

## Original Article

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## Elucidating construction control mechanisms and their relationship with quality of life: a qualitative study in District 3 of Tehran

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### Abstract

This study aims to elucidate the systematic relationship between construction control mechanisms and quality of life in Tehran's District 3. The core issue centres on the inefficiency of the existing control system as a multidimensional systemic challenge arising from the interaction of three factors: unstable governance, technical supervision deficiencies, and conflicting economic incentives. The research methodology was designed based on a mixed-methods approach (qualitative-quantitative) and case study, utilizing semi-structured interviews with 30 specialized experts selected through purposive sampling and theoretical saturation. Data analysis was conducted through three-stage coding (open, axial, and selective) using MAXQDA software, with reliability confirmed by a Cohen's Kappa coefficient of 0.67. From the quantitative perspective, the extraction of 76 initial codes and 18 core categories led to the formation of 7 final thematic dimensions encompassing governance, supervision, physical structure, environmental quality, economic factors, social security, and building safety. The findings reveal that the primary challenges concentrate on urban governance (29%) and regulatory frameworks (20%), with a high correlation observed between governance and supervision (0.88). Qualitative analyses further indicate that lack of transparency, institutional misalignment, and reliance on unstable density-based revenues have created a vicious cycle of construction violations and diminished quality of life. Significant path coefficients based on structural equation modeling demonstrate strong effects of information transparency ( $\beta=0.81$ ) and mid-level governance ( $\beta=0.72$ ) on the control system. Additionally, land speculation ( $\beta=0.76$ ) and construction quality and safety ( $\beta=0.71$ ) were identified as determining factors in urban quality of life. At the policy level, integrated solutions are proposed, including the establishment of a unified digital platform (single window system), the transformation of regulations into performance-based indicators, and the development of sustainable financial instruments. The implementation of a regional pilot project using a stepped-wedge design, along with the development of performance monitoring indicators, is recommended as an operational strategy to achieve the research objectives.

### Keywords

Construction violations  
District 3 of Tehran Municipality  
Quality of life  
Urban fabric  
Urban governance  
Social participation

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## 1. Introduction

The accelerated process of urbanization in Iran, similar to many developing countries, has become one of the most fundamental challenges of urban governance over the past three decades (Hosseinpour et al., 2023). According to data from the Statistical Center of Iran (2016), more than 74 percent of the country's population resides within urban areas, while only 28 percent of the national territory is equipped with sustainable urban infrastructure (Azarbarzin et al., 2024; Aghaei et al., 2022). This imbalance between physical urban growth and the institutional capacity of urban management has resulted in serious consequences for residents' quality of life (Hidari Tamrabadi & Karami, 2022; Rahnama & Razzaghian, 2014; Latif Aghili et al., 2021). Concurrently with the rapid increase in urban population, deficiencies in fiscal and spatial policymaking have caused urban management—particularly in the Tehran metropolitan area—to diverge from its core mission of ensuring welfare and livability, instead becoming increasingly reliant on unstable revenue sources.

Following the implementation of the Second National Development Plan (1995–1999) and the enactment of the “Municipal Financial Self-Sufficiency Law,” a process was initiated that ostensibly aimed to reduce municipalities' dependence on central government budgets. In practice, however, it led to the institutionalization of “density selling” and the chronic dependence of urban management on revenues generated from building permits, land-use changes, and penalties for construction violations (Ebrahimiān & Ganji, 2022). Estimates indicate that during the 2010s, more than 45 percent of Tehran Municipality's revenues were derived from density-related charges, a figure that reached as high as 65 percent in some northern districts of the city (Izadkhasti & Negintaji, 2024). Rather than enhancing public services, this financial dependence has contributed to uncontrolled construction expansion, excessive building densities beyond environmental carrying capacity, a decline in per capita service provision, and ultimately a noticeable deterioration in citizens' quality of life (Karimniya, 2022).

Tehran's District 3 exemplifies this condition. The district is characterized by high building density—averaging approximately 565 persons per hectare in its central neighborhoods and exceeding 780 persons per hectare in northern neighborhoods—and has experienced widespread unauthorized construction, illegal conversion of garden lands, and the proliferation of high-rise buildings within older urban fabrics. Data

from the district's detailed development plan (2019) indicate that over five years (2013–2018), more than 400 building permits were issued outside the framework of the approved plan, 70 percent of which involved violations related to building density or site coverage. This situation reflects significant weaknesses in enforcement and monitoring mechanisms governing urban construction, which have not only disrupted the city's physical order but have also undermined key livability indicators such as access to daylight, ventilation, green space, and visual tranquility (Pazooki, 2024).

