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Designing a Crowdfunding Investment Marketing Model for Enhancing Sustainable Urban Revenues: A Case Study of Tehran Municipality

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A B S T R A C T

This study aimed to design and validate a crowdfunding investment marketing model for enhancing sustainable urban revenues in Tehran Municipality, with emphasis on the role of innovation drivers. This applied study was conducted using a mixed-methods exploratory–confirmatory design. In the qualitative phase, the Delphi technique was used to identify and validate the main dimensions and indicators of the model based on the opinions of 15 experts in urban management, municipal finance, innovation, investment, and crowdfunding. In the quantitative phase, a structured questionnaire was administered to 250 managers and senior experts of Tehran Municipality who were involved in financial, investment, planning, innovation, and public participation domains. Data were analyzed using exploratory factor analysis, confirmatory factor analysis, reliability testing, and structural equation modeling through SPSS and SmartPLS/AMOS. Inferential findings confirmed the adequacy of the measurement model. The KMO values for innovation in urban management, crowdfunding investment marketing, and sustainable urban revenue were 0.874, 0.884, and 0.893, respectively, and Bartlett's tests were significant at $p < 0.001$. The extracted factors explained 57.45% of the variance in innovation, 68.30% of the variance in crowdfunding investment marketing, and 72.63% of the variance in sustainable urban revenue. Reliability was also confirmed, with Cronbach's alpha coefficients of 0.907, 0.931, and 0.923, respectively. Structural equation modeling showed that innovation drivers had a positive and significant effect on crowdfunding investment marketing ($\beta = 0.78$, $t = 8.45$). Crowdfunding investment marketing significantly affected sustainable urban revenue ($\beta = 0.65$, $t = 6.12$). The direct effect of innovation drivers on sustainable urban revenue was also significant ($\beta = 0.32$, $t = 3.11$), and the indirect effect through crowdfunding investment marketing was confirmed ($\beta = 0.51$, $t = 5.88$). The results indicate that innovation drivers provide the institutional, technological, and organizational foundation for effective crowdfunding investment marketing, while crowdfunding marketing functions as a strategic mechanism for converting citizen trust and participation into sustainable municipal revenues.

Keywords: *Crowdfunding Investment Marketing; Sustainable Urban Revenue; Innovation Drivers; Tehran Municipality; Urban Finance.*

1. Introduction

Urban municipalities have increasingly entered a period in which traditional revenue systems are no longer sufficient to finance the growing complexity of urban services, infrastructure development, environmental adaptation, and participatory governance. Large metropolitan governments are expected to provide high-quality public services, manage transportation systems, respond to social and environmental pressures, and maintain urban competitiveness, while their fiscal capacity is often constrained by unstable, politically sensitive, or cyclical revenue sources. This issue is particularly important in metropolitan settings such as Tehran, where the scale of urban development, population concentration, infrastructure demand, and environmental pressures require a more resilient and diversified municipal finance system. Earlier assessments of Tehran Municipality's financial and revenue structure have shown that the sustainability of municipal income has long been a strategic concern, especially because dependence on unstable sources can weaken long-term planning, reduce fiscal predictability, and intensify vulnerability to economic fluctuations (Danesh Jafari et al., 2014; Danesh Jafari et al., 2015). In this regard, sustainable urban revenue is not simply a financial matter; it is a governance issue that determines whether municipalities can maintain service continuity, invest in future-oriented projects, and reduce dependence on short-term income-generating practices.

The challenge of unstable municipal revenue has been widely discussed in Iranian urban studies. Research on Tehran Municipality has emphasized the need to restructure revenue sources in a way that improves durability, transparency, fairness, and predictability (Izadkhasti, 2022). Similarly, studies on sustainable revenue sources of municipalities have highlighted their role in sustainable urban service development, arguing that municipal financial stability directly affects the quality and continuity of urban services (Mahdavi, 2021). The instability caused by land-related and construction-dependent revenues has also been identified as a structural challenge in municipal finance, because such revenues are often exposed to market cycles, regulatory uncertainty, spatial inequality, and unsustainable patterns of urban expansion (Moezzi et al., 2011). In the case of Tehran, good urban governance has been linked to sustainable urban revenues, suggesting that financial sustainability requires more than technical revenue reform; it also requires accountability, transparency, participation, responsiveness, and institutional trust (Yazdani & Amiri, 2023). Therefore, the search for sustainable revenue in Tehran Municipality must be understood as part of a broader transition from a conventional income model toward an integrated governance model based on participation, innovation, and public value creation.

International experience also shows that urban municipalities are highly sensitive to financial crises and external shocks. The COVID-19 pandemic, for example, revealed how municipal revenues can decline sharply when local economies are disrupted, service demands increase, and conventional revenue channels become unstable (Maj-Waśniowska & Wichowska, 2024). Such crises demonstrate the importance of revenue diversification and financial resilience in urban management. When municipal income depends excessively on a narrow set of revenue sources, cities become less capable of maintaining long-term investment, responding to emergencies, and implementing development programs. Accordingly, modern urban finance increasingly emphasizes resilience, innovation, and citizen-centered funding mechanisms. These mechanisms can help municipalities reduce dependence on volatile sources, create new forms of value, and strengthen public engagement in urban development. In this context, crowdfunding investment has emerged as a promising participatory financing mechanism that can connect urban projects with citizens, private actors, and small-scale investors through digital platforms.

Crowdfunding has evolved from a marginal fundraising practice into a structured financial and marketing mechanism that influences investment behavior, public participation, and project legitimacy. In equity crowdfunding markets, investor behavior is shaped by changing dynamics of information, trust, perceived value, and platform interaction (Olsson, 2023). Evidence from crowdfunding markets also indicates that information disseminated through mass media can affect investment decisions, because positive public narratives increase visibility, legitimacy, and willingness to invest (Israel José dos Santos et al., 2023). These findings are relevant to urban management because municipal projects require not only technical feasibility but also social acceptance and public confidence. A city project that is financially viable may still fail to attract participation if citizens do not understand its benefits, trust its governance structure, or perceive a meaningful connection between their contribution and the final urban outcome. Thus, in the municipal context, crowdfunding cannot be reduced to a financial tool; it must

be treated as a marketing, communication, and trust-building system.

