

Original Article

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Exploring the challenges and solutions for financing urban infrastructure projects in municipalities: A case study of the Tehran Municipality

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Abstract

Financing urban infrastructure projects, as a fundamental responsibility of urban governance, has consistently encountered various structural, revenue, and operational challenges. This is particularly evident in metropolises such as Tehran, where the scale and diversity of projects are vast, and infrastructural needs are constantly escalating. The primary objective of this research is to identify and analyze the core challenges of financing urban infrastructure projects in the Tehran Municipality and to propose appropriate solutions to address these obstacles. This study was conducted by applying a qualitative approach and thematic analysis methodology. To collect data, 14 semi-structured interviews were conducted with urban management experts, which were subsequently analyzed using thematic coding. Based on the findings, 16 main themes were extracted, comprising 7 main themes in the challenges section and 9 main themes in the solutions section. The extracted themes regarding challenges include "diminished credibility and trust," "operational and bureaucratic challenges," "revenue challenges," "financial reliance on the central government," "inability to attract investment," "legal and structural challenges," and "inefficient expenditure management." Furthermore, the main themes identified for solutions encompass "structural reforms and bureaucracy reduction," "reforming core revenue sources," "decentralization," "enhancing transparency and trust," "incentivizing domestic and international investors," "facilitating private sector participation," "innovating financing instruments," "strengthening sustainable revenue sources," and "diversifying financial resources to reduce reliance on the central government." The results of this research can assist urban policymakers in designing sustainable and efficient financial models tailored to the specific characteristics of urban infrastructure projects in the Tehran Municipality, thereby paving the way for the more effective implementation of urban infrastructure projects.

Keywords

financing challenges
financing urban infrastructure projects
public-private partnership (PPP)
sustainable revenue sources
Tehran Municipality
urban governance

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1. Introduction

Financing urban infrastructure projects represents one of the most critical challenges in global urban governance. With rapid urbanization and the escalating demand for urban infrastructure and services, governments and municipalities face severe difficulties in securing adequate financial resources required to implement these projects.

Municipalities, functioning as non-governmental public entities, must be accountable to citizens, much like any other executive agency (Dehghanpour-Farashah et al., 2023). In recent years, financial issues related to municipal revenues and expenditures have emerged as primary challenges in urban governance and municipal accountability. The expansion of municipal responsibilities, coupled with declining central government budgets, has rendered municipalities among the most vulnerable institutions (Tafazzoli et al., 2023). Municipal revenue streams typically comprise taxes, consumption tolls, and intergovernmental financial transfers. Furthermore, alternative methods such as debt financing via bonds, public-private partnerships (PPPs), and the utilization of innovative financing mechanisms like citizen investment have been proposed (Hosseinikhah et al., 2022). Budget management encompasses structuring revenue sources and allocating expenditures to address societal needs effectively. In this context, collaboration among the state, the private sector, and non-governmental organizations (NGOs) plays a pivotal role in the development of urban infrastructure and services (Rajabi et al., 2021).

To execute urban infrastructure projects, municipalities require massive capital injections. Despite possessing robust economic justifications, many of these projects are delayed due to financial constraints. The significance of municipal financial independence lies in the fact that, in many countries, these institutions operate as local governments and independently make urban economic decisions. The fewer municipalities rely on state budgets for revenue generation, the greater their political and financial stability. Direct reliance on state subsidies increases the vulnerability to political interference in their decision-making processes and exacerbates revenue volatility caused by external decisions. Conversely, revenue autonomy facilitates more precise medium- and long-term planning (Banar et al., 2013).

Accordingly, several Iranian municipalities, including the Tehran Municipality, have strived to advance toward financial self-sufficiency and pursue

mechanisms to attract non-governmental financial resources, such as diverse investment schemes. However, the weakness and underdevelopment of the country's banking system and capital market have hindered the sustainable attraction of financial resources through these channels. Furthermore, the dominance of state-owned banks has subjected the acquisition of substantial loans to lengthy and complex bureaucratic processes, which fundamentally contradicts the objectives of municipal financial independence (Banar et al., 2013).

An analysis of the approved budget of the Tehran Municipality for the year 1402 (2023-2024) reveals that public revenues and expenditures amounted to approximately 76 trillion tomans¹. Of this, 50% was generated from construction-related revenues and 20% from value-added tax (VAT). Concurrently, the shares of borrowing (about 6%) and asset divestment (about 8%) highlight the municipality's dependence on unsustainable resources. In contrast, the share of government aid in the public urban budget remains severely limited (Tehran Municipality, 2023). Such a revenue composition, amidst economic volatility and declining public purchasing power, has intensified the pressure on municipalities, resulting in project delays, cost overruns, and a decline in the quality of public services. In this context, the Sustainable Municipal and Rural Revenue Law (2022) underscores the importance of utilizing novel financial instruments. It authorizes municipalities to leverage mechanisms such as municipal and participation bonds, Islamic Sukuk, public-private partnership (PPP) contracts, project investment funds, long-term loans, asset divestment, and endowment bonds to secure sustainable financial resources (Plan and Budget Organization, 2023). Nevertheless, the operationalization of these instruments within the Tehran Municipality continues to face numerous structural, legal, and administrative hurdles, underscoring the necessity of the current research.