Recent studies demonstrate that in Iranian metropolitan areas, inadequate enforcement of national building regulations, inefficiencies within the Construction Engineering Organization in quality control processes, and the absence of a coordinating institution among permit-issuing authorities constitute the primary reasons for the failure of construction control policies (Alizadeh & Asghari Zamani, 2021; Sharj Sharifi et al., 2022). In other words, the design of urban construction mechanisms—primarily intended to organize development and enhance visual and physical quality—has failed to simultaneously provide behavioral and aesthetic opportunities for residents and visitors alike, which, according to Lang, constitute the fundamental objective of urban design. The disorder in volumetric skyline, visual coherence, and physical form, along with the lack of well-defined public spaces and insufficient control over construction quality, observed over recent decades in most Iranian cities, substantiates this claim (Bakhshi & Khalili, 2023; Pourhossein Roshan et al., 2021; Habibi & Sheikh Ahmadi, 2023; Kargar et al., 2012; Omidhosseinabadi & Ahmadi, 2020).

Moreover, predominantly physical-oriented approaches in the formulation of urban planning regulations—without adequate consideration of the social and environmental dimensions of quality of life—have resulted in construction control functioning more as an administrative and revenue-generating instrument than as a tool for improving urban livability (De Oliveira & Jose, 2019; Moroke et al., 2019). This institutional gap has, in turn, contributed to declining public trust in local authorities and reduced citizen participation in urban monitoring processes (Sapena et al., 2020; Hu et al., 2012; Taqi et al., 2021). Furthermore, long-term density-selling policies in Tehran have exacerbated spatial and social inequalities. In northern districts, increased building density has driven land price escalation and capital concentration, whereas in southern districts, the quality of public

services and building safety has deteriorated (Ghadami & Khaleqnia, 2014).

Based on data from the Urban Quality of Life Survey (UN-Habitat, 2024), satisfaction with the physical environment in high-income areas of Tehran stands at approximately 62 percent, while in low-income areas it falls below 35 percent. This stark disparity underscores the direct relationship between weak regulatory mechanisms and declining spatial justice at the city level. Additionally, density selling and the issuance of permits that contravene detailed plan regulations have produced severe economic and physical consequences. Studies indicate that the sale of excess density in Tehran has been highly inflationary, causing residential land prices to rise exponentially. Currently, the average price of land in Tehran is approximately twice the average housing price (Sameti & Bakhshayesh, 2012). As a result, the profitability of new investments has declined, and developers' incentives to enter the market have been significantly reduced. At the same time, uncoordinated high-rise development and excessive density have placed substantial pressure on infrastructure systems such as transportation and urban services, while generating an incoherent urban landscape. This physical disorder has intensified problems such as traffic congestion and pollution and has further contributed to dysfunction within the urban structure (Mina & Rahimi, 2019).

Accordingly, the central problem addressed in this study is the examination of how construction control mechanisms, and through which processes, can contribute to the enhancement of urban quality of life. To this end, the research focuses on Tehran's District 3 and adopts a qualitative and interpretive approach. Using semi-structured interviews with urban managers, supervising engineers, urban planning experts, and residents, the study explores the perceptions and lived experiences of key actors in order to elucidate the relationship between policy, institutions, legal frameworks, and quality of life within the real-world urban context.

Data analysis is conducted within the theoretical framework of urban governance and quality of life (UNOPS, 2021) to develop a context-specific model for redesigning the construction control system and for the qualitative monitoring of urban livability. The ultimate objective is to produce an applied framework for regulatory reform and the strengthening of local-level oversight mechanisms that is not only capable of curbing unauthorized construction but also, simultaneously, able to enhance the social,

environmental, and physical dimensions of quality of life. In other words, this study is grounded in the assumption that there is a direct and systematic relationship between urban quality of life and the quality of construction governance, such that any improvement in technical and institutional control mechanisms is directly reflected in enhanced levels of residents' satisfaction, sense of security, and urban identity.

## 2. Theoretical foundations

### 2.1 Construction control mechanisms

Within the theoretical framework that examines construction control mechanisms, institutional structures, legal-executive instruments, the economic incentives of actors, and physical and social outcomes must be considered as interrelated agents and variables. In Iran's urban legal system, the commissions established under Article 100 of the Municipal Law and its related notes function as significant quasi-judicial bodies endowed with the authority to impose fines, issue demolition (removal) orders, and enforce executive sanctions. Consequently, they play a pivotal role in regulating construction behavior (Sharj Sharifi et al., 2022). On the one hand, these institutions serve as formal instruments for implementing urban planning regulations and technical-sanitary standards. On the other hand, due to their strong enforcement guarantees (fines and the possibility of demolition), they possess the potential to create deterrence.