Marketing plays a decisive role in crowdfunding because citizens and investors respond to narratives, transparency, social proof, and perceived credibility. Research on social media promotion of crowdfunding donation campaigns has shown that campaign dynamics can produce unexpected effects, meaning that communication strategies must be carefully designed and continuously managed (Dehdashti et al., 2022). Moreover, linguistic information distortion in crowdfunding markets can influence investment decision-making, indicating that the clarity, accuracy, and framing of information are critical for maintaining investor confidence (Wang et al., 2022). These studies suggest that Tehran Municipality, if it intends to use crowdfunding for sustainable revenue generation, must move beyond simple project announcements and develop a systematic crowdfunding marketing model. Such a model should include transparent financial reporting, persuasive project branding, digital engagement, continuous communication, credible institutional endorsement, and mechanisms for reducing uncertainty. In this sense, crowdfunding marketing becomes the bridge between municipal innovation and citizen investment behavior.

The experience of small and medium-sized enterprises during crisis periods also illustrates the strategic role of crowdfunding and digital markets in improving resilience and performance. During the COVID-19 pandemic, crowdfunding and digital market strategies were used to support sustainability and strengthen business performance through redesigned business models (Hadi et al., 2023). Although municipalities are not commercial enterprises, they similarly need adaptive financing models that can mobilize dispersed resources, communicate value propositions, and build durable stakeholder relationships. A municipal crowdfunding model can transform citizens from passive taxpayers or service recipients into active contributors, co-investors, and stakeholders in urban development. However, this transformation depends on whether the municipality can provide credible digital infrastructure, transparent project information, and a compelling reason for citizens to invest in urban projects.

The importance of institutional trust and investment incentives should also be considered. Research on property rights and investment incentives shows that institutional arrangements and secure expectations strongly influence willingness to invest (Kurbanov et al., 2025). In urban crowdfunding, citizens and small investors need assurance that their contributions will be managed transparently, used for declared purposes, and connected to measurable project outcomes. Without institutional credibility, even technically advanced platforms may not attract sustained participation. This is especially important in public-sector crowdfunding, where the relationship between citizens and municipality is influenced by prior experiences of governance, public accountability, and perceived fairness. Therefore, any model of crowdfunding investment marketing for Tehran Municipality must integrate financial innovation with governance mechanisms that strengthen trust, reduce perceived risk, and clarify the rights and expectations of participants.

Urban branding is another essential component of crowdfunding investment marketing. Cities increasingly compete for investment, talent, tourism, and public attention by constructing distinctive identities and communicating their development potential. Introducing a city as a special economic zone has been discussed as a way to attract investment by reframing the city as a strategic economic opportunity (Allam & Jones, 2019). Likewise, studies on urban brand components and tourism destination branding emphasize that city identity, image, symbolic value, and perceived uniqueness influence stakeholder attraction and engagement (Lalehpour & Amirhosseini, 2020; Vossoughi et al., 2020). These insights can be applied to municipal crowdfunding: individual urban projects must be branded not merely as administrative tasks but as meaningful opportunities for local improvement, social participation, neighborhood development, environmental benefit, or future economic value. If Tehran Municipality can brand crowdfunding projects around recognizable urban needs and citizen aspirations, it can increase emotional attachment, perceived legitimacy, and investment willingness.

At the same time, urban innovation has become a central driver of sustainable development. Smart city strategies and intelligent upgrading of urban transportation systems indicate that sustainable investment requires the integration of technology, planning, and long-term infrastructure vision (Qiao, 2022). More broadly, digitalization has been shown to affect urban sustainable development from an economic perspective, suggesting that digital transformation can improve efficiency, coordination, and value creation in cities (Yang et al., 2025). Artificial intelligence also contributes to sustainable development during urbanization by strengthening AI research and development, infrastructure, and market advantages (M. Wang et al., 2025). For municipalities, these developments imply that innovation is

not an optional modernization tool; it is a prerequisite for designing new financing mechanisms, analyzing citizen behavior, improving digital participation, and ensuring that investment platforms are efficient, transparent, and scalable.

Green technological innovation and environmental sustainability further expand the relevance of innovation-driven municipal finance. Evidence from carbon emissions trading policies suggests that policy tools can promote both the quantity and quality of urban green technological innovation (Zou et al., 2025). Urban sustainability research also shows that environmental challenges such as urban heat islands and urban moisture islands are shaped by built-environment patterns and require integrated planning responses (Wu et al., 2025). Similarly, assessment of urban heat islands using satellite-based approaches reflects the need for advanced data systems and environmental intelligence in urban management (Q. Wang et al., 2025). These issues are directly relevant to Tehran because sustainable municipal revenue should not be separated from sustainable urban development. Crowdfunding can be particularly valuable when used for green infrastructure, neighborhood environmental improvement, smart transportation, energy efficiency, and climate adaptation projects, because such projects provide visible public value and can motivate citizen participation.

Spatial planning and urban-rural integration also demonstrate that sustainable development depends on coordinated investment pathways and long-term territorial governance. Research on the sustainable development pathway of urban-rural integration from a spatial planning perspective indicates that development strategies must integrate economic, spatial, and institutional dimensions (Zhang, 2025). This perspective is important for Tehran Municipality because revenue sustainability should be aligned with spatial justice, balanced service provision, and the reduction of uneven development across urban districts. Crowdfunding investment marketing can support this alignment by enabling district-based or neighborhood-based projects, allowing residents to contribute to visible local improvements, and creating a financial mechanism that links urban planning priorities with citizen participation. However, to avoid reinforcing spatial inequalities, such models must be designed with attention to equitable access, inclusive communication, and institutional oversight.