Despite this, international studies indicate that even in countries with advanced banking systems and capital markets, such as the United States, Canada, and the European Union, financing urban projects primarily via banks or stock exchanges is not highly prevalent (Harris & Piwowar, 2004). In Iran, rising inflation, declining oil revenues, an expanding national public budget deficit, and reduced government subsidies to municipalities have posed severe challenges to financing urban infrastructure projects in Tehran. Furthermore, the recession in the housing market has diminished

construction-related revenues, further debilitating the municipality's financial capacity. The consequences of this predicament include delayed commissioning of urban infrastructure projects, frequent contractor turnovers, financial disputes between the municipality and contractors, and even alterations to approved master plans. Field investigations demonstrate that traditional methods such as bond sales, asset bartering, or the sale of building density rights (floor space index sales) no longer satisfy the substantial demands of urban infrastructure projects in the Tehran metropolis. Consequently, adopting innovative financing methods necessitates a rigorous analysis and comprehensive pathology of the current situation.

The majority of domestic studies concerning municipal financing have predominantly concentrated on describing existing problems, rarely focusing specifically on urban infrastructure projects to provide actionable, policy-oriented solutions for their financing. Conversely, financial models proposed in foreign studies cannot be directly implemented without considering the unique institutional and legal barriers prevalent in Iran. This research gap highlights the imperative of conducting this study, which aims not only to meticulously identify the financing challenges of urban infrastructure projects in the Tehran Municipality but also to provide localized solutions tailored to the specific context of this municipality. Accordingly, the primary objective of this research is to identify and analyze the key challenges of financing urban infrastructure projects in the Tehran Municipality and to propose practical, policy-oriented solutions to address them, thereby facilitating improved efficiency within the urban governance system.

2. Theoretical framework and literature review

2.1. Theoretical framework

Urban infrastructure projects and the role of municipalities

Urban infrastructure projects serve as the primary instruments for realizing urban development objectives. They are executed with the aim of enhancing infrastructure and the quality of life for citizens, playing a vital role in the physical and economic development of cities (Akbari et al., 2010). In Iran's urban management system, the legal responsibility for managing and executing these projects is vested in municipalities. According to Article 55 of the Municipalities Law, the core duty of this institution is to provide public services and manage

urban affairs, which encompasses developmental duties such as the construction of streets, squares, and public spaces. With the rapid expansion of urbanization, the scope of municipal responsibilities has broadened from basic service provision to managing urban development and formulating fiscal policies to catalyze private sector participation (Tafazzoli et al., 2023; Akbari et al., 2010).

Within the organizational structure of municipalities, particularly in metropolises, the execution process of urban infrastructure projects is the product of interaction between two primary administrative arms. The Deputy for technical and civil engineering acts as the executor, bearing the responsibility for evaluating, designing, supervising, and executing the projects (Kashanijoo, 2011). However, this process remains incomplete without the support of the deputy for planning and development, which functions as the financing and performance-monitoring arm. This interaction forms a systematic cycle: the planning deputy paves the way for execution by formulating macro-plans and securing budgets; the technical and civil engineering deputy brings the projects to the implementation phase; and ultimately, the planning deputy assesses the projects' success through performance evaluation. This institutional coordination guarantees the cohesion and efficiency of urban infrastructure projects.

Municipal financing

Financing, as a fundamental pillar of economic systems, plays a pivotal role in the sustainability and development of public institutions. The growth and development of municipalities are directly correlated with their access to financial resources, and the timely and efficient provision of capital is a prerequisite for the proper execution of urban infrastructure projects and developmental initiatives (Aboojafari et al., 2014). This critical need is doubly significant in metropolises, which play a central role in national development, as their performance is largely dependent on sound financial management.

As cities expand, the costs associated with executing new projects and maintaining infrastructure have continuously escalated, whereas municipal revenue streams have remained relatively stagnant (Tafazzoli et al., 2023). This gap between expenditures and revenues has driven municipalities toward adopting modern financial instruments that are compatible with Islamic economics, such as participation bonds, Ijarah Sukuk, and Istisna Sukuk (Iqbal & Mirakhor, 2011). In practice, there are diverse experiences of

utilizing these instruments within the country's municipalities. For instance, the Tehran Municipality has extensively utilized participation bonds to finance large-scale projects like metro line expansions and highway construction. Furthermore, the application of various forms of Sukuk to finance public transit fleets and other urban infrastructure projects in Tehran and other metropolises indicates a strategic shift toward these innovative solutions.

Municipal financing methods are categorized into direct and indirect approaches (Tafazzoli et al., 2023). In the direct method, revenues are predominantly sourced from citizens in the form of taxes, tolls, and service fees, which, in addition to generating sustainable resources, foster a sense of public participation. Conversely, indirect methods involve attracting private sector investment and leveraging the capital market, acting as a complement to public resources to strengthen infrastructure and urban development. Selecting an appropriate optimal mix of these methods plays a determining role in financial sustainability and the enhancement of urban performance.