However, empirical evidence derived from their rulings and performance indicates that the combination of adjudication procedures, the allocation of territorial jurisdiction, and the manner in which penalties are applied has generated serious weaknesses in achieving effective control (Ebrahimiān & Ganji, 2022). Relative corruption or profit-seeking incentives tend to emerge when the cost of violation—measured in terms of risk and the amount of the fine—is assessed to be lower than the benefits derived from density selling or unauthorized construction. Under such conditions, the fine itself, as a source of municipal revenue, may become inclined toward generating “uncontrolled profit,” thereby undermining corrective and regulatory motivations. Case studies and document analyses demonstrate that the fine-calculation system and the manner of its enforcement (including payment deadlines, the inability to ensure immediate execution, and the prolonged duration of cases) have reduced the deterrent effect of penalties and, in some instances,

have even led to the creation of economic incentives for violating actors (Mohammadi & Saeedi, 2014). Another structural factor contributing to weaknesses in construction control lies in the determination and enforcement of the local jurisdiction of these commissions. Ambiguities regarding urban boundaries and buffer zones, as well as disputes over the precise identification of the “location of violation,” lead to delays in adjudication and in the issuance of enforceable rulings. The Administrative Justice Court has repeatedly addressed this issue, emphasizing that verification of territorial jurisdiction is a prerequisite for the legitimacy of commission decisions, and that violations occurring outside the municipality’s area of mandate should not fall under its jurisdiction. Such institutional ambiguities not only result in fragmented implementation but also create legal space for evading decisive enforcement (Pourhossein Roshan et al., 2021).

## 2.2. The impact of floor area ratio (FAR), sales, and rent-seeking on quality of life

The sale of floor area ratio (FAR) and the associated rent-seeking represent a critical issue that must be analyzed from both urban planning and spatial justice perspectives. Granting additional FAR or permitting unauthorized construction in exchange for fees or informal payments directly affects the environmental quality of neighborhoods—through reduced open space, increased traffic congestion, insufficient

parking, and diminished landscape quality—and indirectly influences citizens’ access to services and overall quality of life. Evidence indicates that the rules governing FAR allocation, technical-urban criteria, and the economic mechanisms for determining penalties must be designed so that short-term gains from FAR sales do not outweigh long-term public benefits. Otherwise, the control mechanism itself becomes a channel for generating spatial inequality (Estoque & Wu, 2024; Becerik-Gerber et al., 2022; Gusakova et al., 2020).

The link between construction control mechanisms and quality of life can be demonstrated through three distinct pathways. First, the physical effects of violations—reduced open space, increased land permeability and density, and additional infrastructure burden—directly impact environmental and health-related indicators. Second, the socio-economic consequences—such as higher traffic costs, depreciation of adjacent property values, and intensified spatial inequality—undermine citizens’ welfare. Third, institutional and administrative effects—such as decreased public trust in urban governance institutions and perceptions of injustice—diminish social quality of life and residents’ sense of belonging to the city. Consequently, control policies that rely solely on punitive measures, without reforming underlying motivational and institutional structures, cannot sustainably improve quality of life (Dalvand et al., 2022).

**Table 1. Impacts of construction on quality of life indicators in urban contexts**

Category	Positive impacts (component/dimension/indicator/item)	Negative impacts (component/dimension/indicator/item)
Economic	<ul style="list-style-type: none"> <li>• component: economic growth and employment creation</li> <li>• dimension: economy / employment</li> <li>• indicator: employment growth rate, net jobs created</li> <li>• items: number of direct and indirect jobs created, change in regional unemployment rate (Liu Et Al., 2024; Huang Et Al., 2023).</li> <li>• component: increased property value and investment attractiveness</li> <li>• dimension: housing market / capital</li> <li>• indicator: change in average housing price, volume of investment attracted</li> <li>• items: percentage change in housing prices, value of investment contracts (Jena &amp; Kansal, 2025).</li> </ul>	<ul style="list-style-type: none"> <li>• component: economic inequality and resident displacement (gentrification)</li> <li>• dimension: income / housing</li> <li>• indicator: rate of forced relocation, housing cost-to-income ratio</li> <li>• items: percentage of displaced households, share of housing cost in average income (Finnemann et al., 2024).</li> <li>• component: decline in resident satisfaction</li> <li>• dimension: urban satisfaction</li> <li>• indicator: decrease in general satisfaction index</li> <li>• items: percentage of respondents dissatisfied with physical or service changes (Kang Et Al., 2022; Afacan, 2015).</li> </ul>
Socio-environmental	<ul style="list-style-type: none"> <li>• component: development of sustainable infrastructure and expansion of green spaces</li> <li>• dimension: urban environment / sustainability</li> <li>• indicator: green space per capita (m<sup>2</sup>/person), recycling rate</li> <li>• items: accessible green space per person, percentage of segregated waste (Mburu, 2024; Valerio, 2024).</li> <li>• component: improved living conditions and health through housing renovation</li> <li>• dimension: health/quality of life</li> <li>• indicator: housing quality, public health indices</li> <li>• items: percentage of upgraded housing units, reduction in respiratory diseases (Huang et al., 2023; Kumar et al., 2021; Ji et al., 2024).</li> </ul>	<ul style="list-style-type: none"> <li>• component: pollution and ecosystem degradation</li> <li>• dimension: air/water pollution and biodiversity</li> <li>• indicator: PM<sub>2.5</sub> concentration, water quality parameters (BOD/COD), biodiversity index</li> <li>• items: average PM<sub>2.5</sub> (µg/m<sup>3</sup>), BOD (mg/l), number of recorded species (Mburu, 2024; Acharya, 2025; Muzaffar &amp; Ali, 2024; Kumar et al., 2025; Merem et al., 2011).</li> <li>• component: increased social stress and adverse mental health impacts</li> <li>• dimension: social/mental health</li> <li>• indicator: urban stress index, mental health service utilization rate</li> <li>• items: percentage of residents with high stress levels, number of psychotherapy visits (Auwalu &amp; Bello, 2023; Hassan et al., 2023).</li> </ul>

