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Ranking of innovative financing instruments for urban projects using a hybrid multi-criteria approach (case study: Hamedan Municipality)

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Abstract

With the expansion of metropolises and the increasing demand for urban services, traditional municipal revenues are not sufficient to cover development and current costs. This financial gap makes the move towards modern financing methods necessary. The present research was conducted with the aim of prioritizing 24 innovative financing instruments (derived from the literature) for 5 selected projects of Hamadan Municipality, employing a quantitative strategy and utilizing the opinions of 15 experts in the field of finance and investment. For this purpose, multi-criteria decision-making (MCDM) techniques were applied, wherein the weighting of criteria was performed through the Analytic Hierarchy Process (AHP), and the final ranking of alternatives was conducted using the TOPSIS technique. Findings showed that among the five criteria (risk, cost, time, return, and efficiency), the "efficiency" indicator, with a weight of 0.476, holds the highest importance in selecting the financing method. Furthermore, the project prioritization results indicate that in large-scale and revenue-generating projects with stable cash flows, participatory methods of the BOT family are the priority. Whereas for real estate projects lacking continuous income and based on asset value, the instruments of "land and building fund," "civil partnership," and "barter" are considered preferred options. In commercial projects, the "civil partnership" method also achieved a superior position. Finally, the results emphasize the necessity of municipalities transitioning from traditional financing methods to modern modes relying on private sector investment and demonstrate that selecting the appropriate method does not have a single solution and must be undertaken flexibly and in proportion to the nature and scale of each project.

Keywords

Hamadan
Multi-criteria decision making
Public-private partnership (PPP)
Urban financing

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1. Introduction

Municipalities are public non-governmental institutions in Iran. Unlike many European and American countries that benefit from government subsidies, Iranian municipalities have been required to provide their own financial resources following the implementation of the self-reliance policy in the 1980s and the absence of their budget allocation in the national budget law. Although this approach has presented municipalities with numerous challenges, they are compelled to generate revenue through various legal mechanisms to compensate for their lack of financial dependence on the government and to expend the resulting resources on fulfilling their assigned duties and managing urban affairs (Karimniya, 2022).

According to Article 55 of the Municipal Law, these institutions are responsible for duties such as constructing streets and thoroughfares, city cleaning and maintenance, developing parks and green spaces, providing water and lighting, establishing cemeteries and slaughterhouses, and overseeing public health. Generally, municipal revenue sources are categorized into four main groups: local taxes, service fees and tolls, intergovernmental transfers (government aid), and borrowing (Feizi Tootkaleh et al., 2021). These revenue sources may have addressed the financial problems of municipalities at the time of their enactment. However, they currently fail to cover current and development expenditures (Karimniya, 2022), and each is "unsustainable" to varying degrees. One of the most significant challenges of urban management in Iran is the instability of these revenue sources. Municipalities have been confronted with financial difficulties due to over-reliance on unsustainable revenues (Danesh Jafari et al., 2014). The heavy dependence of the municipal revenue sector on urban construction and the sale of excess density (floor area ratio) has placed the municipal financial sector in a state of instability (Ragheb & Shahri, 2020). Studies indicate that approximately 80 to 90 percent of Tehran Municipality's revenue depends on the construction sector, which is considered a prime example of unsustainable revenue (Danesh Jafari et al., 2014). This intense dependency makes municipalities highly vulnerable to booms and recessions in the housing sector and further undermines the conditions for achieving sustainable urban development (Basiri Parsa & Akbari, 2010).

However, the question arises: what is the solution to this problem, and which sources should municipalities utilize to finance urban projects? The solution lies in the application of innovative financing instruments, which the legislator has authorized for municipalities under Article 1 of the "Law on Sustainable Revenue and Expenditure for Municipalities and Village Administrations." Given that traditional revenue sources cannot cover all the investment and development needs of municipalities, it appears essential for municipalities to turn toward financial markets and private sector partnerships to mobilize the necessary financial resources (Ragheb & Shahri, 2020).

Although some Iranian metropolises, such as Tehran and Mashhad, have experience in utilizing innovative financing instruments, the application of these instruments has not yet become "pervasive and systematic" in many of the country's municipalities. In practice, the bulk of their financing still relies on traditional revenues (Danesh Jafari et al., 2014). Consequently, employing a diverse portfolio of these financing methods and the associated technical knowledge remains a novel approach for most municipalities, especially for cities like Hamedan.

Innovative financing instruments have emerged as a prominent means to encourage increased private sector investment. These instruments are not necessarily new. Instead, they can be innovative in terms of their application or the combination of existing mechanisms and structures to incentivize investors to increase the flow of investment into urban projects. This innovation arises from new combinations of various types of financial instruments and the creation of new partnerships among finance providers (Gouett et al., 2023).

While numerous studies have been conducted regarding urban project financing through private sector participation and the implementation of innovative financing instruments in other Iranian municipalities—using similar or different research methodologies—this study specifically focuses on the city of Hamedan and its development projects. Adopting an applied approach, this research aims to identify and select the most appropriate financing methods for several Hamedan Municipality projects that require funding.

2. Theoretical framework

Municipal financing is defined as the provision of efficient systems and resources to secure liquidity and address the financial requirements of municipalities (Naghavi & Heidarpoor, 2018). The objective of this

approach globally is to generate the necessary resources to finance local services, aiming for citizen satisfaction. Municipal financing is crucial for ensuring the sustainability and stability of goods and services provided by local governments.

The effective mobilization of municipal financial resources is essential for several reasons: in the absence of a robust and continuous revenue stream, the sustainable development of cities and towns remains unattainable. One consequence of financial inadequacy is that urban authorities will lack the resources required for effective strategic planning. Furthermore, unless precise mechanisms for revenue generation from local citizens are established, achieving fiscal accountability becomes impossible, thereby placing undue pressure on local governments.

2.1. Municipal financing approaches

In the past, municipalities utilized their internal budget resources to finance urban infrastructure projects. This method, referred to as "traditional financing," primarily relied on internal municipal budget sources and is therefore considered a type of on-budget financing. In this approach, municipalities secure the necessary financial resources for infrastructure projects by collecting local tolls and taxes. Consequently, no specific relationship exists between project revenues and the financial resources used for their implementation. In fact, financing is conducted through cost allocation.

The core assumption of this method is that the execution of infrastructure projects leads to the expansion of urban activities, which in turn increases the tax base. Thus, a virtuous cycle is created between infrastructure project implementation, activity development, an increased tax base, and subsequently, the execution of more extensive projects. The fundamental flaw in this assumption lies in the limitations regarding the scope and volume of resources. As the components of this cycle are sequentially dependent, the pace of activity expansion is slow, and this process cannot adequately accommodate the ever-increasing growth of urban activities. Under such conditions, the scarcity of financial resources for infrastructure projects leads to constraints on urban activity development, ultimately resulting in a slowdown in the urban development process and project implementation (Banar et al., 2013).

Sole reliance on internal municipal budget resources poses significant challenges to financing large-scale and long-term urban projects, thereby highlighting the necessity of utilizing off-budget financial resources. In this regard, financial markets have gained attention as a platform for mobilizing financial resources.

A financial market refers to a marketplace where the necessary financial resources for projects are provided. More technically, in a financial market, buyers and sellers engage in the trading of assets such as stocks, securities, currencies, and derivatives. Based on maturity, financial markets are classified into two types: the money market and the capital market. The money market encompasses short-term financial resources, typically with a maturity of up to one year, while the capital market involves long-term financial resources (exceeding one year). In both markets, financial instruments are utilized for financing.

Numerous arguments support the preference for the capital market over the money market, citing factors such as long-term financing, market depth, the diversity of instruments and institutions, and overall market volume. Through the use of financial instruments (particularly within the capital market), the concept of long-term resource mobilization via the secondary market has emerged, which plays a pivotal role in the comparative analysis of urban project financing methods (Banar et al., 2013).