Nevertheless, the financial structure of Iranian municipalities faces a historical and structural challenge. Following Clause B of Note 52 of the 1983 National Budget Law, which mandated the government to submit a municipal self-sufficiency bill, municipalities moved toward independence from the state budget. However, this autonomy resulted in their severe reliance on construction-related revenues, which account for approximately 70% to 80% of their financial resources, leaving municipalities highly vulnerable during periods of economic recession. Consequently, only about 10% of municipal revenues are considered sustainable (Karimnia, 2022). Although a portion of the value-added tax (VAT) has been allocated to municipalities, issues such as centralization, weak financial markets, and the inefficiency of outdated legislation continue to pose significant challenges (Shokri Noudehi, 2017).

To overcome these problems and achieve sustainable revenues, reforming financial structures and transitioning toward a decentralized and transparent system are imperative. Transferring fiscal authority to local levels, enhancing managerial capacities, and drafting new legislation are among the effective measures in this regard (Hatami, 2011). Moreover, to achieve sustainable revenues, municipal fiscal policymaking must be designed to ensure that financial resources are balancedly sourced from three sectors: the public, the government, and the private sector.

Establishing corporate governance, developing advanced financial markets, and strengthening modern financial mechanisms can pave the way for municipalities to overcome economic challenges and achieve sustainable urban development (Shahlacheshm Yousefabad & Hatami Alamdari, 2023).

Modern methods and approaches to financing urban projects

Urban project financing has undergone substantial structural transformation in recent decades, accompanied by the emergence of more innovative approaches. Historically, municipalities relied predominantly on internal resources and earmarked revenues, such as local taxes, municipal levies, and revenues generated from development rights and density sales. Although this traditional model appeared to establish a direct relationship between revenues and expenditures, in practice, it was constrained by severe resource limitations, revenue volatility, and a persistent mismatch between the growing financial requirements of urban development projects and the fiscal capacity of municipalities (Tafazzoli et al., 2023). It was commonly assumed that the expansion of urban infrastructure would broaden the tax base; however, the continuous decline in available financial resources often prevented this virtuous cycle from fully materializing, thereby contributing to stagnation in urban development (Alm, 2015).

In this regard, the transition from conventional budgeting and resource-allocation systems toward a sustainable and efficient paradigm requires moving beyond a one-dimensional perspective and adopting more innovative approaches. The historical dependence on traditional methods and unstable revenue streams has resulted in budgetary fluctuations, disruptions in macro-level planning, reduced efficiency, and diminished transparency—factors that ultimately erode public trust. To break out of this dysfunctional administrative and fiscal cycle, the use of advanced tools and technologies, such as big data and artificial intelligence, has become indispensable for establishing a transparent, data-driven, evidence-based, and accountable framework (Dehghanpour-Farashah et al., 2025b).

With the expansion of urbanization and the increasing complexity of infrastructural projects, traditional approaches fell short of meeting new demands. Consequently, the utilization of financial markets emerged as a modern financing method. Financial markets, comprising the capital market and the money market, enable the attraction of both short- and long-

term resources (Diamond, 1991). Financial instruments such as participation bonds, Murabaha, Ijarah, and land and building funds are among the most critical strategies for funding urban projects. International experiences also confirm the effective role of the capital market in financing large-scale urban projects. However, challenges such as infrastructural weaknesses and municipalities' limited access to capital remain persistent (Diamond, 1991).

Another innovative method is public-private partnership (PPP), which results in the distribution of responsibilities and risks between the public and private sectors (Kirima et al., 2024). Diverse contractual models, such as BOT (build-operate-transfer), BOO (build-own-operate), DBFO (design-build-finance-operate), and lease-operate, leverage the capital and expertise of the private sector in the execution of urban infrastructure projects (Sadeqi et al., 2015). In these models, the public sector typically provides the land or construction permits, and the private sector undertakes the project's execution. Subsequently, both parties share the benefits based on their partnership equity (Yescombe, 2011). Participation often yields better outcomes at lower costs, thereby enhancing the efficiency of urban management systems (Dehghanpour-Farashah et al., 2025a).

Additionally, the application of municipal and participation bonds, alongside providing long-term capital for urban infrastructure projects and managing liquidity, lays the groundwork for the active participation of citizens in urban development (Hosseinikhah et al., 2022).

2.2. Literature review

Domestic studies

Mir Hosseini et al. (2021) conducted a study aimed at investigating modern financing methods for municipal projects in Yazd. Data were collected through library research and questionnaires. The statistical population comprised 50 financial staff members of the Yazd Municipality. Data analysis was performed by applying the Delphi method. The results indicated that methods such as equity participation, profit sharing, Istisna, and credit lines are among the most critical options for reducing project execution costs. Furthermore, reliance on unsustainable revenues was identified as the primary barrier to transitioning toward modern financing methods.