Category	Positive impacts (component/dimension/indicator/item)	Negative impacts (component/dimension/indicator/item)
Urban form and services	<ul style="list-style-type: none"> <li>• component: development of smart city services and enhancement of urban welfare</li> <li>• dimension: technology / urban services</li> <li>• indicator: coverage of digital urban services, service response time</li> <li>• items: percentage of neighborhoods covered by smart services, average response time to requests (Lin et al., 2019; Lu &amp; Liang, 2024).</li> <li>• component: upgrading infrastructure and improving access to services (transportation, health, education)</li> <li>• dimension: infrastructure / accessibility</li> <li>• indicator: average travel time, service capacity</li> <li>• items: average travel time to health or educational centers, number of stations or public transport capacity per 10,000 residents (Auwalu &amp; Bello, 2023).</li> </ul>	<ul style="list-style-type: none"> <li>• component: urban sprawl and increased social isolation</li> <li>• dimension: physical / transportation / social interaction</li> <li>• indicator: increased population density, share of trips by private vehicle, social participation index</li> <li>• items: persons per km<sup>2</sup>, percentage of daily trips by car, participation rate in local events (Al-Thani, 2019; Akkuş, 2025; Power, 2001; Hassan Et Al., 2023).</li> <li>• component: increased pressure on public services and infrastructure</li> <li>• dimension: service capacity / efficiency</li> <li>• indicator: per capita service delivery cost, supply-to-demand ratio</li> <li>• items: operational cost per capita (currency/person), percentage of capacity shortfall in schools and health centers (Yar, 2017).</li> </ul>

### 2.3. The role of regulatory institutions and the issue of violations

The role of the Administrative Justice Court in overseeing the decisions of municipal commissions represents a legal-control equilibrium point: the Court is tasked with examining both the procedural form and the substantive content of decisions to ensure that public and private rights are not infringed. However, a limited approach that requires a “direct personal benefit” as a precondition for the Court’s intervention in some instances results in broader public interests—such as neighborhood quality of life—receiving less judicial protection. This regulatory weakness is particularly evident in cases with significant public impacts, highlighting the need to redefine the scope of “public interest” in review processes (Omidhosseinabadi & Ahmadi, 2020).

From the perspective of regulatory effectiveness, three categories of mechanisms should be designed and implemented synergistically. First, institutional and urban planning prevention (including updating master plans, establishing clear physical regulations for density, and implementing construction monitoring systems) to prevent violations at their root cause. Second, balance in economic-incentive mechanisms (setting fines based on actual value rather than merely per square meter, ensuring transparency of revenues, and preventing fines from becoming an inappropriate revenue source) to alter the cost-benefit calculation of violations. Third, strengthening adjudication and judicial oversight processes (reducing review time, ensuring the right to defense, developing criteria for jurisdiction, and establishing general standards for accepting complaints from public stakeholders) to enhance both the legitimacy and speed of enforcement of control decisions. Documentation and case analysis indicate

that the absence of any of these elements reduces the overall efficiency of the control system (Bakhshi & Khalili, 2023).

To establish a documented and scientifically grounded operational framework, a set of evaluation indicators must be developed that are simultaneously measurable, sensitive to policy changes, and based on local data. These include indicators for assessing compliance with urban planning regulations, speed and effectiveness of enforcement of rulings, the ratio of fine revenues to capital budgets allocated for infrastructure repair, and neighborhood-level quality-of-life metrics (access to open space, parking density, pollution levels, and social satisfaction). Preliminary data and existing judicial procedures demonstrate that, without such indicators, policy evaluation and reform cannot rely on formal reporting or scientific analysis (Azizi & Jamalabadi, 2016; Forghani et al., 2020).

Ultimately, reform strategies must be simultaneously legal-administrative, planning-oriented, and economic. This involves revising the calculation and scheduling of fines, increasing transparency in FAR sales and imposing stricter regulations for FAR transfers, enhancing preventive controls (Like, issuing permits based on compliance with master plans and provision of parking), expanding the role of independent monitors (including engineering associations and civil society organizations), and developing the Administrative Justice Court’s capacity for rapid and public-interest-focused adjudication. Collectively, the reviewed documents emphasize the necessity of aligning legal regulations with quality-of-life objectives to ensure that construction control functions as a tool for sustainable urban development (Hosseinpour et al., 2023).

### 3. Literature review

In any scientific research, tracing previous studies and reviewing the literature on the subject is necessary before addressing the research question, as appropriate responses and deeper analyses cannot be achieved without accessing and building upon the findings of others. In developed countries such as those in Europe, North America, and advanced Asian cities, construction control mechanisms are based on codified technical regulations, precise building codes, and efficient regulatory systems. Implementation of these regulations, according to reports by the Federal Emergency Management Agency (FEMA), the Organization for Economic Cooperation and Development (OECD), and the International Code Council (ICC), has led to reductions in human and financial losses, increased urban resilience, and improved quality-of-life indicators, including safety, health, and citizen satisfaction (Codes, 2020; Dunlop & Radaelli, 2022).