Financing through the capital market offers numerous advantages for issuers, including access to a broader range of investors—such as individual investors, investment funds, insurance companies, and financial institutions—which contributes to the diversification of financial resources and reduces reliance on a single source. This approach can also decrease companies' dependence on the banking system and, in some cases, lower financing costs due to more favorable interest rates and service fees. Moreover, participation in the capital market and the issuance of securities, owing to stringent admission procedures and rigorous oversight by the Securities and Exchange Organization, enhances corporate credibility and reputation, thereby strengthening investor confidence.

Public-private partnership (PPP) is another approach to financing and implementing urban projects. This model serves as an efficient framework for allocating responsibilities, risks, and benefits between the public and private sectors.

PPP is a mechanism in which the public sector utilizes private sector capacities—including knowledge, experience, and financial resources—to provide

infrastructure services. In other words, PPP involves a contractual arrangement between the public sector (such as the government or municipality) and the private sector for the design, construction, financing, maintenance, and operation of public assets or services through private sector investment or management over a specified period. This arrangement ensures that operational risks are transparently shared between the public and private sectors. Furthermore, financial payments to the private sector during the project's operational phase are fulfilled through project revenues or by the public entity as the consumer of the project's services. Accordingly, in PPP, the public sector's role shifts from direct investment, execution, and operation to policymaking, regulation, and overseeing the quality and quantity of services delivered (Ghafari et al., 2021).

The implementation of projects through the public-private partnership (PPP) model offers numerous benefits for municipalities, including: (i) attracting private sector capital, which allows municipalities to overcome budget constraints by leveraging private resources; (ii) cost reduction while maintaining quality, as the private partner is incentivized to minimize long-term maintenance costs by ensuring high-quality construction; and (iii) accelerated project completion, given that the private partner's profitability depends on the timely commissioning of the project to avoid financial losses and idle capital.

2.2. Classification of municipal projects and financing mechanisms

Municipalities predominantly provide goods and services that the market, for various reasons, fails to supply efficiently at the urban level. Generally, the scope of market intervention is limited to goods and services characterized by rivalry and excludability, wherein consumption by one individual precludes consumption by another, and for which property rights and pricing mechanisms can be clearly defined. These are categorized as private goods. Conversely, some goods are non-rivalrous and non-excludable. Despite requiring significant production costs, the individual segregation and sale of these goods to consumers is either impossible or prohibitively expensive. Consequently, the provision of such goods falls under the responsibility of the public sector and local governments.

Accordingly, municipal outputs are classified into three primary categories based on the degree of rivalry: pure public goods, impure public goods, and private goods (Yari, 2011). While the provision of each category within the urban context necessitates financial mobilization, the respective financing mechanisms differ significantly. To fund the production and supply of public goods and services, municipalities are compelled to rely on taxation and levy mechanisms to secure their investments. In contrast, for private goods and services, it is feasible to recover the costs by charging user fees or prices directly to the respective consumers.

Consequently, it can be inferred that municipalities generally employ the traditional financing approach, founded on tolls and taxation, for the provision of pure public goods and services. Conversely, the utilization of innovative financing instruments is essential for financing private projects and certain impure public goods. Due to their revenue-generating potential, these categories of projects exhibit greater investment attractiveness for the private sector, thereby facilitating the application of capital market instruments and public-private partnerships.

Sohrabi et al. (2026) identified 24 innovative financing instruments and methods for municipalities, categorizing them into three primary groups:(i) asset-based methods, which refer to approaches where the assets of the project or the issuer serve as the primary mechanism for capital attraction; (ii) debt-based methods, in which financing is secured through borrowing from various sources (such as banks and investors), with the recipient committed to repaying the principal and interest over a predetermined period; and (iii) equity-based methods, founded on partnership models, where financing is facilitated through the issuance of shares or investment units to both retail and institutional investors.

Subsequently, Table 1 delineates the operational mechanisms of each method and provides a comparative analysis of these instruments in terms of time horizon, initial liquidity requirements for the employer, and the extent of risk transfer to the private sector.

Table 1. Innovative municipal financing instruments and methods

Category	Financing instrument	Implementation mechanism	Application	Time horizon	Initial liquidity	Risk transfer
Asset-based instruments	Bot family	Private sector construction and operation; final transfer to the public sector	Projects with sustainable income	Long term	Very low	High
	Civil partnership agreement	Combining the parties' capital to perform a specific task and profit sharing in proportion to the contribution	Commercial, residential	Medium term	Low (non-cash)	Medium (divided between parties)
	Joint venture	a strategic alliance of two or more firms with the sharing of resources and management	Large projects requiring expertise and complementary resources	medium-term to long-term	Medium (divided between parties)	Medium (divided between parties)
	Buy back	Contractor investment and repayment of principal and interest solely from the product	Industrial/manufacturing with a specific product	Medium-term (10-12 years)	Low (costs with contractor)	High
	Epcf contract	Design, construction, and financing by the contractor	Urgent construction projects	Medium term	Low	Medium (execution and finance risk = contractor, repayment = employer)
	Foreign investment	Share acquisition and managerial control of the project by a foreign investor.	Large industrial and infrastructure projects, technology transfer	Long term	Low	High
	Barter	Debt settlement by transferring property/concession to the contractor	Construction and building projects	Short term	Very low	High
	Oil barter	Allocation of crude oil for the import of equipment	Purchase of transportation fleet (metro/bus)	Medium term	Very low	High
Debt-based instruments	Participation bonds	Issuance of bonds with provisional and final profit	Profitable projects with cash flow	Medium term (4-5 years)	Low (issuance cost)	Low (risk is on the bond issuer)
	Ijarah sukuk	Financing for new assets or based on existing assets through lease-to-own	Purchase or monetization of real estate, machinery, and vehicles	Medium term (3–7 years)	Low (issuance cost)	Low (they are the owner of the asset)
	Istisna sukuk	Issuing bonds and collecting funds for ordering the construction of a new project	New industrial or construction projects	Medium term (2 to 5 years)	Low	Medium (project completion risk)
	Murabaha sukuk	Purchase of goods by an intermediary and installment sale to the employer	Purchase of raw materials and capital goods	Short term	Low	Low (risk is with the employer)
	Ju'alah sukuk	Financing construction and renovation with joint ownership rights	Major repairs and contracting services	Short term	Low	Low
	Parallel salam sukuk	Pre-sale of goods produced in the future	Financing of exchange-traded commodity producers	Short term	Low	Medium
	Islamic treasury bills	Transfer of term debt bonds to the creditor with tradability	Settlement of contractors' overdue debts	Short term	Very low	Low

Category	Financing instrument	Implementation mechanism	Application	Time horizon	Initial liquidity	Risk transfer
Debt-based instruments	Productive credit certificates (gam)	Tradable bank credit certificate in the supply chain	Production chain working capital	Short term	Very low	Low
	Barat card	Bank guarantee of debt payment at maturity	Guaranteeing payment to contractors	Short term	Low (collateral)	Low (bank guarantee)
	Bank borrowing	Receiving a loan with a fixed rate and collateral	Projects with fixed income	Short term	Very low	Very low (collateral)
	Leasing	Purchase and lease-to-own of assets to the employer	Purchase of durable goods and machinery	Medium term	Low	Low (ownership with the leasing company)
	Crowd funding	Collecting small online amounts	Attractive and innovative plans	Short term	Low	High (direct risk to the people)
Equity-based instruments	Land and building fund	Collecting small funds for construction on land	Building	Medium term (construc-tion and sale)	Low (land)	High
	Project fund	Formation of a fund dedicated to a project (conversion to public shares)	Large-scale economic projects	Long term	Low	High
	Real estate investment trust (REIT)	Investment in constructed real estate, leasing, and selling it	Monetization and increasing liquidity of real estate assets (public sector)	Long term	Very low	Medium (depends on the property and rental market)
	Project company (public joint stock)	Establishment of a public joint-stock company and underwriting in the stock market from the beginning	Large construction and industrial projects with economic justification	Long term	Low	High

3. Literature review

To date, numerous studies have been conducted with the objective of identifying and implementing innovative financing instruments and methods for municipalities, both in Iran and internationally.