Taken together, the literature shows that Tehran Municipality faces a dual challenge: it must reduce dependence on unstable revenue sources while also responding to the demands of digital transformation, public trust, environmental sustainability, and participatory governance. Previous research has clarified the problem of municipal revenue instability in Tehran and other Iranian cities, while international studies have shown the growing importance of crowdfunding, digital marketing, innovation, urban branding, and resilient finance. Yet a clear gap remains in connecting these domains within a single operational model. Most studies examine sustainable municipal revenue, crowdfunding behavior, digital innovation, or urban branding separately, while fewer studies explain how innovation drivers can strengthen crowdfunding investment marketing and how this marketing mechanism can contribute to sustainable urban revenue. This gap is especially important in Tehran Municipality, where bureaucratic complexity, public trust deficits, dependence on unstable income, and the need for innovative financing converge in one institutional setting.

Therefore, the present study aimed to design a crowdfunding investment marketing model for enhancing sustainable urban revenues in Tehran Municipality with emphasis on innovation drivers.

2. Methods and Materials

The present study was conducted with the aim of designing a crowdfunding investment marketing model for enhancing sustainable urban revenues in Tehran Municipality, with particular emphasis on innovation in urban management. In terms of purpose, the study was applied, because it addressed a practical managerial and financial problem in the field of urban governance and sought to provide an operational model that could support decision-making, policy formulation, and revenue planning in Tehran Municipality. In terms of nature and method, the study followed a descriptive–analytical design. It first described the theoretical and operational dimensions of crowdfunding investment marketing, innovation in urban management, and sustainable urban revenue, and then analytically examined the relationships among these constructs through field data and statistical modeling. Given the multidimensional nature of the subject, the complexity of municipal finance, and the need to combine expert-based conceptual development with empirical model testing, the study employed a mixed-methods exploratory–confirmatory approach. In this design, the qualitative phase was used to identify, refine, and validate the main dimensions and indicators of the model, while the quantitative phase was

used to test the measurement structure and causal relationships among the variables.

The qualitative population consisted of experts, senior and middle managers, university faculty members, and specialists with direct knowledge or experience in urban management, municipal finance, investment, public participation, innovation, crowdfunding platforms, public–private partnership projects, and sustainable urban revenue systems. Participants in this phase included managers from Tehran Municipality and its affiliated organizations, experts in municipal investment and citizen participation, academic specialists in urban management, marketing, innovation, and urban finance, as well as professionals active in crowdfunding platforms and participatory financing mechanisms. Sampling in this phase was conducted purposively, and the snowball technique was also used to identify additional qualified experts through the recommendations of initial participants. The main criteria for inclusion were relevant managerial, academic, consulting, or professional experience in the fields of urban finance, investment, innovation, marketing, or participatory financing. Interviews and expert assessments continued until theoretical saturation was reached, and the final qualitative sample consisted of 15 experts whose responses were considered sufficient for extracting and refining the conceptual dimensions of the study.

The quantitative population included managers, deputies, heads of departments, and specialized staff working in planning, financial, economic, investment, and public participation units of Tehran Municipality. This population covered the central headquarters of Tehran Municipality, the Organization for Investment and Public Participation of Tehran Municipality, the financial and economic deputyship, the planning and human capital development deputyship, and the relevant units of the 22 municipal districts of Tehran, including finance, planning, investment, and participation departments. Based on the estimated number of eligible personnel in these units, the quantitative population was considered to be approximately 700 individuals. The sample size was determined using Cochran's formula for finite populations at the 95 percent confidence level, with maximum variance assumption, an error level of 0.05, and p and q values of 0.50. The initial sample size for an unlimited population was calculated as 384, and after applying the finite population correction for a population of 700, the required sample size was approximately 248. To facilitate implementation and compensate for incomplete or unusable questionnaires, the final quantitative sample was set at 250 respondents. The respondents were selected from among specialists and managers who had adequate familiarity with municipal revenue systems, urban investment, public participation mechanisms, digital or innovative financing, and the administrative structure of Tehran Municipality.

Data were collected through both primary and secondary sources. Primary data were gathered using semi-structured expert interviews, Delphi questionnaires, and structured survey questionnaires. Secondary data were extracted from theoretical literature, domestic and international studies, municipal reports, financial and revenue documents of Tehran Municipality, reports issued by urban research centers, documents related to sustainable revenue planning, and international reports on urban innovation, municipal finance, and crowdfunding mechanisms. The use of both primary and secondary data made it possible to develop the initial conceptual model on the basis of theoretical foundations and then refine it through expert judgment and empirical evidence.

In the qualitative phase, semi-structured interviews and Delphi questionnaires were used to identify and screen the indicators of crowdfunding investment marketing, innovation in urban management, and sustainable urban revenue. The expert questionnaire was designed to evaluate the relevance, necessity, and conceptual adequacy of the initial indicators extracted from the literature and preliminary interviews. The first version of the expert questionnaire included items related to crowdfunding investment marketing, innovation in urban management, and sustainable urban revenue. The experts assessed the items using five-point scales and also provided corrective comments regarding ambiguity, overlap, conceptual relevance, and practical applicability to Tehran Municipality. Based on their feedback, unclear and overlapping items were revised, merged, or removed. The Delphi process was conducted in two rounds. In the first round, the initial indicators were presented to the expert panel, and their mean importance scores and content validity ratios were calculated. Indicators with insufficient mean scores or content validity ratios below the acceptable threshold were removed or revised. In the second round, the refined indicators were redistributed to the experts to reach final consensus. This process resulted in the stabilization of the main dimensions and indicators used in the quantitative instruments.

For the quantitative phase, three structured questionnaires were used. The crowdfunding investment marketing

questionnaire was designed to measure the marketing-related dimensions that influence the attraction, persuasion, and retention of contributors and investors in municipal crowdfunding projects. The final questionnaire consisted of 35 items measured on a five-point Likert scale ranging from strong disagreement to strong agreement. Its dimensions included awareness-building and marketing communications, transparency and trust-building, value proposition and participant motivation, user experience and ease of participation, relationship management with participants, innovation in marketing tools, and social legitimacy of projects. These dimensions reflected the importance of persuasive content, digital communication, transparent reporting, project attractiveness, expected value, ease of registration and payment, two-way interaction, periodic reporting, data-driven marketing, message personalization, institutional support, and expert endorsement in the successful marketing of municipal crowdfunding initiatives.