In contrast, in developing countries, including parts of Asia, Africa, and Latin America, despite existing legal frameworks, weak enforcement capacity, the prevalence of informal construction, inefficient regulatory systems, and administrative corruption have weakened the link between construction control and quality-of-life improvements. Modern global policies, such as people-centred regulation, promoted by the OECD and the European Union (EU), emphasize integrating technical, social, and environmental dimensions in regulatory design (Horn & Lee, 2023). However, World Bank and UN-Habitat reports indicate that applying these principles in developing countries is not feasible without strengthening local institutions and formalizing construction practices. Consequently, the main difference between these two groups of countries is not in the existence of regulations but in enforcement efficiency, institutional transparency, and stakeholder participation—factors that result in a more sustainable and desirable quality of life in cities with high enforcement capacity and effective construction control compared to areas where laws remain primarily on paper (Bettencourt & Marchio, 2023).

Regarding international studies, Răducan et al. (2025), in a systematic review of urban quality-of-life models, demonstrated that combining physical, social, and economic indicators is essential for a comprehensive assessment of quality of life, and any analysis of construction control mechanisms that focuses solely on technical aspects provides an incomplete picture of

outcomes. Chelstowska et al. (2025) and colleagues, applying grounded theory and field experience analysis, found that construction logistics, especially in large projects, directly reduce urban quality of life by an increase of noise, traffic congestion, and temporary access restrictions. Li & Fan (2025), through quantitative-visual assessment of streetscapes and deep learning applications, showed that in dense urban contexts, imbalance in physical form and poor-quality street elements significantly reduce resident satisfaction and quality-of-life indicators, effectively quantifying the direct relationship between street physical elements and perceptions of urban life. Malik et al. (2024), in a field study in Malawi, found that despite existing policies and technical regulations, limited enforcement capacity, restricted access to technology, and weak follow-up of executive guarantees prevent sustainable construction performance and, consequently, improvements in quality-of-life indicators. Estoque & Wu (2024), while examining the relationship among resilience, sustainability, and quality of life in urban construction and associated social and environmental changes, emphasized the role of local ecological knowledge, governance, and transformative planning for environmental preservation and quality-of-life improvement in contemporary contexts. Hanapi et al. (2023) compared the dynamics of building standards and design in guiding private developers toward improving the quality of life in low-cost housing for urban refugees. Research by Becerik-Gerber et al. (2022) on Human-Building Interaction (HBI) demonstrated the way buildings affect human experiences and outcomes, with adaptable, learning, and evolving structures enhancing user quality of life while optimizing resource use and service accessibility. Gusakova et al. (2020) found that horizontal development projects enable integrated urban growth alongside improved living standards and comfort for populations, where affordability, convenience, safety, energy efficiency, and modern engineering equipment contribute to sustainable development. Eichner & Ivanova (2018) analyzed socio-ecological aspects of high-rise construction, showing that tall buildings entail significant social and environmental risks with negative impacts on the biosphere and human health. In the Iranian context, three principal causative axes weaken construction control and reduce quality of life: (1) the financial structure of municipalities and dependence on FAR-derived revenues, which incentivize issuing non-compliant permits; (2) legal

and judicial deficiencies in the monitoring processes of commissions and oversight by the Administrative Justice Court, reducing the effectiveness of enforcement; and (3) institutional-technical weaknesses (monitoring, inter-agency coordination, and inspector capacity) that hinder regulation implementation and monitoring of socio-physical quality. For example, Pazouki (2024), in an analytical study on uncontrolled FAR sales in Tehran, showed that this policy increases infrastructure pressure, spatial inequality, and decreases urban quality-of-life indicators. Izadkhasht & Negin-Taji (2024), by estimating Tehran Municipality's revenue capacity based on value-added tax law, indicated that tax system reform could reduce dependence on construction-related income and ensure financial stability. Hosseinpour et al. (2023) highlighted that the main physical-environmental consequences of high-rise construction in Tabriz relate to air pollution, surrounding functions and land uses, and visual impacts. Azarbarzin et al. (2023) found a strong and significant relationship between environmental indicators and high-rise construction trends, with the most important impacts on land-use change attributed to livability, economic, infrastructure, physical, ecological, and social indices, respectively. Sharj Sharifi et al. (2022), by examining the Administrative Justice Court's oversight of Article 100 Commission decisions, showed that limited oversight and narrow interpretations of public rights hinder spatial justice and effective enforcement of construction control regulations. Dalvand et al. (2022) concluded that the most critical consequences of building violations in Tehran's District 16 relate to urban form, building safety, and the conversion of parking spaces to residential and commercial use, with violations primarily linked to urban management performance and economic factors. Heydari Temrabadi & Karami (2022) demonstrated that urban environments with balanced visual quality and a sense of place encourage citizens' urban presence, place attachment, and pro-environmental behaviors. Karimnia (2022), in a comparative study of ten major cities worldwide, showed that diversified financial resources and budgetary transparency are prerequisites for reducing FAR sales and improving municipal financial management. Ebrahimiān & Ganji (2022), in a legal study of Administrative Justice Court supervision over Article 100 Commissions, found that weaknesses in judicial structure and jurisdictional ambiguities reduce deterrence and perpetuate building violations.