Tafazzoli et al. (2023) conducted research to examine the financing methods of the Tehran Municipality, emphasizing the role of social capital in this process.

The statistical population included senior financial managers, deputies, consultants, financial experts, distinguished professors, revenue managers, and assessment experts. Data were analyzed using the multi-criteria decision-making (MCDM) method. The findings revealed that the participation factor holds higher importance and priority compared to other financing methods. Subsequently, the investment factor ranked second. Bond and legal factors were placed third and fourth, respectively, while the contract factor received the lowest priority.

Yazdani et al. (2023) carried out a study aimed at designing an effective municipal financing model for Tehran and investigating its impact on urban sustainability. This qualitative research was conducted through interviews with 31 experts in urban management, urban finance, and prominent university professors. Thematic analysis led to the identification of 105 basic themes, 19 organizing themes, and two key outcomes: urban social health and the sustainable development of urban pillars. These two outcomes were introduced as the main results of the research as well as indicators for sustainable financing. Additionally, the results demonstrated that factors such as the resistance economy, an active urban cycle, influential stakeholders, and urban livability play a crucial role in urban financing. However, their importance in achieving urban sustainability was evaluated slightly lower.

Sharafi et al. (2024), in their research titled "Modeling Factors Affecting Project Financing Risk," detailed various factors influencing the risk of project financing. These included social risk, contractor risk, construction risk, design risk, legal risk, financial risk, and subcontracting risks.

International studies

Yesufu et al. (2023) evaluated project financing options for small and medium-sized enterprises (SMEs) operating in the construction industry in Nigeria. In this study, the examined options were identified through a comprehensive literature review and grouped into six main categories: commercial banking, traditional financing sources, non-financial institutions, modern financing models, World Bank-related sources, and Islamic (interest-free) banking. To collect data, semi-structured questionnaires were utilized, with 363 questionnaires randomly distributed across construction projects. The findings indicated that small enterprises predominantly rely on term loans, whereas medium enterprises depend on short-term bank facilities (overdrafts).

Mmadi (2023) conducted a study to critically review Malawi's road financing model, analyze its strengths and weaknesses, and provide a sustainable solution to improve road infrastructure financing. By critiquing Malawi's road financing model, the author demonstrated that the current model is incapable of generating sufficient resources for infrastructure development and maintenance, which will lead to a substantial budget deficit (projected at 28% of GDP by 2037). The researcher concluded that a profound gap exists between the desired and actual quality of infrastructure, necessitating fundamental reforms in the revenue model to bridge this gap.

Kirima et al. (2024) investigated the effect of project financing on the performance of road infrastructure development projects in Kenya. The target population for this study comprised 199 individuals involved in 15 road development projects nationwide. The primary data collection instruments were structured and unstructured questionnaires. Furthermore, interviews were employed to gain deeper insights into the research issues. The results demonstrated that project financing has a positive and significant impact on the performance of road projects in Kenya. The study concluded that project financing increases available financial resources while concurrently reducing overall project risk to an acceptable level for stakeholders.

Gap analysis

A review of the literature reveals a dichotomy in the focus of domestic and international studies. Domestic studies, including Tafazzoli et al. (2023), Yazdani et al. (2023), and Mir Hosseini et al. (2021), have predominantly focused on the pathology of the status quo, identifying challenges such as reliance on unsustainable revenues, accumulated debts, and structural barriers. These studies have primarily described the "what" and "why" of the issues within the municipal financing system. In contrast, international studies like Yesufu et al. (2023) and Kirima et al. (2024) have paid closer attention to modern solutions and financial instruments, such as public-private partnerships (PPPs) and modern financing models, focusing on the "how" of problem-solving. However, analyzing these two streams clearly highlights a research gap. On the one hand, domestic studies often remain at the descriptive level, rarely providing operational, policy-oriented models for transitioning away from this state. On the other hand, the models proposed in foreign studies cannot be directly implemented without considering the unique institutional, legal, and bureaucratic barriers specific

to Iran (such as state centralization, a weak capital market, and high investment risks). Therefore, the primary research gap is the absence of a localized, strategic model that, while meticulously identifying domestic challenges, provides operational, "policy-driven" solutions to activate modern financial instruments specifically within the context of urban infrastructure projects in the Tehran Municipality. By employing thematic analysis and extracting the tacit knowledge of executive experts, and by focusing on urban infrastructure projects within the Tehran Municipality, the current research strives to bridge this gap through an in-depth exploration of challenges and solutions from their perspective. In doing so, it elevates existing knowledge from the mere description of problems to the provision of context-appropriate, operational solutions.