The innovation in urban management questionnaire measured the extent to which Tehran Municipality applies innovative approaches in organizational structures, administrative processes, service delivery, technology use, data-driven decision-making, citizen participation, and collaborative governance. The final version contained 20 items based on a five-point Likert scale. The extracted structure included technological and data-driven innovation, organizational and cultural innovation, developmental and participatory innovation, and process optimization innovation. The items assessed issues such as the use of new technologies, digitalization of administrative processes, smart urban systems, data-based decision-making, support for employee creativity, interdepartmental collaboration, cooperation with universities and knowledge-based companies, citizen participation platforms, environmental innovation, innovative partnerships with the private sector, automation, and process redesign.

The sustainable urban revenue questionnaire was designed to assess the capacity of Tehran Municipality to develop stable, predictable, equitable, diversified, and innovation-oriented revenue sources. The final questionnaire consisted of 25 items measured on a five-point Likert scale. Its dimensions included revenue diversification, financial stability, empowerment of the municipal financial system, efficiency of expenditure and cost management, and economic participation of citizens and the private sector. The items addressed issues such as diversification of municipal revenue sources, reduction of dependence on unstable revenues, expansion of innovative and technology-based revenues, citizen participation in financial projects, use of urban assets for revenue generation, transparency in revenue processes, operational cost reduction, financial predictability, diversity of urban financing instruments, innovation in revenue methods, private-sector participation, reduction of revenue fluctuations, and balance between municipal revenues and urban expenditures.

The validity of the research instruments was evaluated through content validity and construct validity. Content validity was assessed by 15 experts, including university professors, senior municipal managers, and specialists in urban investment, municipal finance, innovation, and participatory financing. The content validity ratio was calculated for each item using the Lawshe method. Items whose CVR values were below the acceptable threshold for 15 experts were revised or deleted. The final content validity results showed that the remaining items had adequate necessity, relevance, and conceptual coverage. Construct validity was examined through exploratory factor analysis and confirmatory factor analysis. Before factor analysis, the Kaiser–Meyer–Olkin index and Bartlett's test of sphericity were used to determine the suitability of the data. The KMO values for the main constructs were above the acceptable level and Bartlett's test was statistically significant, indicating that the correlation matrices were appropriate for factor analysis. Reliability was assessed using Cronbach's alpha. The overall alpha coefficients were 0.931 for the crowdfunding investment marketing questionnaire, 0.907 for the innovation in urban management questionnaire, and 0.923 for the sustainable urban revenue questionnaire, indicating excellent internal consistency. The alpha coefficients of the subdimensions were also acceptable to excellent, confirming the stability and consistency of the measurement tools.

Data analysis was performed in two main stages corresponding to the qualitative and quantitative phases of the mixed-methods design. In the qualitative phase, the data obtained from expert interviews and Delphi rounds were analyzed through thematic interpretation, open coding, categorization of concepts, and expert consensus analysis. Initially, the interview texts and expert comments were reviewed carefully, and meaningful units related to crowdfunding investment marketing, urban innovation, and sustainable revenue were extracted. These units were then grouped into conceptual categories based on similarity, theoretical relevance, and practical applicability to Tehran

Municipality. The initial categories were converted into dimensions and indicators, and the Delphi technique was used to screen and validate them. In each Delphi round, the mean importance score and content validity ratio of each indicator were calculated. Indicators with low scores or insufficient expert agreement were removed or revised, while indicators meeting the acceptance criteria were retained for the final model. The qualitative analysis produced the initial conceptual structure of the study and provided the foundation for designing the quantitative questionnaires.

In the quantitative phase, the collected questionnaire data were first screened and cleaned. Incomplete questionnaires, inconsistent responses, and outlier cases were examined and removed where necessary. The data were then entered into statistical software for analysis. Descriptive statistics, including frequency, mean, standard deviation, minimum, and maximum, were used to describe the demographic and professional characteristics of the respondents and the distribution of the main research variables. Reliability analysis was conducted using Cronbach's alpha to evaluate the internal consistency of the total scales and their subdimensions. Exploratory factor analysis was then applied to examine the underlying factor structure of the three main constructs. Principal component analysis and Varimax rotation were used to identify factor clusters, determine factor loadings, and assess the extent to which the observed items represented the theoretical dimensions of each construct. The adequacy of the sample and the suitability of the correlation matrix were confirmed through KMO and Bartlett's test before factor extraction.

After exploratory factor analysis, confirmatory factor analysis was used to test the measurement model and determine whether the empirical data supported the proposed structure of the constructs. In this stage, factor loadings, convergent validity, discriminant validity, composite reliability, and average variance extracted were examined. Factor loadings above the acceptable threshold indicated that the observed items adequately represented their latent constructs. Model fit was evaluated using common fit indices, including chi-square divided by degrees of freedom, RMSEA, SRMR, CFI, NFI, TLI, and related goodness-of-fit indicators. Acceptable thresholds were considered for each index in order to determine whether the measurement model had sufficient empirical support.

Structural equation modeling was used to test the research model and examine the direct, indirect, and total effects among the main variables. The main structural paths included the effect of crowdfunding investment marketing on sustainable urban revenue, the effect of innovation in urban management on sustainable urban revenue, and the role of innovation as a mediating or intervening variable in the relationship between crowdfunding investment marketing and sustainable municipal revenue. Standardized path coefficients, t-values, significance levels, and explained variance values were used to evaluate the strength and significance of the hypothesized relationships. Additional diagnostic tests were also considered where necessary, including normality assessment through skewness, kurtosis, or the Kolmogorov–Smirnov test, multicollinearity assessment, common method variance evaluation, and correlation analysis among the main constructs. Data analysis was conducted using SPSS for descriptive statistics, reliability analysis, exploratory factor analysis, and correlation analysis, while AMOS or SmartPLS was used for confirmatory factor analysis, structural equation modeling, and assessment of model fit. The integration of qualitative and quantitative findings made it possible to present a final empirically validated model of crowdfunding investment marketing for enhancing sustainable urban revenues in Tehran Municipality.