Alizadeh & Asgari-Zamani (2021) demonstrated that density-oriented policies in Zafaraniyeh, Tabriz, lead to spatial inequality, increased infrastructure pressure, and reduced urban quality. Omidhosseinabadi & Ahmadi (2020) found that increasing density in District 22 led to reduced quality of life. Mina & Rahimi (2019) observed that legal punishments without institutional and financial reform do not effectively deter building violations. Ghadami & Khaleghnia (2014) concluded that municipal reliance on FAR sales revenue disrupts spatial balance and promotes unsustainable urban development in Tehran. Nazarian & Neghaban (2013) found that over ten years, building violations reviewed by the Article 100 commission of Tehran increased annually. Finally, Sameti & Bakhshaish (2012) determined that rental and FAR-related revenues are the leading cause of financial instability and weakened technical oversight in Isfahan's municipality.

A comparative analysis of the literature indicates a fundamental gap between international approaches, which view construction control within integrated governance frameworks combined with resilience and multidimensional quality-of-life perspectives, and domestic studies, which mainly focus on physical outcomes and administrative management. This gap necessitates a conceptual redefinition, framing construction control not merely as a set of discrete regulations but as an interactive socio-technical system in which legal rules, institutional capacity, and technical-physical variables interact as causes, mediators, and moderators.

Based on this framework, three measurable and testable innovations emerge: (a) transforming regulations into performance-oriented tools (requirements based on spatial, resilience, and safety outcomes); (b) creating a digital "one-stop-shop" institutional architecture integrating permit issuance, field inspection, and electronic monitoring to minimize information errors and regulatory evasion; and (c) defining a set of standardized operational indicators capable of continuous measurement, policy thresholding, and causal analysis. Methodologically, integrating in-depth qualitative approaches with advanced quantitative modeling (SEM for mediation analysis, Difference-in-Differences(DID) and Synthetic Control for policy impact estimation, system dynamics and agent-based modeling for scenario testing) ensures empirical validation and generalizability. Strategically, three pillars must coincide: reforming urban economic incentives, standardizing and independently auditing monitoring processes, and

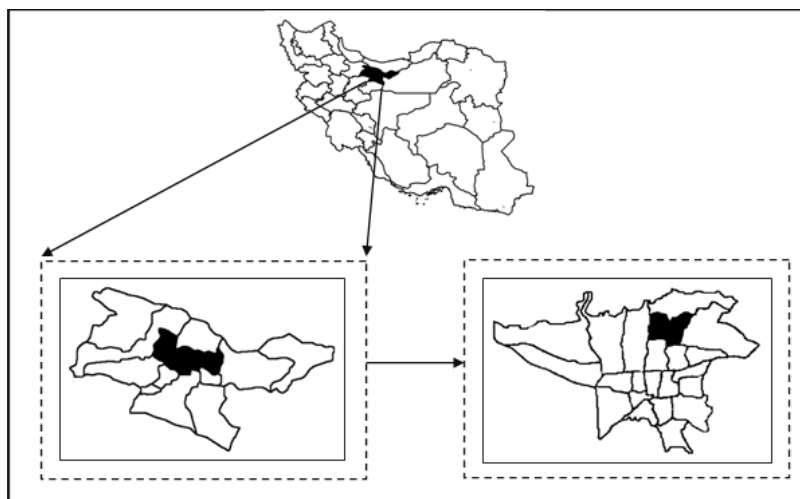
activating citizen participation and accountability mechanisms. The proposed model is recommended to be piloted regionally using a stepped-wedge intervention design with multi-source data, calibrating the cost-benefit of each component to convert normative rules into measurable, performance-oriented policy instruments. This approach bridges local literature gaps, resolves technical-institutional dualities, and substantially strengthens evidence-based urban decision-making.

#### 4. Study area

The city of Tehran is administratively divided into 22 districts, 123 sub-districts, and 375 neighborhoods (Tehran Municipality, 2016). District 3, with a population of 330,649 and a population density of 113.2 persons per hectare in 2016, is located in the northeastern part of the city (Tehran's Statistical Yearbook, 2016). Covering an area of 2,921.6 hectares, the district contains 17.4 hectares of dilapidated urban fabric and is bordered by District 1 to the north, Districts 7 and 6 to the south, District 2 to the west, and District 4 to the east. The current geographical boundaries of the district are defined by major transportation arteries: (a) northern boundary: Chamran Highway, Modares Highway, and Sadr Highway; (b) eastern boundary: Pasdaran Street and

Shariati Street; (c) southern boundary: Resalat Highway, Haqqani Highway, and Hemmat Highway; (d) western boundary: Chamran Highway (Aghaei et al., 2022).