3.1. Domestic studies

Tafazoli et al. (2023) conducted a study titled "Evaluating financial service methods in municipalities and introducing the appropriate method." This applied research utilized a quantitative, survey-based approach, specifically focusing on the Tehran Municipality. Data analysis using multi-criteria decision-making (MCDM) methods revealed that the "participation" factor holds the highest level of significance among various financing methods. The findings indicate that social capital not only reduces costs but also strengthens the interaction between citizens and the municipality, thereby facilitating the efficient and targeted realization of urban development goals.

Eslami Bidgoli et al. (2022) conducted a research project titled "Comparative research of sources and financing methods of Tehran Municipality with other cities in the world" to identify sustainable financial resources for Tehran. By analyzing the revenues of ten selected cities and utilizing a fuzzy-based methodology integrated with expert opinions, they evaluated the sustainability and feasibility of various financial resources. The findings demonstrated that Public-Private Partnerships (PPP), operational revenues, and the issuance of bonds and Sukuk possess higher sustainability and feasibility compared to other sources.

Berenjian Tabrizi (2021) conducted a study titled " How to finance urban development plans using stocks in municipalities," in which the efficiency of equity shares for financing urban projects was investigated through a comprehensive review of domestic and international literature. Utilizing a causal-analytical approach and performing data analysis via SPSS 19, the research demonstrated that equity shares are economically viable instruments for financing urban schemes. Furthermore, the findings revealed that among existing methods, Participation Bonds are considered the most efficient mechanism for financing urban development projects.
Vatandoust (2020) conducted a study titled "Financing and investment methods in municipalities," exploring the financial challenges municipalities face in funding urban project costs. Utilizing a descriptive approach based on archival research, the study analyzed various financing methods and investment strategies available to municipalities. The findings indicate that internal municipal resources are typically insufficient to meet their financial requirements. Consequently, the research suggests that the execution of urban projects necessitates leveraging external financial systems beyond internal resource pools.
Shahnazi et al. (2017) conducted a research project titled "feasibility of using waqf bonds in financing municipalities projects and examining its welfare effects in comparison with municipal tax: a case study of Shiraz, Iran" Utilizing an analytical-applied and survey-based approach, this study evaluated the efficiency of waqf bonds (endowment bonds) as an innovative instrument for financing urban projects in Shiraz. The results indicated that public trust in the municipality, belief in the effectiveness of waqf bonds for project financing, citizens' attitudes toward paying tolls, and the amount of tolls already paid are significant factors influencing the willingness to invest in these bonds. These findings suggest that waqf bonds represent a reliable and viable option for financing infrastructure projects and providing public urban services.
Banar et al. (2013) investigated "External financing of urban projects and efficiency of city services (The case of Tehran Municipality)" comparing Tehran with other selected global municipalities. The research demonstrates that, compared to its international counterparts, Tehran Municipality has utilized significantly lower levels of foreign financing in its projects. Furthermore, the study concludes that leveraging international funding for urban projects offers substantial long-term benefits for the Tehran Municipality.

3.2.International studies

Asumadu et al. (2023) conducted a study titled "Analysis of urban slum infrastructure projects financing in Ghana: A closer look at traditional and innovative financing mechanisms". The primary findings indicate that among innovative financing instruments, Public-Private Partnership (PPP) and municipal bonds are recognized as the most efficient options for such contexts.
Koniagina et al. (2021) conducted a study titled "Crowdsourcing and crowdfunding in the management of large cities." The findings indicate that although Russian citizens show interest in social projects, most of the implemented projects are predominantly commercial in nature. In addition to identifying existing barriers, the study provides recommendations for improving the effective use of these financing methods.
Al-Ajlouni and Al Habeeb (2020) carried out research titled "Municipal Sukuk as a model for financing municipalities and public service institutions in Saudi Arabia". The results demonstrate that municipal sukuk can serve as an effective financial instrument to meet the fiscal requirements of municipalities and public service entities within the Saudi Arabian context.
Singla et al. (2019) investigated alternative financial instruments for infrastructure needs in U.S. municipalities following the economic recession in their study, "Paying for infrastructure in the post-recession era: exploring the use of alternative funding and financing tools". The findings revealed that municipalities are increasingly pursuing alternative strategies such as green bonds, PPP, and privatization. Furthermore, factors such as the specific type of instrument and prevailing political conditions play a crucial role in the decision-making process.
Aleksandrova and Zheleva Kalcheva (2019) performed a study titled "Alternatives for financing of municipal investments - green bonds". This paper analyzes alternatives for municipal investment financing related explicitly to climate change. It evaluates the positive aspects and opportunities within the green bond market while assessing the obstacles associated with this financing model.

4. Materials and methods

The present study is applied in nature and adopts a descriptive–analytical design with a quantitative approach in terms of data collection and analysis. A survey-based multi-criteria decision-making (MCDM) model was employed to collect and analyze expert judgments. The research alternatives consisted of 24 innovative financing instruments, selected based on the model proposed by Sohrabi et al. These alternatives were evaluated based on five key criteria to prioritize them for five selected projects of Hamedan Municipality.

A systematic literature review (SLR) was conducted to identify and select the criteria influencing the choice of innovative financing instruments. In the first stage, relevant studies were searched in reputable scientific databases using keywords such as “urban financing,” “evaluation of financing methods,” “prioritization of financing instruments,” and “multi-criteria decision-making” over the past ten years, resulting in the identification of 30 initial studies.

In the second stage, a step-by-step screening process was performed by reviewing article titles, abstracts, and full texts. The studies were evaluated based on predefined inclusion and exclusion criteria. Inclusion criteria included direct relevance to urban projects and municipalities, and the provision of operational indicators for ranking financing methods. Conversely, studies addressing non-urban domains or lacking a criteria-based framework were excluded. Ultimately, 11 eligible articles were selected for final analysis.

In the third stage, qualitative content analysis was applied to extract all criteria used in the 11 selected studies, which were then categorized into a frequency matrix. Finally, the five criteria with the highest relative frequency in the literature were selected as the final criteria of the study.

Table 2. Identification and frequency of research criteria in the literature

No.	Articles / Criteria	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
1	(Hosseini & Alibakhshi, 2023)	☑	-	☑	☑	-	☑	☑	☑	-	-
2	(Shahbazi et al., 2021)	☑	☑	☑	-	☑	-	-	-	-	-
3	(Bahrololoum & Bakhtiar, 2020)	☑	☑	☑	-	-	-	-	-	-	-
4	(Damoori & Javidan, 2019)	☑	-	☑	-	-	-	-	-	-	-
5	(Hajiani et al., 2018)	☑	☑	☑	☑	-	-	-	-	-	-
6	(Yarmohammadian et al., 2018)	☑	-	☑	-	☑	☑	-	-	-	-
7	(Vosoughi et al., 2017)	-	-	-	-	☑	-	-	-	☑	☑
8	(Mehrmanesh & Hatami, 2017)	-	☑	-	-	☑	-	-	-	☑	☑
9	(Noorzai et al., 2016)	☑	-	☑	☑	-	-	☑	☑	-	-
10	(Ghorbani & Azimi, 2015)	-	☑	-	-	☑	☑	☑	-	☑	☑
11	(Moayedfar et al., 2013)	☑	☑	-	☑	-	☑	-	-	-	-
-	Frequency (repetition)	8	6	7	4	5	4	3	2	3	3

Table guide: C1: risk , C2: financing cost , C3: time (access to resources) , C4: yield/return , C5: efficiency , C6: volume/capital adequacy , C7: laws and regulations , C8: guarantees , C9: sustainability , C10: equity

As presented in Table 2, the criteria with the highest frequency across the reviewed studies were screened and selected. Accordingly, the five primary research criteria are: (1) risk, (2) financing cost, (3) time (access to resources), (4) yield/return, and (5) efficiency. The definitions of these criteria are provided in Table 3.