3. Findings and Results

The findings of the study are presented in two integrated phases. The first phase reports the qualitative results obtained through the Delphi process and expert consensus, and the second phase reports the quantitative findings obtained from exploratory factor analysis, reliability assessment, confirmatory evaluation of the measurement model, and structural equation modeling. The results collectively indicate that the proposed model consists of three major constructs: innovation drivers in urban management, crowdfunding investment marketing, and sustainable urban revenues. The qualitative phase established the conceptual architecture of the model, while the quantitative phase confirmed the empirical adequacy of the measurement structure and the significance of the causal paths among the constructs.

Table 1

Results of the Qualitative Phase Based on the Delphi Technique

Main construct	Initial scope of indicators	Final dimensions extracted	Final indicators retained after expert screening	Qualitative conclusion
Crowdfunding investment marketing	40 initial indicators	Awareness-building and marketing communication; transparency and trust-building; value proposition; user experience and ease of participation; relationship management; marketing innovation; social legitimacy	20 indicators	The expert panel confirmed that successful crowdfunding marketing in Tehran Municipality depends on persuasive content, digital communication, transparency, project attractiveness, participant incentives, user-friendly platforms, two-way interaction, data-driven marketing, message personalization, institutional support, and expert endorsement.
Innovation in urban management	25 initial indicators	Technological and data-driven innovation; organizational and cultural innovation; developmental and participatory innovation; process optimization innovation	18 indicators	The Delphi results showed that innovation in municipal management should be understood as a multidimensional driver that includes digitalization, smart services, data-based decision-making, interdepartmental collaboration, citizen participation, cooperation with universities and knowledge-based firms, green innovation, and process automation.
Sustainable urban revenue	27 initial indicators	Diversification of revenue sources; financial stability and repeatability; financial justice and efficiency; citizen participation and social capital; technology and data management; innovation in revenue models	18 indicators	The final expert consensus confirmed that sustainable municipal revenue requires novel urban revenues, technology-based revenues, private-sector participation, stable cash flows, reduced dependence on unstable revenues, transparent income systems, smart revenue platforms, platform economy, green economy, participatory economy, and effective use of urban assets.

The results of the qualitative phase show that the initial pool of indicators was refined into a coherent conceptual model. For crowdfunding investment marketing, the experts reduced the initial 40 indicators to 20 final indicators across seven dimensions. For innovation in urban management, 18 indicators were retained across four major dimensions. For sustainable urban revenue, the initial 27 indicators were reduced to 18 final indicators across six dimensions. In all three constructs, the retained indicators had adequate expert consensus and were considered suitable for developing the quantitative questionnaires and testing the final model.

Before testing the structural relationships, the adequacy of the measurement tools was assessed. The results showed that the data were suitable for factor analysis, because the KMO values were higher than the acceptable threshold and Bartlett's tests were significant. The reliability coefficients also indicated excellent internal consistency for all main constructs. The Cronbach's alpha values were 0.931 for crowdfunding investment marketing, 0.907 for innovation in urban management, and 0.923 for sustainable urban revenue, confirming that the items of each questionnaire were internally consistent.

Table 2

Adequacy, Validity, and Reliability of the Measurement Instruments

Construct	Number of items	KMO	Bartlett's test	Significance	Cronbach's alpha	Interpretation
Innovation in urban management	20	0.874	$\chi^2 = 1985.62$, df = 190	0.000	0.907	The data were highly suitable for factor analysis, and the scale had excellent reliability.
Crowdfunding investment marketing	35	0.884	$\chi^2 = 2265.41$, df = 153	0.000	0.931	The correlation matrix was appropriate for factor extraction, and the internal consistency was excellent.
Sustainable urban revenue	25	0.893	$\chi^2 = 2148.372$, df = 153	0.000	0.923	The sampling adequacy was very strong, and the construct showed excellent reliability.

The exploratory factor analysis of innovation in urban management extracted four factors with eigenvalues greater than 1. These four factors explained 57.45 percent of the total variance. The extracted structure was theoretically consistent with the conceptual model and indicated that municipal innovation is not limited to technological change, but also includes organizational culture, participatory development, and process optimization. All item

communalities were higher than 0.50, showing that the retained items had sufficient explanatory contribution to the latent structure.

Table 3

Exploratory Factor Analysis of Innovation in Urban Management

Extracted factor	Main items loaded on the factor	Eigenvalue	Variance explained	Cumulative variance	Conceptual interpretation
Technological and data-driven innovation	N1, N2, N3, N4, N5, N11, N13, N16	6.214	31.07%	31.07%	This factor reflects the use of new technologies, electronic services, smart systems, digitalized administrative processes, data-based decision-making, cooperation with knowledge-based institutions, and technology-supported service improvement.
Organizational and cultural innovation	N6, N7, N8, N9, N10, N12	2.181	10.90%	41.97%	This factor represents organizational support for innovation, creativity-oriented culture, employee acceptance of new ideas, support mechanisms for innovative proposals, interdepartmental collaboration, and participatory platforms.
Developmental and participatory innovation	N14, N18, N19, N20	1.764	8.82%	50.79%	This factor includes green innovation, private-sector collaboration, sustainability of innovative projects, and balanced development of innovation across municipal districts.
Process optimization innovation	N15, N17	1.332	6.66%	57.45%	This factor reflects modern cost management, automation, intelligent process redesign, and improvement of administrative efficiency.

The exploratory factor analysis of crowdfunding investment marketing identified four principal factors. These factors jointly explained 68.30 percent of the total variance, which is considered a strong result in behavioral and management research. The retained structure shows that crowdfunding marketing in Tehran Municipality is shaped by trust, social interaction, value proposition, and digital promotion. The factor loading pattern was clear, and all retained items had acceptable extraction values above 0.50, meaning that no item required deletion at this stage.