3. Research methodology

The current study is designed with a qualitative-applied nature and was conducted using an inductive approach. The philosophical foundation of this research is interpretive, aiming to gain an in-depth understanding of the perspectives and experiences of urban management experts regarding the financing challenges and solutions within the Tehran Municipality. Within this philosophy, social reality is interpreted from the participants' viewpoint, and the researcher strives to extract the latent meanings embedded in their statements. This study is exploratory and applied, wherein data were collected through semi-structured interviews with urban management experts to deeply identify the hidden and complex dimensions of financing urban infrastructure projects. The research population comprised managers and experts in the civil and technical sectors of the Tehran Municipality, who were selected based on their experience and familiarity with financing processes. Purposive and snowball sampling methods were employed to identify suitable candidates. The demographic characteristics of the research participants are presented in Table 1.

The interview questions were meticulously designed to identify the most significant challenges, revenue resource limitations, legal and policy barriers, bureaucratic and administrative bottlenecks, as well as actionable solutions to improve the financing framework of the Tehran Municipality.

The interviews were conducted with the participants' full, informed consent and were audio-recorded, followed by verbatim transcription. Data analysis was

performed using the thematic analysis method. Thematic analysis is a qualitative data analysis technique that involves identifying, analyzing, and reporting patterns or themes within a dataset (Braun & Clarke, 2006). This method enables the researcher to immerse themselves in the data, uncovering profound meanings and latent concepts within the participants' discourse and categorizing them into coherent themes. The data analysis was carried out based on the six-phase approach proposed by Braun and Clarke, utilizing MAXQDA software. The analysis commenced with deep familiarization with the data and meticulous re-reading of the interviews. Subsequently, initial codes were extracted, and conceptually similar codes were grouped into broader, meaningful themes. The analytical process was iterative and recursive, with the researcher constantly moving back and forth between the raw data, the extracted codes, and the analytical results. Given the

nature of the research questions—which focused on identifying financing challenges and solutions—the coding and theme categorization process was conducted in two distinct yet parallel tracks. Initially, all codes related to financing challenges were placed in one category, and all codes related to solutions in another. Within each category, codes were organized based on semantic similarity into sub-themes and, ultimately, into main themes. This separation commenced at the theme generation phase and continued through to the final analysis. The initial themes were reviewed to ensure internal cohesion and alignment with the primary data, after which clear definitions were formulated for each theme. Finally, the concluding report presented all findings and interpretations in two separate sections (financing challenges and proposed solutions) to provide a lucid picture of the Tehran Municipality's financial landscape.

Table 1. Demographic characteristics of the research participants

Participants	Number	Education		Experience			Gender	
		Master's	Ph.D. & above	<10	10-15	>15	Male	Female
Junior manager	6	5	1	2	2	2	4	2
Middle manager	5	5	0	2	3	0	2	3
Senior manager	3	2	1	0	2	1	2	1
Total	14	12	2	4	7	3	8	6

To evaluate the quality and trustworthiness of the findings, the criteria proposed by Lincoln and Guba (1985) were employed, encompassing credibility, dependability, confirmability, and transferability. Credibility was established by incorporating diverse perspectives from the interviewees and continuously assessing the connection between the sub-themes and the main themes. Dependability was achieved by having interviewees review and verify the extracted codes (member checking), as well as utilizing inter-coder reliability and calculating Holsti's reliability coefficient (Holsti, 1969). In this study, Holsti's coefficient exceeded 0.7, thereby confirming the reliability and dependability of the research (Holsti, 1969). Confirmability was guaranteed by thoroughly documenting the interview process and having it audited by supervisory professors and domain experts. Transferability was ensured by selecting interviewees with highly diverse operational experiences, allowing the findings to be generalizable to similar contexts and

municipalities. These measures significantly enhanced the quality and validity of the research, ensuring the accuracy and precision of the results.

The data collection process continued until theoretical saturation was reached. Theoretical saturation refers to the stage in qualitative research where new interviews yield no novel information or codes, and the data reach a point of redundancy and stability. Ultimately, this saturation was achieved after conducting 14 interviews, such that no new themes were extracted from the 12th interview onward. Table 2 illustrates the progression toward theoretical saturation, broken down by each interview. The number 1 indicates a reference to the respective theme in that interview, while the number 0 indicates no reference. As observed in the table, no new themes were introduced in interviews 12, 13, and 14, confirming that theoretical saturation was effectively achieved by the 12th interview.