Table 3. Criteria used in the Analytic Hierarchy Process (AHP)

No.	Criterion	Definition
1	Efficiency	This refers to the degree of practicality of the proposed method for municipal projects, as well as its capability and feasibility in financing the intended project. It may be argued that none of the financing tools or methods is inherently superior to the others. Rather, each is suited to a specific type of project based on particular conditions and characteristics.
2	Financing cost	This refers to all costs incurred by a municipality to gain access to financial resources through a given financing method. For instance, in public–private partnership (PPP) approaches, such costs include expenses related to tendering processes, advertising, marketing, and investor attraction. In contrast, capital market–based methods involve costs such as consultancy fees, market making, underwriting commitments, and interest payments on the issued financial instruments (Bahrololoum & Bakhtiar, 2020).
3	Time to access financial resources	This refers to the time interval between the initiation of a financing method by a municipality and the point at which access to the intended financial resources is achieved. This duration varies across different financing methods (Yarmohammadi et al., 2017).
4	Return	This refers to the level of revenue or net profit generated for the municipality through the implementation of the selected financing method for the project (Zakernia et al., 2016).
5	Risk	This refers to the degree of uncertainty associated with the return of the selected financing method. Risk may be assessed based on the level of success and profitability of the implemented method, as well as the municipality's ability to meet its debt repayment obligations (Mousavian et al., 2012).

The study population consisted of 15 experts in the field of urban finance and investment, selected through purposive sampling based on their relevant expertise and professional experience. The required data were collected using two structured questionnaires: a pairwise comparison questionnaire to determine the relative weights of the criteria, and a decision matrix questionnaire to conduct the final ranking of the alternatives. The demographic characteristics of the experts are presented in Table 4.

Table 4. Demographic characteristics of the experts

Demographic characteristics	Category	Frequency	Percentage (%)
Education level	Master's degree	8	53%
	Ph.d.	7	47%
Field of study	Financial management	3	20%
	Accounting	4	27%
	Economics	2	15%
	Urban planning	1	7%
	Strategic management	1	7%
	Financial engineering	2	15%
	Industrial engineering	1	7%
Professional position	University faculty member	5	34%
	Financing manager (investment bank)	2	14%
	Financing expert (investment bank)	3	20%
	Deputy of the municipal investment organization	1	7%
	Member of the Hamedan city council	1	7%
	Stock market expert	2	14%
	Expert at the general office of economic affairs and finance	1	7%
Total		15	100%

4.1 Validity and reliability of the research instrument

To evaluate the reliability of expert judgments in pairwise comparisons and ensure their logical consistency, the inconsistency ratio (IR) was calculated using Expert Choice software. According to the principles of the Analytic Hierarchy Process (AHP), an IR value below 0.1 confirms matrix consistency and response validity (Saaty, 1980). In this study, the IR was 0.02, indicating a high level of judgmental consistency and reliably calculated weights.

Furthermore, in quantitative research, statistical dispersion measures, especially standard deviation (SD), are commonly employed to assess the degree of agreement and demonstrate expert consensus. SD measures the dispersion of expert responses around the mean.

Lower values indicate that most expert ratings are clustered near the mean, reflecting minimal divergence and a high level of consensus (Greatorex & Dexter, 2000).

Based on statistical principles, the acceptance threshold for this index depends on the length of the rating scale. Generally, if the average SD is less than one-fourth (or, under more stringent conditions, one-sixth) of the scale range, it is considered desirable and indicative of strong consensus (Hsu & Sandford, 2007). Given the use of a 10-point scale (with a range of 9) in the present study, SD values below 1.5 indicate an excellent level of consensus. In contrast, values below 2.25 represent a reasonable and acceptable level.

The low SD values observed suggest that, despite the relatively small sample size (15 experts), a shared understanding of the subject matter was achieved. This indicates sample adequacy (Etikan et al., 2016), implying that the inclusion of additional experts would not result in significant changes in the mean scores or final rankings. The following table presents the SD results for the five projects examined.

Table 5. Mean standard deviation of responses in the decision matrix

No.	Project title	Mean standard deviation (SD)
1	Aghajani beig multi-storey parking	1.62
2	Kababian complex	1.35
3	Hamedan birds market	0.98
4	Ghanizadian project	1.94
5	Shahid Bashiri Stadium	1.27

4.2. Data analysis methods

In the first stage, the AHP was employed to determine the weights and relative importance of the five identified criteria. Through this approach, experts performed pairwise comparisons of the criteria, and the resulting data were analyzed using Expert Choice software to derive the final weights.

In the second stage, the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) was utilized for the final ranking of the 24 financing instruments across each of the five selected projects. This technique prioritizes alternatives based on their simultaneous distance from both the positive ideal solution (PIS) and the negative ideal solution (NIS).

4.3. Introduction of the selected projects

This section provides a brief overview of the five projects selected from Hamedan Municipality. These initiatives were identified and proposed by the deputy for planning of Hamedan Municipality as priority projects requiring innovative financing mechanisms. The general characteristics and technical specifications of these projects are summarized in Table 6.

Table 6. General characteristics of the selected research projects, based on information provided by the deputy for planning of Hamedan municipality to the researcher

Project title	Usage	Area (m2)	Project specifications/details
Aghajani Beig multi-storey parking	Parking, office, and commercial	24200	Established to address the parking demands on Madani Blvd. The site covers 41,000 m² with a total built-up area of 24,200 m², comprising 2,000 m² of commercial, 1,200 m² of office, and 21,000 m² of parking space. The 8-story structure has a total capacity of 531 parking units.
Kababian complex	Commercial, hospitality, restaurant, and parking	11000	Aimed at the urban regeneration of the Kababian neighborhood to boost tourism. The 4-story complex includes a commercial ground floor, a first floor for accommodation and a restaurant, and two basement levels for parking (150 spaces). The commercial section features 15–16 large units (80–120 m2 each) dedicated to tourism-related crafts (handicrafts, pottery, and souvenirs). The Hamedan Municipal Civil Engineering Organization completed the whole architectural design.
Hamedan birds market	Ornamental bird market	20000	Designed to organize and centralize bird vendors into a specialized market. The project is planned in three phases: Phase I (5 floors: 3 commercial and 2 basement parking); Phase II (4 floors: 2 commercial, 2 basement parking); and Phase III (2 floors: 1 commercial, 1 basement parking). It includes 170 commercial units (avg. 45 m2) to be sold to vendors.
Ghanizadian project	Residential and commercial	5000	A mixed-use residential-commercial building is currently in the preliminary design stage by the Municipal Civil Engineering Organization. The land has been acquired. The 9-story concept includes 6 residential floors, 1 commercial floor, 1 parking level, and 1 floor dedicated to a sauna and jacuzzi. Located on Ghanizadian Blvd, Ostadan.
Shahid Bashiri Stadium	Multi-purpose sports hall	1720	Established to promote public health and leisure. All necessary permits and licenses have been obtained. The architectural design and structural framework (skeleton) have been completed by the municipality in compliance with all relevant engineering standards. The facility consists of two floors, each 860 m2

5. Results

As previously discussed, the evaluative criteria were derived from a comprehensive review of the scientific literature. To assess the relative significance of each criterion, a pairwise comparison questionnaire was developed and administered to a panel of 15 experts, whose demographic profiles are detailed in Table 4. The collected data were processed and analyzed by applying Expert Choice software to determine the final weights. The synthesized weights for each criterion are presented in Table 7.

Table 7. Final weights of the research criteria

Criteria	Final weight
Efficiency	0.476
Return	0.183
Risk	0.127
Time to access financial resources	0.126
Financing cost	0.088

Following the determination of the criteria weights, appropriate financing methods for each project were prioritized using the TOPSIS. A structured TOPSIS questionnaire was developed for each project and administered to the panel of experts. By averaging expert judgments, a decision matrix was constructed for each project. Following normalization of the decision matrices and the application of criteria weights, the distances of each alternative from the positive ideal solution (PIS) and the negative ideal solution (NIS) were computed. Finally, the relative closeness coefficient (CC_i) was calculated for each alternative. Values closer to 1 indicate higher preference and ranking. The prioritization results of financing methods for the five projects of Hamedan Municipality are presented in Table 8.