As a first step in evaluating the research problem, identifying common construction violations—including unauthorized construction, deviation from building regulations, additional floor construction, change of land use, environmental degradation, and similar issues—is essential. An examination of violations in District 3 indicates that the main types of infractions are as follows: 1) change of land use from residential to administrative in non-conforming zones; 2) change of land use from residential to commercial in non-conforming zones; 3) additional construction resulting from the addition of extra floors; 4) violations occurring in different building units depending on the construction method, including: (a) additional construction by enclosing courtyards and exceeding permitted coverage; (b) additional construction due to longitudinal expansion of the building beyond the allowed  $60\% + m^2$ ; (c) insufficient parking; and (d) conversion of buildings to unauthorized residential use. Since this district comprises six sub-districts, the spatial distribution of violations is illustrated in Figure 2(a).



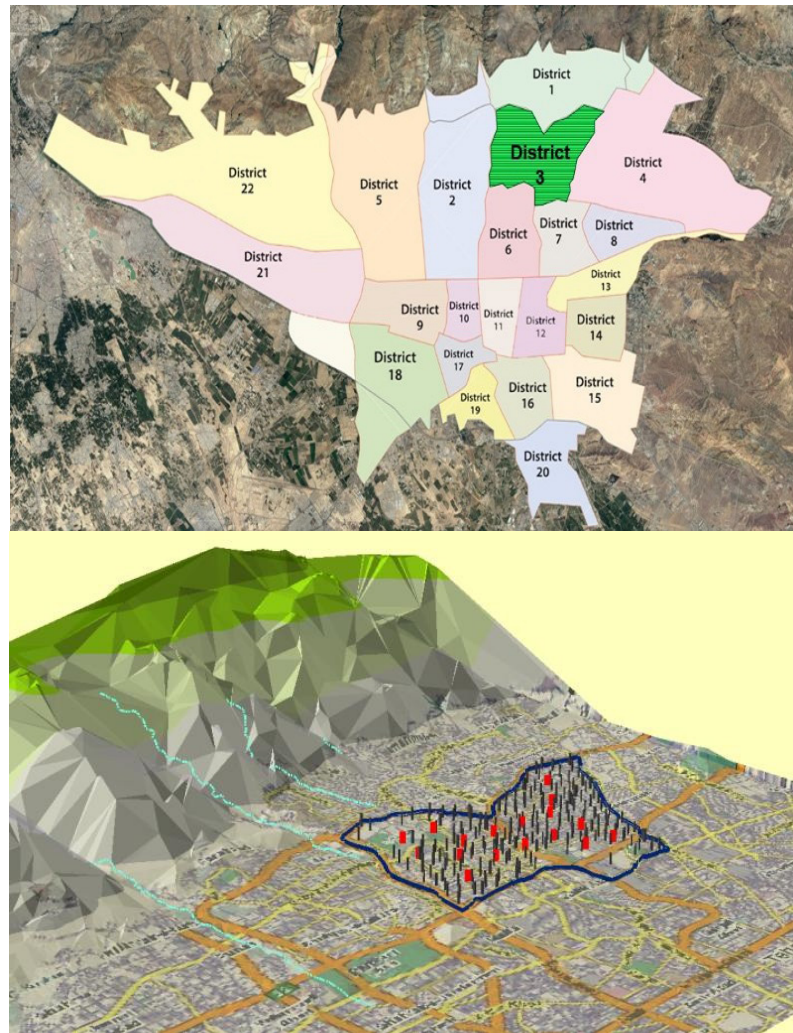


Figure 1. Geographical location of District 3, Tehran Municipality

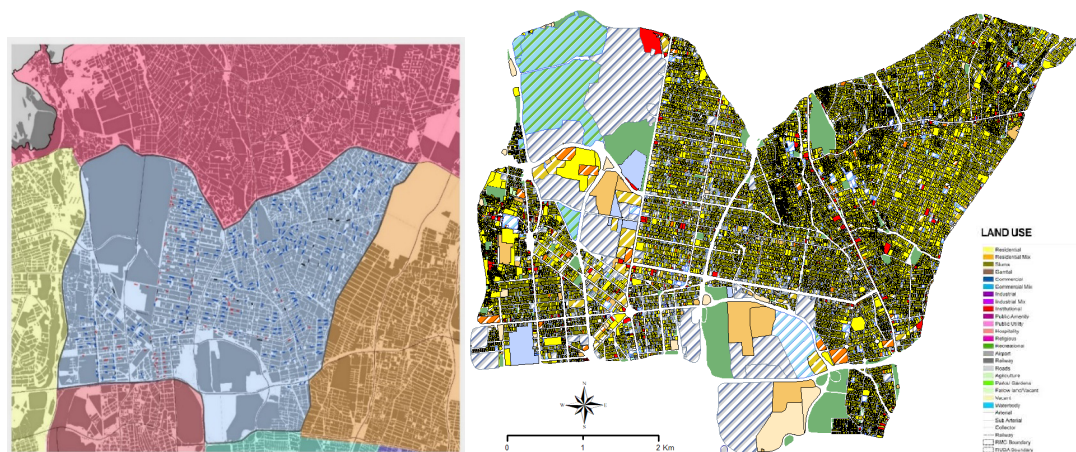


Figure 2. (a) Building violations in district 3, Tehran Municipality, and (b) land use

## 5. Materials and methods

This study was designed as qualitative research (interviews) based on a case study approach in District

3 of Tehran Municipality, aiming to extract structured experiences, perspectives, and knowledge from urban decision-makers and experts regarding construction

control mechanisms and criteria for enhancing the quality of life in the urban fabric.