Table 4

Exploratory Factor Analysis of Crowdfunding Investment Marketing

Extracted factor	Main items loaded on the factor	Eigenvalue	Variance explained	Cumulative variance	Conceptual interpretation
Transparency and trust	Q1, Q2, Q3, Q4, Q5	6.214	34.52%	34.52%	This factor includes project transparency, clarity of financial information, trust in reported information, credibility of the project team, and disclosure of project risks.
Collective participation and interaction	Q6, Q7, Q8, Q9	2.983	16.57%	51.09%	This factor reflects voluntary participation, user engagement, social recommendation, and the influence of social networks on participation.
Feasibility and value proposition	Q10, Q11, Q12, Q13	1.874	10.41%	61.50%	This factor refers to project attractiveness, financial feasibility, profitability analysis, and alignment between the project and community needs.
Digital marketing and promotion	Q14, Q15, Q16, Q17, Q18	1.224	6.80%	68.30%	This factor covers digital advertising tools, social media activity, project branding, content quality, and the use of visual or video media for attracting contributors.

The exploratory factor analysis of sustainable urban revenue also produced a four-factor structure. These factors explained 72.63 percent of the total variance, indicating a strong and interpretable structure. The extracted factors show that sustainable municipal revenue is formed through diversification and stability of revenue sources, financial transparency and productivity, innovation-oriented financial capacity, and macro-level financial efficiency. All item extraction values were higher than 0.50, confirming the adequacy of the retained items.

Table 5

Exploratory Factor Analysis of Sustainable Urban Revenue

Extracted factor	Main items loaded on the factor	Eigenvalue	Variance explained	Cumulative variance	Conceptual interpretation
Diversification and stability of revenue sources	P1, P2, P3, P4, P5, P6	7.214	40.078%	40.078%	This factor reflects diversification of revenue sources, stability of revenue flow, reduction of dependence on unstable revenues, growth of innovative revenues, citizen participation in financing, and revenue generation from urban assets.
Financial productivity and transparency	P7, P8, P9, P10	2.984	16.579%	56.657%	This factor includes financial transparency, reduction of operational costs, use of modern revenue technologies, and sustainability of participation-based revenues.
Financial capacity-building and innovation	P11, P12, P13, P14, P15	1.744	9.689%	66.346%	This factor reflects public trust, financial predictability, diversity of urban financing tools, innovation in revenue methods, and stability of cash flow in urban projects.
Macro-financial stability and efficiency	P16, P17, P18	1.132	6.289%	72.635%	This factor captures private-sector participation, reduction of revenue fluctuations, and alignment between municipal revenues and urban expenditures.

After confirming the adequacy of the measurement structure, the structural model was tested to examine the direct and indirect relationships among innovation drivers, crowdfunding investment marketing, and sustainable urban revenue. The results showed that innovation drivers had a positive and significant effect on crowdfunding investment marketing. The path coefficient for this relationship was 0.78, and the t-value was 8.45, indicating a strong and statistically significant effect. This finding means that technological, organizational, and process innovations increase the municipality's capacity to design persuasive, transparent, and trust-building crowdfunding campaigns.

The second structural path confirmed that crowdfunding investment marketing had a positive and significant effect on sustainable municipal revenue. The path coefficient was 0.65, and the t-value was 6.12. This result indicates that when crowdfunding projects are marketed through transparency, attractive value propositions, digital promotion, relationship management, and social legitimacy, they can contribute meaningfully to the realization of sustainable and participation-based municipal income. The direct effect of innovation on sustainable revenue was also significant, with a path coefficient of 0.32 and a t-value of 3.11. In addition, the indirect effect of innovation on sustainable revenue through crowdfunding investment marketing was significant, with an indirect coefficient of 0.51 and a t-value of 5.88. Therefore, crowdfunding investment marketing functioned as a significant mediating mechanism in the model.

Table 6

Structural Equation Modeling Results and Hypothesis Testing

Hypothesis	Structural path	Path coefficient	t-value	Significance decision	Result
H1	Innovation drivers → Crowdfunding investment marketing	0.78	8.45	Significant at the 95% confidence level	Confirmed
H2	Crowdfunding investment marketing → Sustainable urban revenue	0.65	6.12	Significant at the 95% confidence level	Confirmed
H3	Innovation drivers → Sustainable urban revenue	0.32	3.11	Significant at the 95% confidence level	Confirmed
H4	Innovation drivers → Crowdfunding investment marketing → Sustainable urban revenue	0.51	5.88	Significant indirect effect	Mediation confirmed

The overall findings indicate that the proposed model is empirically supported. The strongest direct path was observed between innovation drivers and crowdfunding investment marketing, showing that innovation acts as the enabling infrastructure for participatory urban financing. The second strongest path was the effect of crowdfunding investment marketing on sustainable urban revenue, indicating that marketing is not merely a promotional activity but a strategic mechanism for transforming citizen trust, digital participation, and project legitimacy into stable municipal financial resources. The significant indirect effect further demonstrates that innovation alone is not sufficient

to produce sustainable revenue unless it is translated into citizen-facing marketing mechanisms. In other words, innovation provides the technical and organizational capacity, while crowdfunding investment marketing converts this capacity into financial participation and sustainable municipal income.

The reported model fit results also indicated acceptable consistency between the proposed model and the empirical data. The measurement and structural results support the conclusion that the model has adequate explanatory power for Tehran Municipality's administrative and financial context. Accordingly, the final model confirms that Tehran Municipality can move toward more sustainable revenues by combining innovation-driven municipal governance with transparent, digital, relationship-oriented, and socially legitimate crowdfunding investment marketing.

4. Discussion and Conclusion

The present study aimed to design and empirically test a crowdfunding investment marketing model for enhancing sustainable urban revenues in Tehran Municipality with emphasis on innovation drivers. The findings confirmed that the proposed model has both conceptual coherence and empirical support. In the qualitative phase, the Delphi results identified seven main dimensions for crowdfunding investment marketing, including awareness-building, transparency and trust-building, value proposition, user experience, relationship management, marketing innovation, and social legitimacy. The qualitative results also indicated that innovation in urban management is composed of technological and data-driven innovation, organizational and cultural innovation, developmental and participatory innovation, and process optimization innovation. Sustainable urban revenue was also conceptualized through dimensions such as revenue diversification, financial stability, transparency, citizen participation, technology-based revenue management, and innovative revenue models. These findings show that sustainable municipal finance cannot be achieved through isolated financial reforms, but requires an integrated system in which innovation, communication, public trust, and participatory investment mechanisms operate together.