Table 8. Ranking results of financing instruments for the case projects

		Aghajani Beig multi-storey parking	Kababian complex	Hamedan birds market	Ghanizadian project	Shahid Bashiri Stadium
No.	Financing instruments (options)	Rank (Ci)	Rank (Ci)	Rank (Ci)	Rank (Ci)	Rank (Ci)
1	BOT family	1 (0.895)	1 (0.849)	9 (0.569)	4 (0.845)	1 (0.857)
2	Civil partnership agreement	2 (0.888)	2 (0.809)	1 (0.937)	3 (0.852)	3 (0.811)
3	Barter	3 (0.813)	3 (0.763)	2 (0.894)	1 (0.930)	2 (0.839)
4	Land and building fund	4 (0.792)	4 (0.721)	4 (0.773)	2 (0.875)	10 (0.569)
5	EPCF contract	8 (0.653)	5 (0.682)	3 (0.827)	7 (0.662)	6 (0.628)
6	Bank borrowing	6 (0.758)	6 (0.656)	7 (0.629)	8 (0.623)	4 (0.787)
7	Participation bonds	5 (0.641)	7 (0.641)	14 (0.397)	5 (0.733)	5 (0.676)
8	Istisna sukuk	14 (0.486)	8 (0.450)	12 (0.534)	9 (0.617)	9 (0.569)
9	Project company (public joint stock)	18 (0.319)	9 (0.448)	11 (0.545)	15 (0.364)	17 (0.375)
10	Ju'alah sukuk	9 (0.645)	10 (0.433)	8 (0.577)	11 (0.568)	14 (0.401)
11	Islamic treasury bills	7 (0.686)	11 (0.404)	6 (0.632)	6 (0.667)	11 (0.494)
12	Ijarah sukuk	11 (0.523)	12 (0.397)	18 (0.353)	13 (0.489)	18 (0.373)
13	Buy back	10 (0.554)	13 (0.390)	17 (0.369)	14 (0.415)	8 (0.586)
14	Joint venture	12 (0.502)	14 (0.374)	13 (0.413)	12 (0.555)	15 (0.392)
15	Murabaha sukuk	13 (0.496)	15 (0.345)	10 (0.553)	10 (0.578)	12 (0.488)
16	Project fund	20 (0.204)	16 (0.288)	19 (0.311)	18 (0.323)	13 (0.485)
17	Real estate investment trust (REIT)	21 (0.204)	17 (0.257)	20 (0.267)	20 (0.317)	21 (0.250)
18	Barat card	16 (0.385)	18 (0.246)	5 (0.669)	16 (0.345)	16 (0.381)
19	Foreign investment	15 (0.474)	19 (0.239)	16 (0.370)	17 (0.335)	20 (0.280)
20	Leasing	17 (0.322)	20 (0.236)	22 (0.213)	24 (0.137)	22 (0.200)
21	Parallel Salam sukuk	19 (0.293)	21 (0.217)	21 (0.257)	19 (0.320)	24 (0.118)
22	Oil barter	22 (0.185)	22 (0.174)	24 (0.143)	23 (0.159)	23 (0.144)
23	Productive credit certificates (GAM)	23 (0.128)	23 (0.127)	23 (0.155)	22 (0.197)	19 (0.304)
24	Crowd funding	24 (0.112)	24 (0.116)	15 (0.384)	21 (0.218)	7 (0.595)

5.1. Sensitivity analysis

Sensitivity analysis is a critical phase in multi-criteria decision-making (MCDM), conducted to evaluate the robustness and stability of the final results against potential variations in model inputs. This analysis indicates the degree of confidence that can be placed in the resulting rankings. It examines whether minor changes in expert judgments—particularly in criteria weights—lead to significant alterations in the prioritization of alternatives (Momeni et al., 2015).

In this context, the "Aghajani Beig multi-storey parking" project was selected as a representative case study, and the model's behavior was examined under variations in the weights of all five criteria: efficiency, economic return, risk, time, and cost. To focus on the most competitive alternatives and to reduce visual complexity in the graphical outputs, changes in rankings were reported only for the top five options. In this process, the weight of each criterion was varied within ranges of ±10% and ±20% (totaling 20 scenarios), and the corresponding results are presented as trend charts in Figure 1.

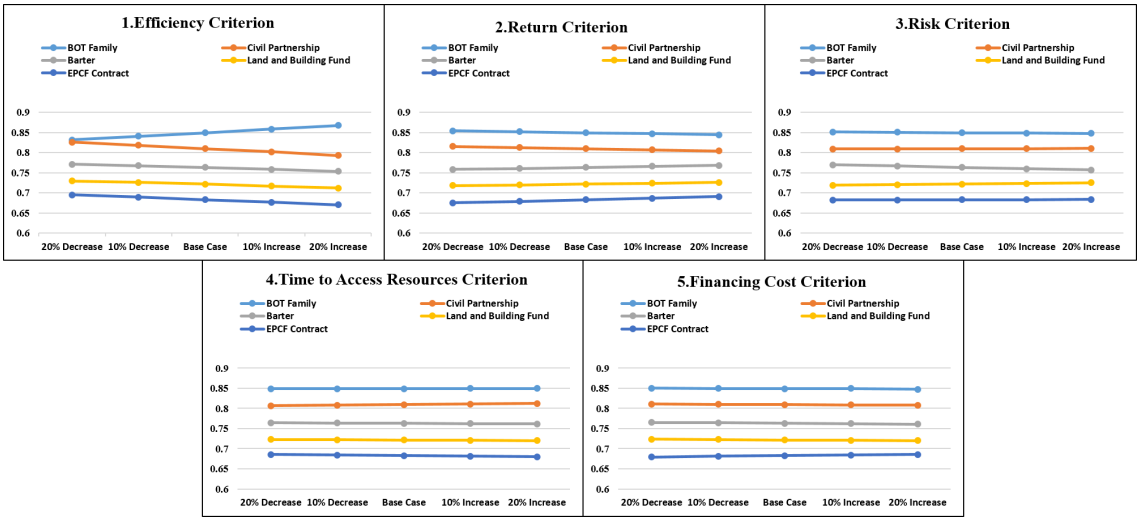

Figure 1. Sensitivity analysis of the rankings of top alternatives (Aghajani Beig multi-storey parking project)

A detailed examination of the five aforementioned Figures reveals that the "BOT family" alternative firmly maintained its top position across all twenty scenarios. Its trend line remained at the uppermost level with no intersections or crossovers with other alternatives, underscoring the reliability and robustness of the final selection.

Analyzing the model's behavior regarding the "efficiency" criterion (Figure 1) indicates that as the weight of this criterion decreases, the score gap between the first and second-ranked alternatives (civil partnership) narrows. This behavior is logical, as the primary advantage of the top-ranked option is rooted in this specific criterion. Nevertheless, even a 20% weight reduction did not result in any rank reversal.

Conversely, the lines corresponding to the return, risk, time, and cost criteria are nearly parallel and horizontal. This phenomenon signifies the model's minimal sensitivity to fluctuations in these weights and confirms the absolute stability of the generated rankings. Consequently, it can be concluded that the proposed prioritization possesses high validity, and decision-makers can rely on these findings without concern over potential weighting inaccuracies.

6. Discussion and conclusion

This study was conducted to examine the application of innovative financing instruments within the Hamedan Municipality, aiming to facilitate a transition from reliance on traditional and unsustainable revenue streams. While some of these instruments have long been established in broader financial contexts, their application in municipal project financing represents a relatively novel approach.

The primary finding of this research indicates that no single financing instrument serves as a universal solution for all projects. Instead, the optimal choice arises from a strategic alignment between the specific characteristics of each project and the structural attributes of the selected financing instrument.

The findings of this research indicate that in selecting financing methods for the Hamedan Municipality projects, the efficiency criterion—with a synthesized weight of 0.476—holds the highest significance, taking precedence over other criteria such as return (0.183) and risk (0.127). This underscores the expert panel's perspective that the most vital factor in the selection process is the strategic alignment between the financing method and the specific nature of each project. Consequently, the results suggest that a "one-size-fits-all" approach does not apply to municipal projects, as the optimal instrument must be tailored to the project's unique characteristics. While various studies have addressed this domain, some corroborate the present findings, whereas others offer contrasting perspectives. A selection of these relevant studies is reviewed and introduced in the following section.