Table 2. Theoretical saturation of interviews with urban management experts

Category	Main themes	Int. 1	Int. 2	Int. 3	Int. 4	Int. 5	Int. 6	Int. 7	Int. 8	Int. 9	Int. 10	Int. 11	Int. 12	Int. 13	Int. 14
Challenges	Operational and bureaucratic challenges	0	1	1	1	1	1	1	1	1	1	1	1	1	1
	Revenue challenges	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Financial reliance on the central government.	1	1	1	0	0	1	1	1	1	1	1	1	0	1
	Inability to attract investment	1	1	1	1	1	1	1	1	0	1	1	1	0	0
	Legal and structural challenges	1	1	1	1	1	1	1	0	1	0	1	1	1	1
	Inefficient expenditure management	0	0	0	0	0	0	0	0	0	1	0	1	0	0
	Diminished credibility and trust	0	0	0	1	0	0	1	0	0	1	0	1	1	1
Solutions	Diversifying resources & reducing reliance	1	1	0	1	1	0	1	0	0	0	0	0	0	0
	Strengthening sustainable revenues	1	1	1	1	1	1	0	0	0	0	1	1	1	0
	Innovating financing instruments	1	1	1	1	1	1	1	1	1	0	1	1	1	1
	Incentivizing dom. & int. investors	0	0	0	0	0	0	0	0	0	0	1	1	0	1
	Enhancing transparency and trust	1	1	1	0	1	1	1	1	0	0	0	1	0	0
	Decentralization	1	0	0	0	1	0	0	0	1	0	1	0	0	0
	Reforming core revenue sources	0	1	1	1	1	1	1	1	1	1	1	1	1	1
	Structural reforms & bureaucracy reduction	0	1	0	1	1	0	1	1	1	1	1	1	1	1
	Facilitating private sector participation	1	0	0	0	1	1	1	0	1	0	1	0	0	1

4. Research findings

The research findings are categorized into challenges and solutions for financing urban infrastructure projects in the Tehran Municipality, as presented in Table 3. This table delineates the main themes and sub-themes corresponding to each category. As

illustrated, a total of 16 overarching themes and 55 sub-themes were identified. The challenges section encompasses 7 main themes and 23 sub-themes, while the solutions section comprises 9 main themes and 28 sub-themes.

Table 3. Main and sub-themes related to challenges and solutions for financing urban infrastructure projects in the Tehran Municipality

Category	Main themes	Sub-themes
Challenges	1. Operational and bureaucratic financing challenges	1. Institutional gap in financing 2. Institutional discoordination 3. Slow and complex financing process
	2. Revenue challenges	4. Weakness in investment incentives 5. Macroeconomic challenges 6. Corruption and lack of supervision 7. Weak connection to financial markets 8. Weak financial planning 9. Unsustainable internal financial resources 10. Unhealthy revenue structure
	3. Financial reliance on the central government	11. Structural centralization in budgeting 12. Reliance on government budget allocations
	4. Inability to attract investment	13. Weakness in international financing 14. Lack of legal foundation for national and international investment

Category	Main themes	Sub-themes
Challenges	5. Legal and structural challenges	15. Inefficiency of financial infrastructure 16. Operational project barriers 17. Inefficient administrative structure 18. Legal limitations in participatory financing 19. Bureaucracy in bond financing
	6. Inefficient expenditure management	20. Imbalance in prioritization and uneven resource allocation 21. Financial problems and liquidity shortages
	7. Diminished credibility and trust	22. Accumulated debts 23. Decreased municipal credibility
Solutions	1. Structural reforms and bureaucracy reduction	24. Strengthening specialized financial structures 25. Financial independence from the government 26. Digitalization 27. Reducing administrative bureaucracy
	2. Reforming core revenue sources	1. Revenues from urban services 2. Public-Private Partnerships (PPPs) 3. Utilization of financial instruments 4. Rental revenues 5. Sale and exploitation of real estate 6. Construction-related revenues
	3. Decentralization	7. Financial independence 8. Delegation of authority 9. Increasing municipal decision-making power
	4. Enhancing transparency and trust	10. Improving financial transparency via digitalization 11. Increasing overall transparency 12. Improving informational transparency 13. Increasing public trust in the municipality
	5. Incentivizing national and international investors	14. Reforming revenue policymaking and tax structure 15. Incentivizing local investors 16. Defining incentive packages and exemptions 17. Incentivizing international investors
	6. Facilitating private sector participation	18. Reforming policies and creating a legal basis for participation 19. Outsourcing urban services 20. Attracting and supporting private sector investment
	7. Innovating financing instruments	21. Creating specialized financial institutions 22. Utilizing modern financial technologies (Fintech) 23. Forming joint project funds
	8. Strengthening sustainable revenue sources	24. Enhancing municipal financial credibility 25. Access to sustainable revenues 26. Reforming the revenue structure
	9. Diversifying resources and reducing government reliance	27. Reducing government-dependent revenue sources 28. Diversifying financial resources

Figure 1 provides a schematic summary of the main themes within the two categories of challenges and solutions for financing urban infrastructure projects in the Tehran Municipality. The detailed interpretation and elaboration of each theme are discussed below.



Figure 1. Challenges and solutions for financing urban infrastructure projects in the Tehran Municipality

4.1. Challenges of financing urban infrastructure projects in the Tehran Municipality

Operational and bureaucratic challenges

Complex administrative procedures, delays in project approvals, and discoordination among various municipal departments constitute significant barriers to efficient financing. The multiplicity of required permits, weak delegation of authority, and high centralization in decision-making diminish project speed and inflate costs. This challenge aligns with the findings of Sharafi et al. (2024), who identify executive inefficiency and bureaucratic structure as primary obstacles to project progress.