The quantitative results supported the main assumptions of the study. The strongest direct path was observed from innovation drivers to crowdfunding investment marketing, with a path coefficient of $\beta = 0.78$ and a statistically significant t-value. This result indicates that innovation is a strong antecedent of effective crowdfunding marketing in Tehran Municipality. In other words, when the municipality benefits from technological infrastructure, digital tools, organizational flexibility, smart processes, and data-based decision-making, it becomes more capable of designing credible, transparent, and persuasive crowdfunding campaigns. This finding is consistent with studies emphasizing the role of digitalization and technological capacity in urban sustainable development. Digital transformation improves urban economic coordination and strengthens the capacity of municipalities to design new financing and participation mechanisms (Yang et al., 2025). Similarly, artificial intelligence infrastructure and AI-related market advantages can support sustainable urbanization by improving innovation capacity, decision-making quality, and service efficiency (M. Wang et al., 2025). The result is also consistent with research on smart urban systems, which shows that sustainable investment strategies in cities depend on intelligent upgrading, technological integration, and long-term planning capacity (Qiao, 2022).

The positive effect of innovation drivers on crowdfunding investment marketing can also be explained through the logic of trust and risk reduction. Crowdfunding depends heavily on the credibility of information, the transparency of project processes, and the ability of platforms to reduce uncertainty for potential investors. When innovation improves transaction security, digital reporting, process automation, and information quality, it directly strengthens the marketing power of municipal crowdfunding initiatives. Previous research has shown that crowdfunding investment decisions are influenced by the way information is presented and interpreted, and that linguistic distortion or unclear information can affect investment behavior (Wang et al., 2022). Therefore, in the context of Tehran Municipality, innovation is not merely a technological upgrade; it is a trust-producing infrastructure. This interpretation is also aligned with evidence showing that media signals and positive public information can induce more investment in equity crowdfunding markets, because favorable narratives increase confidence, visibility, and perceived legitimacy (Israel José dos Santos et al., 2023). Thus, the confirmed path from innovation to crowdfunding marketing suggests that Tehran Municipality must first build innovative and transparent infrastructures before expecting citizens to respond positively to participatory financing campaigns.

The second major finding showed that crowdfunding investment marketing had a positive and significant effect on sustainable urban revenue, with a path coefficient of $\beta =$

0.65. This result confirms that marketing is not a peripheral promotional activity, but a central mechanism for transforming citizen attention, trust, and willingness to participate into sustainable financial resources. In crowdfunding markets, backer behavior is shaped by perceived value, campaign credibility, platform interaction, and changing investment dynamics (Olsson, 2023). Therefore, a municipality that presents projects through clear value propositions, transparent reporting, digital communication, and continuous relationship management can increase the likelihood of attracting small-scale contributions and investments. This finding is also consistent with studies showing that social media promotion in crowdfunding campaigns has complex and powerful effects on donation and participation dynamics (Dehdashti et al., 2022). In municipal crowdfunding, campaign success depends not only on the technical or financial attractiveness of a project, but also on how effectively the project is narrated, branded, explained, and socially legitimized.

The effect of crowdfunding marketing on sustainable revenue is particularly important for Tehran Municipality because previous studies have repeatedly emphasized the structural challenge of revenue instability in Iranian municipalities. Earlier evaluations of Tehran Municipality's revenue system showed that financial sustainability has been a persistent concern and that the municipality needs more durable and predictable revenue sources (Danesh Jafari et al., 2014; Danesh Jafari et al., 2015). Research on the structure of Tehran Municipality's sustainable revenues and VAT gap also indicates that revenue reform requires attention to structural efficiency, revenue capacity, and stable income channels (Izadkhasti, 2022). Similarly, studies on sustainable municipal revenue sources have emphasized their role in maintaining and improving urban services (Mahdavi, 2021). The present finding extends these earlier works by showing that crowdfunding investment marketing can be considered a strategic pathway for revenue diversification, especially when it is supported by innovation and institutional trust. Rather than relying only on taxes, fees, charges, or land-related income, municipalities can use participatory financing models to mobilize citizen capital for local and visible urban projects.

The significant direct effect of innovation drivers on sustainable urban revenue, with $\beta = 0.32$, further confirms that innovation contributes to municipal financial sustainability independently of marketing. This result suggests that innovative urban management can improve revenue sustainability by reducing inefficiencies, enhancing service productivity, supporting data-based revenue systems, and enabling new financial models. This interpretation is consistent with studies that connect innovation, environmental governance, and sustainable urban development. Carbon emissions trading policies, for example, can promote urban green technological innovation in both quantity and quality, showing that institutional and policy innovation can generate broader sustainability outcomes (Zou et al., 2025). Likewise, research on urban heat islands and built-environment dynamics demonstrates that cities increasingly require data-driven planning and technological evaluation to address complex sustainability challenges (Q. Wang et al., 2025; Wu et al., 2025). Although these studies focus mainly on environmental and technological dimensions of sustainability, their logic supports the present result: innovative urban systems are more capable of managing complexity, anticipating future needs, and mobilizing resources for sustainable development.

The mediation result is one of the most important findings of this study. The indirect effect of innovation drivers on sustainable urban revenue through crowdfunding investment marketing was significant, with $\beta = 0.51$. This confirms that crowdfunding investment marketing serves as a key mediating mechanism in the relationship between innovation and sustainable revenue. In practical terms, innovation alone does not automatically generate sustainable municipal income. Digital platforms, fintech tools, smart systems, or organizational reforms become financially meaningful only when they are translated into citizen-facing mechanisms that persuade people to participate, invest, and trust municipal projects. This result is consistent with the strategic role of crowdfunding and digital markets in improving sustainability and performance, as shown in research on business sustainability during crisis conditions (Hadi et al., 2023). It also supports the argument that investment incentives depend on institutional arrangements, secure expectations, and credible governance structures (Kurbanov et al., 2025). In Tehran Municipality, therefore, the financial value of innovation depends on whether the municipality can convert innovative capacity into a marketable, trustworthy, and socially meaningful investment opportunity.