The prioritization of efficiency in this study is consistent with several previous findings in the municipal finance literature. For instance, Mohebi and Maghsoudi (2015), in their study of Bojnord Municipality, and Ghorbani and Azimi (2015), in the context of urban project financing in Mashhad, also identified efficiency as the paramount criterion.

In contrast, other studies have emphasized different criteria depending on the specific characteristics and

constraints of the projects. Moayedfar et al. (2013) and Karimi and Sarvar (2023)—focusing on the financing of distressed urban areas—identified the rate of return as the dominant criterion, arguing that attracting private-sector investment in high-risk areas is only feasible when expected returns significantly exceed prevailing bank interest rates.

Under conditions of severe budgetary constraints, Mir Ansari et al. (2023) prioritized financing cost as the most critical factor. Similarly, Hosseini and Alibakhshi (2023) considered availability as a vital criterion for infrastructure projects in Tehran due to the restrictive effects of international sanctions. Moreover, Vosoughi et al. (2017) underscored financial sustainability in water and wastewater projects, attributing its importance to the long-term and essential nature of these public services.

The analysis of the TOPSIS results reflects a strategic and logical alignment between the "inherent project characteristics" and the "selected financing instruments." In large-scale, revenue-generating projects—such as the Aghajani Beig multi-storey parking, the Kababian recreational complex, and the Shahid Bashiri stadium—which benefit from continuous revenue streams during the operational phase, the BOT (build-operate-transfer) family of participatory methods emerged at the top of the rankings.

This finding is consistent with the results of Ademola and Hammad (2023). In their evaluation of Chinese infrastructure financing models using the TOPSIS technique, they demonstrated that no universal "best" method exists. Instead, shifts in selection criteria (like prioritizing "return" over "cost") directly alter the optimal financing choice. Their sensitivity analysis indicated that whenever "stable return on investment" (stable ROI) is the decision-making priority, the BOT method is identified as the most efficient option (Ademola & Hammad, 2023). This analysis elucidates the validity of selecting BOT family participatory methods for the revenue-generating projects in this study, where capital recovery through operational revenues is paramount.

Furthermore, these results are in complete agreement with the research of Hatefi and Mohseni (2019). In their risk assessment of civil engineering projects in Tehran, they argued that urban projects—such as parking facilities and recreational centers—possess high revenue-generating potential due to high demand, optimal accessibility, and defined construction periods, making private sector investors highly inclined to accept the associated risks. Consequently, the suitability of the BOT method for these projects stems from the fact that the cash flow generated from "service sales" guarantees the private sector's return on investment.

In support of this, Yarmohammadian et al. (2018) also identified the BOT family as the top option in their prioritization of financing methods for Isfahan Municipality projects. They argued that in these models, the private sector finances and constructs the project and recovers its costs by operating it for a specified period—a critical feature that facilitates the transfer of construction and financing risks from the municipality to the private sector, driven by profit motives.

Additionally, Sadeghi et al. (2015), in their examination of factors affecting private sector participation, deemed participatory methods appropriate for large-scale and high-cost projects. They stated that such collaborations enable public and municipal organizations to share high-risk and heavy investments with the private sector in pursuit of mutual interests (Sadeghi et al., 2015).

Conversely, for projects with a real estate-oriented nature, such as the Ghanizadian Project, which lack continuous revenue streams but possess significant underlying asset value, asset-based instruments such as "land and building funds," "civil partnership agreements," and "barter" were identified as the top alternatives. This selection reflects a strategic pivot from the "outright disposal of land" toward the "productivity and value creation of these assets." Supporting this approach, Ghabra et al. (2020), in their study on Syria's reconstruction, argued that under conditions of limited banking resources and high-scale destruction, land and building funds serve as the most effective mechanism for attracting micro-investments and channeling them into large-scale residential and commercial developments. This reasoning aligns precisely with the status of the Ghanizadian Project (a commercial-residential development), where the municipality, instead of liquidating the land, can establish a fund to attract the necessary construction liquidity from the capital market.

Regarding the "Barter" method, Malek (2023) demonstrated in a legal analysis that bartering is a vital legal tool for Iranian municipalities to navigate liquidity crunches in real estate transactions, recognized as an organizational financing method derived directly from assets.

Furthermore, Hossein Abadi and Taghvaei (2011)

prioritized the "civil partnership" method in their evaluation of urban renewal project financing. They argued that in construction projects where the owner (the municipality) holds the valuable "land" asset but lacks the liquidity for construction, a civil partnership represents the optimal model. In this approach, the land is provided as a non-cash contribution by the owner, while the investor covers construction costs; thus, the project is executed without the need for initial cash outlays, and the resulting added value is shared between the parties.

In the ranking of financing methods for the "Hamedan birds market" project, "civil partnership agreements," "barter," and "EPCF contracts" emerged as the top-ranked alternatives. This selection by the expert panel signifies a clear preference for solutions that minimize the need for initial liquidity and direct municipal budgetary outlays. Essentially, in these models, the primary financing burden is shifted to the counterparty—either a contractor or an investor—allowing the municipality to execute the project without high upfront costs. The counterparty's share or remuneration is subsequently settled through the project's final proceeds or assets.

This finding is in complete agreement with the results of Sadeghi et al. (2015). In their study of participatory projects in Tabriz, they found that for commercial complexes—which share a similar nature with market projects—the "civil partnership" model has been one of the most successful and widely applied frameworks. Similarly, Hossein Abadi and Taghvaei (2011) consider this method highly efficient and executable for projects where the landowner (the municipality) faces a liquidity shortage.

Furthermore, the inclusion of the EPCF contract among the top options can be elucidated by the research of Imam Jomehzadeh et al. (2020). In their analysis, they state that in EPCF frameworks, the main contractor assumes responsibility not only for engineering, procurement, and construction but also for project financing. This feature facilitates the active participation of the private sector in the financing process and enables the municipality to overcome obstacles stemming from a lack of construction budget. Consequently, the selection of this method for the birds market project is deemed highly appropriate.

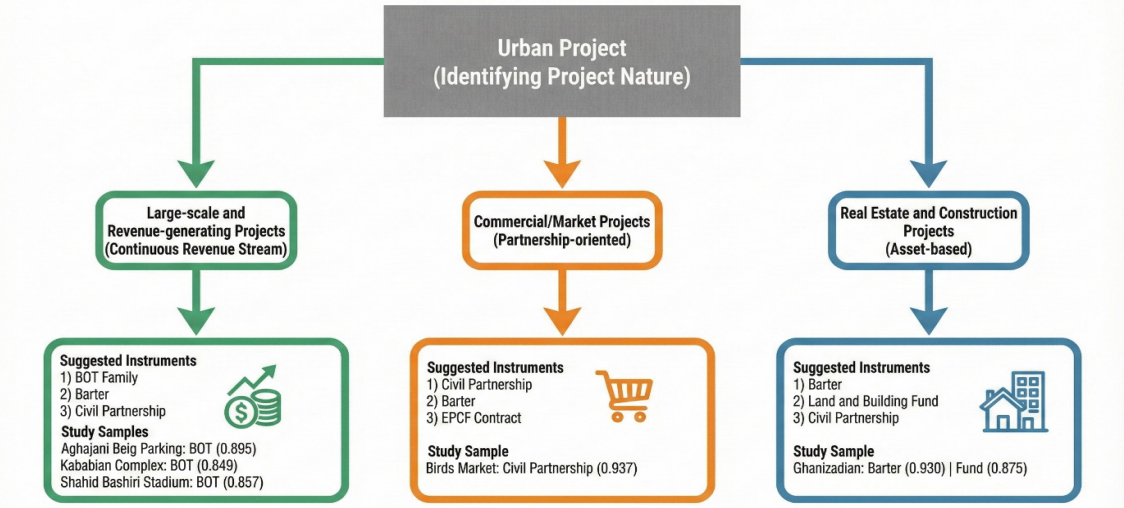

Figure 2. The selection process of appropriate financing instruments based on the project's nature (numbers in parentheses indicate Ci values)

6.1. Recommendations

Enhancing knowledge and shifting the mindset of municipal managers: It is essential to increase the level of awareness among municipal managers and experts regarding modern financing models through specialized training programs. Greater familiarity with these instruments can shift managers' perception of the municipality from a purely service-oriented institution to an "urban economic enterprise," thereby creating the necessary conditions for their broader and more effective implementation.