Revenue challenges

Severe revenue volatility, a high share of unsustainable resources (such as construction tolls), and declining government subsidies are among the most pressing municipal financial challenges. Over-reliance on construction-related revenues leads to financial fragility and instability in civil budgets. These findings are consistent with the results of Hosseinihah et al. (2022) and Alizadeh Barandozi et al. (2023), which emphasized the increasing share of unsustainable

resources and the lack of revenue diversification.

Financial reliance on the central government

The municipalities' dependence on government aid and credits restricts financial autonomy and sustainable planning. This reliance reduces flexibility in project execution and causes delays in resource allocation. Such issues were also observed in the research by Alizadeh Barandozi et al. (2023) and Yazdani et al. (2023), which pointed out the low share of self-generated revenues and the detrimental impact of relying on national budgets.

Inability to attract investment

Weak legal infrastructures, a lack of executive guarantees, insufficient economic attractiveness of projects, and a failure to incentivize national and international investors hinder the attraction of domestic and foreign capital. Distrust regarding the return on investment and the absence of transparent participatory models are major obstacles to sustained investment in urban projects.

Legal and structural challenges

Fragmented and occasionally contradictory laws, outdated bylaws, and a weak legal framework related

to financing are among the most critical structural barriers. These obstacles prevent the utilization of modern financial instruments and participatory methods. This observation aligns with the research by Shuliuk et al. (2024) and Sharafi et al. (2024), which highlighted the weaknesses in legal frameworks.

Inefficient expenditure management

Imbalances in resource allocation and the absence of a transparent system for prioritizing projects lead to resource wastage and decreased municipal financial efficiency. This challenge is particularly evident in unnecessary or incomplete urban infrastructure projects.

Diminished credibility and trust

Weak public trust in the municipality's financial performance undermines the Tehran Municipality's credibility and diminishes investors' willingness to participate. A lack of financial transparency, incomplete reporting, and irregular performance in fulfilling repayment obligations are the primary factors eroding the institutional credibility of municipalities.

4.2. Solutions to address the financing challenges of urban infrastructure projects in the Tehran Municipality

Structural reforms and bureaucracy reduction

This solution is an integrated intervention that simultaneously targets two key challenges: "legal and structural barriers" and "operational and bureaucratic challenges." In the Tehran Municipality, the fragmentation of duties between the planning and financial deputies has led to "institutional discoordination" and executive friction. Therefore, this solution is defined at two levels. Structurally, establishing "specialized financial structures" via a "supreme project financing steering committee" is essential to align decision-making. Operationally, "reducing administrative bureaucracy" through the "digitalization" of processes and the creation of a "single window for investment" can significantly shorten the time required for credit allocation and permit issuance. This aligns with the studies by Yazdani et al. (2023) and Sharafi et al. (2024).

Reforming core revenue sources

Redefining traditional resources, such as renovation tolls, and replacing them with value-added urban resources can enhance financial sustainability. Furthermore, implementing an equitable local tax system promotes urban justice and economic efficiency. This solution targets the "unhealthy revenue

structure" challenge, rooted in severe dependence on construction revenues. For the Tehran Municipality, this reform signifies a strategic paradigm shift from the sale of building density rights toward "revenues from urban services" and the "sale and exploitation of real estate." This aligns with Hosseinikhah et al. (2022).

Decentralization

Increasing the financial autonomy of urban districts and municipalities, alongside delegating financial decision-making authority, fosters greater agility in project management. Decentralization enhances efficiency and ensures decisions are tailored to local needs. This solution directly addresses the challenge of "financial reliance on the government" and specifically "structural centralization in budgeting." The heavy concentration of authority in the central headquarters impedes the agility of Tehran's districts. The operational solution involves granting "financial independence" and "increasing municipal decision-making power" at the district level for small- and medium-scale projects.

Enhancing transparency and trust

Regular financial reporting and open access to urban information help boost public trust and attract capital. Transparency is the bedrock of trust and a prerequisite for sustainable participation. This solution was formulated to counter "diminished credibility and trust" and the sub-theme of "corruption and lack of supervision." The primary instruments for achieving this are "improving financial transparency" and "improving informational transparency," which for Tehran Municipality entails making project contracts and financial statements publicly accessible. This aligns with Oppong et al. (2023).

Incentivizing national and international investors

Attracting foreign and domestic capital by providing facilities and guaranteeing return on investment can help diversify the Tehran Municipality's financial resources. Creating a transparent and stable legal environment is a prerequisite for success in this area. This solution addresses the "inability to attract investment," "weakness in investment incentives," and "lack of legal foundation." This incentivization is realized through reforming revenue policies and defining incentive packages. By offering targeted tax exemptions in distressed urban areas and providing credible guarantees, the municipality can encourage participation in infrastructural projects. This aligns with Shuliuk et al. (2024).

Facilitating private sector participation

Leveraging public-private partnership (PPP) models, such as BOT contracts, and establishing supportive mechanisms enhances municipal financial capacity. This solution focuses on overcoming “legal limitations in participatory financing.” Executive instruments include “reforming policies to create a legal basis” and “outsourcing urban services.” In Tehran, revising PPP contractual models to ensure an equitable risk distribution between the municipality and the private partner can break current deadlocks. This aligns with Kirima et al. (2024).

