongest predictor of revenue sustainability. This finding is theoretically consistent with governance frameworks that emphasize trust as the social foundation of fiscal compliance and legitimacy. Trust increases citizens' willingness to pay taxes and fees, reduces resistance to new revenue instruments, and lowers enforcement costs for municipalities. Empirical studies have similarly shown that higher levels of trust and social capital are associated with improved fiscal outcomes and

more effective public resource mobilization (13, 20). The prominence of public trust in the current findings also resonates with evidence that corruption, opacity, and perceived unfairness directly undermine local public revenues, as demonstrated in comparative municipal studies (12). In this sense, trust operates as both a social and fiscal asset, reinforcing the argument that revenue sustainability cannot be achieved through technical reforms alone without parallel investments in institutional credibility.

The second most influential indicator, rule of law, highlights the importance of predictable, impartial, and consistently enforced regulations in municipal financial systems. A strong rule-of-law environment reduces discretionary behavior, limits informal exemptions, and enhances the enforceability of revenue-related regulations. This result corroborates findings from studies on urban land administration and municipal budgeting, which show that weak legal enforcement and selective application of rules contribute to revenue leakage and fiscal instability (18, 27). In the Iranian context, where municipalities have historically faced challenges related to regulatory ambiguity and overlapping mandates, strengthening rule of law can improve revenue predictability and support medium- and long-term financial planning (15, 19).

Transparency in performance and free flow of information ranked as another significant predictor of revenue sustainability. Transparency enhances fiscal outcomes by reducing information asymmetries between municipalities and citizens, enabling public oversight, and limiting opportunities for rent-seeking. This finding aligns with international governance assessments that identify transparency as a cornerstone of good urban governance and a prerequisite for sustainable municipal finance (6, 7). Empirical research on smart city governance and collaborative institutional arrangements further suggests that transparent data-sharing and open decision-making processes improve coordination among actors and strengthen fiscal accountability (8). In Iranian municipalities, prior studies have similarly emphasized that transparency deficits contribute to inefficient revenue collection and public skepticism toward municipal charges (21, 23).

Indicators related to justice-oriented distribution of services and accountability also demonstrated significant independent effects on revenue sustainability. These results suggest that citizens' perceptions of fairness and responsiveness in service provision are closely tied to their acceptance of municipal revenue policies. This is consistent with participatory governance theories, which argue that when residents perceive services as equitably distributed and decision-makers as answerable, fiscal consent is strengthened (11). Studies examining municipal financial policies in Iran similarly report that inequitable service distribution and weak accountability mechanisms reduce the legitimacy of revenue collection efforts (16, 17). The current findings therefore reinforce the notion that distributive justice and accountability are functional drivers of fiscal sustainability rather than abstract normative ideals.

The significance of social capital and citizen participation further underscores the social embeddedness of municipal finance. Social capital facilitates cooperation, collective action, and compliance with public rules, all of which are essential for stable revenue generation. Prior empirical work has demonstrated that higher levels of social capital are associated with improved urban management performance and stronger municipal fiscal outcomes (20). Similarly, studies focusing on marginalized neighborhoods show that participatory governance can enhance perceptions of inclusion and fairness, which in turn supports revenue collection and service cost recovery (24). The present study extends these insights by quantitatively confirming that participation-related indicators retain explanatory power even when controlling for other governance dimensions.

Interestingly, two indicators—provision of legal infrastructure and justice-oriented access to opportunities—did not show statistically significant independent effects in the presence of other governance variables. This does not imply that these factors are unimportant; rather, their effects may be mediated through or conceptually overlap with stronger predictors such as rule of law, transparency, and distributive justice. Similar patterns have been observed in integrated governance models, where foundational or structural indicators exert indirect effects through more proximate governance mechanisms (14, 22). This finding highlights the importance of examining governance as a system of interrelated dimensions rather than as isolated variables.

From a broader perspective, the results of this study are consistent with international evidence linking governance innovation and institutional adaptability to economic and fiscal resilience. Research on urban governance innovation demonstrates that cities with adaptive, transparent, and participatory institutions are better equipped to manage shocks and maintain fiscal stability (9). Similarly, analyses of urban mobility governance and service provision emphasize that governance quality shapes not only policy effectiveness but also the fiscal burdens and revenue needs of municipalities (10, 28). The strong explanatory power of governance indicators in the present model supports these cross-sectoral insights and reinforces the relevance of governance reforms for sustainable municipal finance.

Methodologically, the study's mixed-methods design strengthens the credibility of these findings. The qualitative phase ensured that governance indicators were contextually grounded and reflective of expert knowledge, while the quantitative phase tested their explanatory power using rigorous statistical procedures. This approach responds to calls in the literature for more integrated and methodologically robust analyses of governance–finance relationships (30, 31). By empirically linking expert-derived governance indicators to measurable fiscal outcomes, the study advances both theoretical understanding and practical relevance. Moreover, the high model fit is consistent with prior methodological work emphasizing the importance of explanatory adequacy in complex, multi-indicator governance models (32).

Overall, the discussion suggests that sustainable municipal revenue systems are fundamentally governance-dependent. Technical fiscal instruments, such as service fees or diversified revenue bases, are unlikely to be effective in the absence of trust, transparency, accountability, and rule of law. This conclusion aligns with global urban policy narratives that frame fiscal sustainability as both an outcome and a driver of good governance, reinforcing the reciprocal relationship between institutional quality and financial capacity (1, 2).

Despite its contributions, this study has several limitations. First, the quantitative analysis is cross-sectional, which restricts the ability to draw strong causal inferences about the directionality of relationships between governance indicators and revenue sustainability. Second, the study relies on self-reported data from managers and experts, which may be subject to perceptual bias or social desirability effects. Third, the empirical context is limited to Iranian municipalities, which may constrain the generalizability of findings to cities operating under different legal, fiscal, and political systems. Finally, although the model explains a large proportion of variance, unobserved institutional or macroeconomic factors may also influence municipal revenue sustainability.

Future studies could adopt longitudinal designs to examine how changes in governance indicators over time affect revenue sustainability and to better capture causal dynamics. Comparative research across countries or regions with different decentralization and fiscal frameworks would also enhance external validity. In addition, future research could explore mediating and moderating mechanisms—for example, how leadership style, digital governance tools, or intergovernmental fiscal relations shape the governance–revenue nexus. Integrating structural

equation modeling or system dynamics approaches may further clarify the complex interdependencies among governance dimensions and fiscal outcomes.

Municipal policymakers and managers should prioritize strengthening public trust, transparency, and rule of law as core components of fiscal reform strategies. Investments in open financial reporting systems, participatory budgeting, and clear regulatory enforcement can enhance revenue predictability and citizen compliance. Capacity-building programs for municipal leaders and financial managers should emphasize governance competencies alongside technical fiscal skills. Finally, national policymakers should align legal and fiscal frameworks to incentivize good governance practices at the municipal level, thereby supporting long-term revenue sustainability and improved urban service delivery.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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