Redefining the approach to private sector engagement: The urban management's perspective toward investors should be elevated from a traditional "contractor" role to that of a "strategic partner" to foster interactions based on mutual interests and a win–win approach. To this end, it is recommended to develop transparent investment packages for key urban locations and to

establish facilitating processes alongside tangible incentives—such as municipal fee discounts or higher profit-sharing ratios—to attract reputable investors.

Moving toward asset productivization: Municipalities possess valuable capital assets, including land and real estate; therefore, it is imperative to move away from the traditional approach of outright disposal of these resources through auctions. Instead, such assets should be utilized as non-cash contributions (equity) in joint-venture projects with the private sector. In this regard, leveraging the successful experiences of other metropolises and utilizing the capacity of the capital market to attract both small-scale and large-scale citizen capital is strongly recommended.

6.2 Suggestions for future research

Model development through the clustering of urban projects: It is suggested that different categories of urban projects be clustered based on a set of defined criteria—such as scale, land use, and revenue streams—and that appropriate financing instruments be identified and proposed for each cluster. This approach could contribute to the development of a more comprehensive and generalizable analytical framework.

Focusing on legal and institutional barriers: A shift toward qualitative methodologies could serve as a valuable complement to quantitative findings. Accordingly, conducting in-depth qualitative studies to precisely identify the legal and institutional barriers to the implementation of innovative financing instruments within the specific context of cities in Iran is recommended. Such findings could help clarify and streamline the path toward practical operationalization.

6.3. Limitations

This study was subject to certain limitations. First, the findings are based on the qualitative judgments of a sample consisting of 15 experts. Although these individuals possess a high level of expertise, the sample size is relatively small, and personal experiences may influence their perspectives. Second, the prioritization of financing instruments was conducted based on the analysis of only five selected projects; therefore, the results cannot be readily generalized to other current or future municipal projects.

Authors' Contributions

Author 1 (25%), Author 2 (15%), Author 3 (65%).

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Additionally, the authors hereby declare the use of artificial intelligence tools in the preparation of the English version of this manuscript. Specifically, Google Gemini (version 3) was utilized in the initial stage to perform the primary translation from Persian to English. Subsequently, ChatGPT (version 5.2) was employed to evaluate, review, and enhance the linguistic quality of the translated text. Finally, the authors conducted a comprehensive manual revision to refine the academic writing style, verify technical terminology, and ensure the accuracy of the scientific content. The use of these tools had no impact on the scientific substance, data analysis, or the research findings of this study.

Conflict of Interest

The authors declare no conflicts of interest.

References

Ademola, D., & Hammad, A. (2023). Application of the TOPSIS decision-making technique in selecting a sustainable project financing model for infrastructure in China. *Lecture Notes in Civil Engineering*, 499, 59–71. https://doi.org/10.1007/978-3-031-61503-0_5

Al-Ajlouni, A., & Al Habeeb, M. (2020). Municipal Sukuk as a model for financing municipalities and public service institutions in Saudi Arabia. *SSRN*. https://doi.org/10.2139/ssrn.4101102

Aleksandrova-Zlatanska, S., & Kalcheva, D. Z. (2019). Alternatives for financing of municipal investments - Green bonds. *REBS Review of Economic Business Studies*, 12(1), 57-77. https://doi.org/10.1515/rebs-2019-0082

Asumadu, G., Quaigrain, R. A., Owusu-Manu, D., & Edwards, D. J. (2023). Analysis of urban slum infrastructure projects financing in Ghana: A closer look at traditional and innovative financing mechanisms. *World Development Perspectives*, 30(4), 100505. https://doi.org/10.1016/j.wdp.2023.100505

Bahrololoum, M. M., & Bakhtiar, S. (2020). Comparative analysis of financing methods for thermal power plants in Iran. *Energy Policy and Planning Research*, 6(3), 221–250. https://epprjournal.ir/article-1-565-fa.html [In Persian]

Banar, S., Abolhasani Hastianti, A., Shaygani, B., & Dejpasand, F. (2013). External financing of urban projects and efficiency of city services (The case of Tehran Municipality). *Journal of Urban Economics and Management*, 1(4), 131–154. [In Persian]

Basiri Parsa, N., & Akbari, N. A. (2010). Sustainability of municipal revenues and sustainable urban development: A case study of Hamedan city. *Paper presented at the First Conference on Sustainable Urban Development*, Tehran, Iran. https://civilica.com/doc/96965 [In Persian]

Berenjian Tabrizi, E. (2021). How to finance urban development plans using stocks in municipalities. *Payashahr Monthly*, 3(28). https://civilica.com/doc/1273407 [In Persian]

Damoori, D., & Javidan, H. (2019). Checking and prioritizing Islamic financing tools using the fuzzy Vicor method. *Islamic Economics & Banking*, 8(26), 69–96. https://mieaoi.ir/article-1-793-en.html [In Persian]

Danesh Jafari, D., Babajani, J., & Karimi Osbuei, S. (2014). Stability analysis of financial resources and income of Tehran Municipality. *Journal of Urban Economics and Management*, 2(7), 15–32. [In Persian]

Eslami Bidgoli, S., Abdoh Tabrizi, H., & Monajem, H. (2022). Comparative research of sources and financing methods of Tehran Municipality with other cities in the world. *Financial Management Perspective*, 12(37), 37–68. https://doi.org/10.52547/JFMP.12.37.37 [In Persian]

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4. https://doi.org/10.11648/j.ajtas.20160501.11

Feyzi Totkeleh, Z., Doostar, A., & Samsam Bozorgi, R. (2021). Investigating the sources of municipal revenue in order to provide a solution to increase sustainable revenue. *Journal of New Research Approaches in Management and Accounting*, 5(79), 135–146. https://www.majournal.ir/index.php/ma/article/view/1039 [In Persian]

Ghabra, M. A. A., Mohagheghnia, M., Zatari, A., & Ghorbanizadeh, V. (2020). Legal and executive review of the use of the land and building fund in the reconstruction of Syria. *Islamic Finance Research*, 9(2), 647–670. https://doi.org/10.30497/ifr.2019.2403 [In Persian]

Ghafari, E., Daneshfard, K., & Memarzadeh Tehran, G. (2021). Designing a public-private partnership model in urban development infrastructure projects: A study on Tehran Municipality. *Iranian Journal of Management Sciences*, 15(60), 27–50. https://journal.iams.ir/article_339_en.html [In Persian]

Ghorbani, R., & Azimi, M. (2015). Modeling and ranking the criteria in providing favorable financing for the public sector by using MCDM: Case study of Mashhad metropolis. *Quarterly Journal of Economic Modeling*, 9(30), 107–124. https://sanad.iau.ir/Journal/eco/Article/995601/ [In Persian]

Gouett, M., Murphy, D., & Parry, J.-E. (2023). *Financing climate change adaptation: Innovative financial instruments for developing countries*. International Institute for Sustainable Development.