Innovating Financing instruments

Utilizing participation bonds, issuing Islamic financial instruments (Sukuk), and employing modern digital financing methods provide a pathway to resource diversity and sustainability. This solution aims to overcome “weak connections to financial markets” and “inefficient financial infrastructure.” The Tehran Municipality must tap into capital market capacities to attract micro and macro liquidity by creating “joint project funds” and issuing Sukuk for specific projects. This aligns with Shuliuk et al. (2024) and Mmadi (2023).

Strengthening sustainable revenue sources

This explicitly addresses the “unsustainability of internal financial resources.” The operational solution is “reforming the sustainable revenue structure” and “enhancing municipal financial credibility.” Replacing episodic and volatile revenues (like density sales) with predictable sources (such as urban service tolls and waste management fees) restores long-term planning capacity and guarantees budgetary stability against economic shocks. This observation is consistent with Hosseinihah et al. (2022).

Diversifying financial resources and reducing reliance on the government

Diversifying financial resources by combining traditional and modern financing methods mitigates financial reliance on the central government, thereby increasing financial flexibility and resilience. This is a macro-strategy to curb “macroeconomic challenges.” Reducing government-dependent revenues is essential for the optimal financing of urban infrastructure projects in the Tehran Municipality. By investing in emerging sectors like the digital economy and urban tourism, the municipality can diversify its revenue portfolio.

5. Discussion and conclusion

The primary objective of this research was to conduct an in-depth analysis of the challenges facing the

financing of urban infrastructure projects in the Tehran Municipality and to propose policy-driven solutions to overcome the status quo. The thematic analysis of expert interviews revealed that Tehran’s municipal financing system grapples with 7 fundamental challenges: “diminished credibility and trust,” “operational and bureaucratic challenges,” “revenue challenges,” “financial reliance on the central government,” “inability to attract investment,” “legal and structural challenges,” and “inefficient expenditure management.” The analysis of these challenges indicates the existence of a “financial vicious circle” in Tehran’s urban management. Historically, reliance on unsustainable revenues, such as the sale of building density rights, has led to budget volatility and planning disruptions, which, coupled with decreased efficiency and transparency, have resulted in the erosion of public trust and capital flight.

In response, this study identified and formulated 9 strategic solutions: “structural reforms and bureaucracy reduction,” “reforming core revenue sources,” “decentralization,” “enhancing transparency and trust,” “incentivizing national and international investors,” “facilitating private sector participation,” “innovating financing instruments,” “strengthening sustainable revenue sources,” and “diversifying financial resources.”

A comparative analysis of these findings against existing literature demonstrates the theoretical and practical innovation of the current research. While domestic studies have predominantly focused on describing the problems, and foreign studies have proposed solutions tailored to advanced economic contexts, this study successfully bridges the gap between challenges and actionable solutions.

Based on the research findings, transitioning from a traditional financial system to a sustainable and efficient financial paradigm in the Tehran Municipality requires coordinated actions across three distinct levels:

A) Structural and institutional level (municipality and city council):

1. Implementing “financial decentralization” and delegating budgetary authority to urban districts to enhance systemic agility.
2. Establishing a “supreme project financing committee” and a “single window for investment” to eliminate discretionary monopoly approvals (commonly referred to as ‘golden signatures’) and reduce bureaucracy, directly aiding in the restoration of investor confidence.

B) Instrumental and executive level (financial and economic deputy):

3. Shifting from “bank borrowing” toward the “capital market”; establishing land and building funds, and issuing usufruct bonds based on urban assets.

4. Replacing revenues generated from the sale of building density with sustainable revenue streams, such as “user fees” and revenues derived from the digital economy and urban tourism.

C) Legal and governance level (central government and parliament):

5. Revising public-private partnership (PPP) laws to ensure an equitable distribution of risk between the public and private sectors, as the current legal vacuum is a primary barrier to attracting investment.

In conclusion, the sustainable financing of urban infrastructure projects in the Tehran Municipality is contingent upon moving away from a traditional view of financial resources and advancing toward a hybrid, multi-layered paradigm. In this model, internal and external resources, traditional and modern methods, and public and private partnerships must be utilized synergistically within a transparent and accountable framework. Achieving this requires collective will and sustained coordination among various institutions, including the municipality, the city council, the Ministry of Interior, the Ministry of Economic Affairs and Finance, the Plan and Budget Organization, and the national banking system.

It is recommended that future researchers focus on the feasibility of implementing each proposed solution within the specific context of the Tehran Municipality or conduct comparative studies with successful regional and global metropolises to provide highly detailed and operational models for each of the nine strategic solutions.

Authors' Contributions

The first author contributed 50%, the second author contributed 30%, and the third author contributed 20% to this research.

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Conflict of Interest

The authors declare no conflict of interest.

EndNotes

ⁱ Toman is the superunit of the official currency of Iran, the rial (1 toman = 10 rials).

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