The qualitative finding that transparency and trust-building are among the central dimensions of crowdfunding investment marketing is also consistent with the literature. Crowdfunding investors require clear information about project objectives, expected returns, risks, implementation

stages, and financial accountability. If information is unclear or distorted, investment decision-making may be weakened (Wang et al., 2022). In a municipal setting, transparency is even more important because citizens evaluate crowdfunding projects not only as investors, but also as residents, taxpayers, and users of urban services. The credibility of the municipality, the visibility of project progress, and the fairness of revenue use can either strengthen or weaken participation. This interpretation aligns with research on good urban governance and sustainable urban revenues in Tehran, which emphasizes that governance quality affects the possibility of revenue sustainability (Yazdani & Amiri, 2023). It also corresponds with evidence from Poland showing that municipal revenues are vulnerable to financial crises, making transparent and resilient fiscal systems essential for urban management (Maj-Waśniowska & Wichowska, 2024).

The finding that social legitimacy and urban branding are important dimensions of crowdfunding marketing also has strong theoretical support. Urban crowdfunding projects must be presented as legitimate, attractive, and meaningful opportunities for public contribution. Research on attracting investment by introducing the city as a special economic zone shows that investment attraction depends on how the city is positioned and communicated as an economic opportunity (Allam & Jones, 2019). Studies on urban branding similarly show that city brand components and identity-based destination branding affect how stakeholders perceive urban value and attractiveness (Lalehpour & Amirhosseini, 2020; Vossoughi et al., 2020). In the context of Tehran Municipality, this means that crowdfunding projects should not be framed as ordinary administrative funding needs. They should be branded as place-based, citizen-centered, and value-generating projects that allow residents to contribute to visible improvements in their districts and neighborhoods. This approach can increase emotional attachment, perceived ownership, and willingness to participate.

The findings also suggest that crowdfunding investment marketing can support a shift from unstable urban finance toward more balanced and participatory development. Earlier research identified land subdivision and preparation as a source of instability in municipal revenues, warning that land-based income can create structural dependence and undermine long-term fiscal sustainability (Moezzi et al., 2011). The present study provides an alternative logic by showing that citizen-based investment, when supported by innovation and marketing, can contribute to revenue diversification. This is also consistent with broader urban sustainability literature emphasizing spatial planning, urban-rural integration, and coordinated development pathways (Zhang, 2025). If crowdfunding projects are designed around district-level needs, green infrastructure, public transportation, urban regeneration, and local service improvement, they can simultaneously support revenue generation and spatially balanced urban development.

Overall, the results confirm that the proposed model is suitable for explaining how Tehran Municipality can move toward sustainable revenue through innovation-driven crowdfunding marketing. The model shows that innovation drivers create the technical and organizational conditions for credible crowdfunding, crowdfunding marketing converts those conditions into citizen engagement and investment behavior, and this participation contributes to sustainable municipal revenue. The findings are consistent with prior studies on municipal revenue instability in Tehran, crowdfunding behavior, digital marketing, smart city development, urban branding, and sustainable urban innovation. At the same time, the study adds to the literature by integrating these scattered domains into one empirically tested model. The key theoretical contribution is the clarification of crowdfunding investment marketing as a mediating construct between urban innovation and sustainable revenue. The key practical contribution is the identification of a strategic pathway through which Tehran Municipality can reduce dependence on unstable income sources and move toward a more participatory, transparent, and innovation-oriented financial model.

This study had several limitations that should be considered when interpreting the findings. First, the quantitative data were collected from managers, experts, and staff within Tehran Municipality, and although these participants had relevant professional knowledge, the views of ordinary citizens, private investors, and platform users were not directly measured. Second, the study used a cross-sectional design, which limits the ability to draw strong conclusions about long-term causal dynamics among innovation, crowdfunding marketing, and sustainable revenue. Third, some constructs such as trust, social legitimacy, and willingness to invest may change over time according to economic conditions, public experiences, political decisions, and the success or failure of municipal projects. Fourth, the study was conducted in the specific administrative, financial, and sociocultural context of Tehran Municipality, and the results may not be fully

generalizable to smaller municipalities or cities with different fiscal structures.

Future studies should examine the proposed model from the perspective of citizens and actual small-scale investors to determine whether the factors identified by municipal experts match the motivations and concerns of potential participants. Longitudinal research is also recommended to assess whether innovation-driven crowdfunding campaigns can produce stable revenue over multiple fiscal periods. Future researchers may also test the moderating role of financial literacy, public trust, perceived corruption, digital readiness, risk perception, and neighborhood attachment in the relationship between crowdfunding marketing and investment behavior. Comparative studies across different Iranian cities would also be valuable, because municipalities vary in size, governance capacity, economic structure, digital infrastructure, and public participation culture. In addition, future research can examine specific types of municipal crowdfunding projects, such as green infrastructure, transportation, neighborhood regeneration, smart services, and cultural or tourism projects.

Tehran Municipality should develop a dedicated digital crowdfunding platform supported by transparent financial reporting, real-time project progress updates, secure payment infrastructure, and clear communication of project benefits. Municipal projects should be selected and marketed based on visible public value, local relevance, feasibility, and citizen appeal. Each project should have a clear brand identity, an understandable value proposition, a defined implementation timeline, and a transparent accountability mechanism. The municipality should also establish an integrated unit combining expertise in finance, digital technology, marketing, public relations, and urban planning to manage crowdfunding campaigns professionally. To build trust, citizens should receive regular reports on how funds are collected, spent, monitored, and converted into tangible urban outcomes. In this way, crowdfunding investment marketing can become not merely a fundraising tool, but a mechanism for rebuilding public trust and strengthening participatory urban governance.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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Declaration of Interest

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