Greatorex, J., & Dexter, T. (2000). An accessible analytical approach for investigating what happens between the rounds of a Delphi study. *Journal of Advanced Nursing*, 32(4), 1016–1024. https://doi.org/10.1046/j.1365-2648.2000.t01-1-01569.x

Hajiani, M., Dehaqin, D., & Eshtehardian, E. (2018). Analysis and prioritization of financing methods for Iran urban railway projects: Case study of Tehran Urban Railway – Line 7. *Islamic Economics & Banking*, 7(24), 61–87. https://mieaoi.ir/article-1-731-en.html [In Persian]

Hatefi, S. M., & Mohseni, H. (2019). Evaluating and prioritizing the risks of BOT projects using structural equations and an integrated model of fuzzy AHP and fuzzy TOPSIS. *Journal of Structural and Construction Engineering*, 6(4), 111–130. https://doi.org/10.22065/jsce.2018.112728.1419 [In Persian]

Heidarpoor, F., & Naghavi, M. (2018). The effect stabilization of the income in the financing system of municipalities with the approach of structural equations. *Journal of Science and Engineering Elites*, 3(4). https://elitesjournal.ir/fa/page.php?rid=284 [In Persian]

Hosein Abadi, M., & Taqvaii, A. A. (2012). Analysis of methods of financing for renewal projects of deteriorated urban textures (Case study: Hamzehabad neighborhood / Tehran). *Urban Management*, 10(29), 235–250. https://ijurm.imo.org.ir/article-1-132-en.html [In Persian]

Hosseini, S. A., & Alibakhshi, M. (2023). Identifying and evaluating the most compatible financing methods in the infrastructure construction projects in the Tehran municipalities. *International Journal of Nonlinear Analysis and Applications*, 14(12), 191–202. https://doi.org/10.22075/ijnaa.2023.31588.4676

Hsu, C., & Sandford, B. A. (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research, and Evaluation*, 12(1), Article 10. https://doi.org/10.7275/pdz9-th90

Imam Jomeh Zadeh, M. H., Akrami, S., & Ershadi, M. (2020). Evaluating the barriers of financing EPCF projects in Iran: An overview of developments in EPCF contracts. *Journal of Improvement Management*, 14(2), 117–145. https://doi.org/10.22034/jmi.2020.113837 [In Persian]

Karimi, J., & Sarver, R. (2023). Analysis of the efficiency and effectiveness of financial instruments-economic rehabilitation and renovation (Case study: District 20 of Tehran). *Geography*, 21(76), 57–68. [In Persian]

Karimniya, S. (2022). Tehran Municipality financial management system: Zemilogy and solutions in the light of a comparative study of ten cities: London, Zurich, New York, Toronto, Auckland, Vienna, Beijing, Tokyo, Dubai, and Istanbul. *Journal of Legal Research*, 21(51), 513–544. https://doi.org/10.48300/jlr.2022.163707 [In Persian]

Koniagina, M., Kokh, L., Kirillova, A., Yanina, O., & Loktionova, Y. (2021). Crowdsourcing and crowdfunding in the management of large cities. *Theoretical and Empirical Research in Urban Management*, 16(3), 5–22. https://um.ase.ro/v16i3/1.pdf

Malek, H. (2023). Analysis of the role of barter in real estate transactions of municipalities in Iran. *3rd International Conference on Architecture, Civil Engineering, Urban Development, Environment, and Horizons of Islamic Art in the Second Step of the Revolution Statement*. https://civilica.com/doc/1961308 [In Persian]

Mehrmanesh, H., & Hatami, A. (2017). Identification and prioritization of financing method using a combined approach AHP-TOPSIS: Case study of Alborz Wire and Cable Company. *7th International Conference on Accounting & Management*, Tehran, Iran. https://civilica.com/doc/658453 [In Persian]

Mir Ansari, M., Ahmadi Rad, M., & Khaligh, J. (2023). Designing a model for selecting financing methods in municipal projects using the AHP-MARCOS method. *1st International Conference on Information Technology, Management, and Computer*. https://civilica.com/doc/2084516 [In Persian]

Moayedfar, R., Sameti, M., & Oloomi, S. (2013). The ranking of fi-

nancing methods in urban old texture (Case study of Isfahan city). **Urban - Regional Studies and Research Journal*, 5*(17), 69-84. https://urs.ui.ac.ir/article_20050.html?lang=en [In Persian]

Mohebi, T., & Maghsoudi, A. (2015). Prioritizing the financing method using the combined AHP TOPSIS approach in Bojnourd Municipality. *8th International Conference on Accounting, Management and Innovation in Business*. https://civilica.com/doc/1261366 [In Persian]

Momeni, M., & Sharifi Salim, A. (2015). Multi-criteria decision-making models and software. Moalef Publications.

Mousavian, S. A., Vosough, B., & Farhadian Arani, A. (2013). Recognizing and ranking Islamic financial instruments (SUKUK). *Strategic Management Thought*, 7(1), 187–212. https://doi.org/10.30497/smt.2013.1435 [In Persian]

Noorzai, E., Gharouni Jafari, K., Heshmatnezhad, R., & Vahedi, B. (2016). Implementing the AHP approach to select an appropriate financing method for PPP highway projects in Iran. *International Journal of Structural and Civil Engineering Research*, 5(1), 67–73. https://doi.org/10.18178/ijscer.5.1.67-73

Ragheb, M., & Shahri, R. (2020). Lack of financial resources in municipalities and the replacement of sustainable revenues. *Quarterly Journal of Urban Design Studies and Urban Research*, 3(2), 63–73. http://www.udsj.ir/post.aspx?id=657 [In Persian]

Saaty, T. L. (1980). *The analytic hierarchy process: Planning, priority setting, resource allocation*. McGraw-Hill International Book Co.

Sadeqi, S. K., & Zenozi, S. S. (2015). The effective factors on private sector cooperation as an approach to finance sustainable resources of municipality projects. *Journal of Urban Economics and Management*, 3(11), 153–167. [In Persian]

Shahbazi, M., Fathi, M. R., & Jesri, N. (2021). Evaluation and prioritization of projects for urban transport by developing a human-centered approach based on fuzzy AHP and fuzzy TOPSIS. *Geography (Regional Planning)*, 11(42), 661–677. [In Persian]

Shahnazi, R., Marzban, H., & Mirzakhani, M. (2017). Feasibility of using Waqf bonds in financing municipal projects and examining their welfare effects in comparison with municipal tax: A case study of Shiraz, Iran. *Journal of Economic Essays: An Islamic Approach*, 14(27), 35–62. https://doi.org/10.30471/iee.2017.1337 [In Persian]

Singla, A., Shumberger, J., & Swindell, D. (2021). Paying for infrastructure in the post-recession era: Exploring the use of alternative funding and financing tools. *Journal of Urban Affairs*, 43(4), 526–548. https://doi.org/10.1080/07352166.2019.1660580

Sohrabi, R., Samavat, A., Asaadi Hamedani, M., & Rahbar, A. H. (2026). Identifying innovative financing instruments in Hamedan municipality. *Urban Economics*, 11(1), 51-66. https://doi.org/10.22108/ue.2025.146535.1327 [In Persian]

Tafazoli, A., Dalmanpour, M., Emami Meibodi, A., & Rahimzadeh, A. (2023). Evaluating financial service methods in municipalities and introducing the appropriate method. *Journal of Urban Economics and Management*, 11(44), 21–31. https://iueam.ir/article-1-2062-en.html [In Persian]

Vatandoust, S. (2020). Financing and investment methods in municipalities. *Paper presented at the Fourth International Conference on Innovative Studies in Economics, Management, and Accounting in Iran*. https://civilica.com/doc/1036311 [In Persian]

Vosoughi, V., Dashti Nasserabadi, H., & Babaei, A. (2017). Investigating appropriate financing methods in collaborative projects of water and wastewater with the AHP approach. *Engineering, Technology & Applied Science Research*, 7(5), 2089-2093. https://doi.org/10.48084/etasr.1400

Yar Mohammadi, R., Azar, A., & Mesbahi Moghaddam, G. R. (2017). Identifying and prioritizing desirable financial criteria in the Islamic capital market based on the resistance economy's perspective. *Journal of Islamic Economics Studies*, 9(2), 78–116. https://doi.org/10.30497/ies.2017.1989 [In Persian]

Yari, H. (2011). *A review of financing and investment methods in municipal projects*. Country Municipalities and Dehyaries Organization Press; Rahdan. [In Persian]

Yarmohammadian, N., Moridian Pirdusti, A., & Nasr Esfahani, R. (2018). Prioritizing and analyzing participatory financing methods for urban projects. *Journal of Financial Management Strategy*, 6(3), 81–108. https://doi.org/10.22051/jfm.2018.16704.1456 [In Persian]

Zakernia, E., Khajehzadeh Dezfouli, M., & Fadaei Vahed, M. (2016). Prioritize the factors affecting the choice of mode of financing in Iran using the TOPSIS method based on the fuzzy linguistic variables. *Financial Engineering and Portfolio Management*, 7(27), 53–74. [In Persian]

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, 5, 1-4. https://doi.org/10.11648/j.ajtas.20160501.11