In the operational phase, in addition to establishing a theoretical-conceptual framework grounded in the literature, a purposive sampling approach supplemented by snowball sampling was applied to select a total of 30 participants, including experts, managers, and professionals in urban management in District 3 of Tehran. The participants had a mean age of 44 years and an average professional experience of 18 years. In terms of gender, 17 participants were male (57%) and 13 female (43%). Regarding educational background, 19 participants held doctoral degrees (63%) and 11 held master's degrees (37%).

From a disciplinary perspective, 9 participants (30%) specialized in urban and regional planning and design, 7 (23%) in civil engineering and urban infrastructure, 6 (20%) in urban economics and financial management, 5 (17%) in urban environment and climate, and 3 (10%) in urban law and local governance. Regarding

professional roles, 12 participants (40%) were senior and mid-level managers in the municipality and affiliated institutions, 9 (30%) were professional consultants and experts, and 9 (30%) were academic researchers and members of the Engineeringdi Organization. The main areas of expertise included urban policy and governance (27%), urban design and physical quality (23%), urban resilience and environmental studies (23%), and legal and economic analysis of construction (27%). This diverse composition ensured comprehensive coverage of data from managerial, technical, economic, and social perspectives, enabling analytically generalizable results.

In addition to qualitative analysis, descriptive data regarding participant characteristics (age, work experience, and professional field) were recorded using Excel or statistical software to generate a descriptive profile of the sample population<sup>1</sup>.

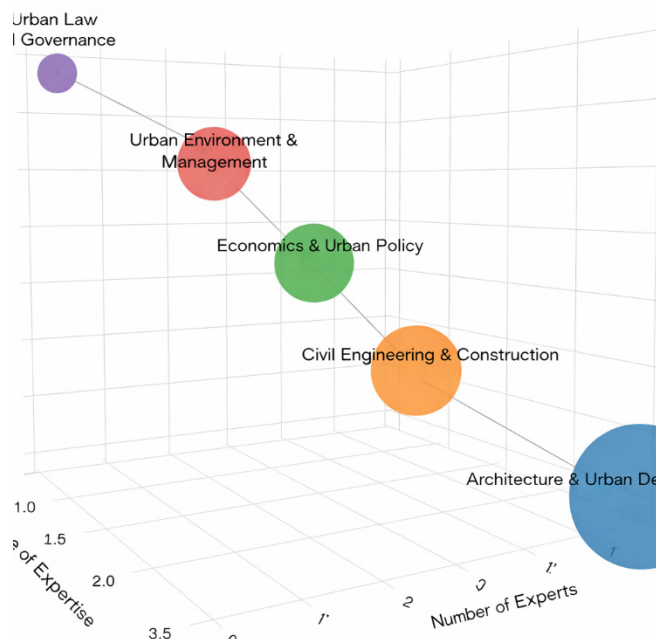


Figure 3. Characteristics of the research experts

During the research process, data were collected using a semi-structured interview guide, which was finalized after pre-testing and revision through 2–3 pilot interviews. The guide included questions covering participants' experiences with construction violations, institutional and operational barriers, policy priorities at neighborhood and district levels, and strategic recommendations regarding quality of life and residential patterns. All interviews were audio-

recorded after obtaining informed consent, conducted over 45–90 minutes, and transcribed verbatim within 48–72 hours. Transcriptions included notations for pauses, emphasis, and brief contextual notes, and each interview was anonymized using a coded identifier (P01,...P30).

In addition to interviews, official urban documents (comprehensive and detailed plans, policies, and related reports) and field observations were

incorporated as secondary data for triangulation. Data analysis was conducted systematically in three stages: open coding, axial coding, and selective coding. Initially, primary concepts and semantic units were extracted through multiple readings of the transcripts based on a codebook. Subsequently, using the compiled codes and a methodology aligned with the COREQ checklist, the data were organized into conceptual categories and main themes. In the final stage, a conceptual model was developed by focusing

on core meaning units.

For data organization and visualization, conceptual network analysis, code co-occurrence analysis, and mapping of conceptual relationships were conducted using MAXQDA, PyVis, Plotly, and Smart PLS. At the same time, statistical tests were performed using SPSS. This systematic process enhanced the accuracy, logical traceability, and theoretical coherence in explaining the relationships between construction variables and quality-of-life indicators.

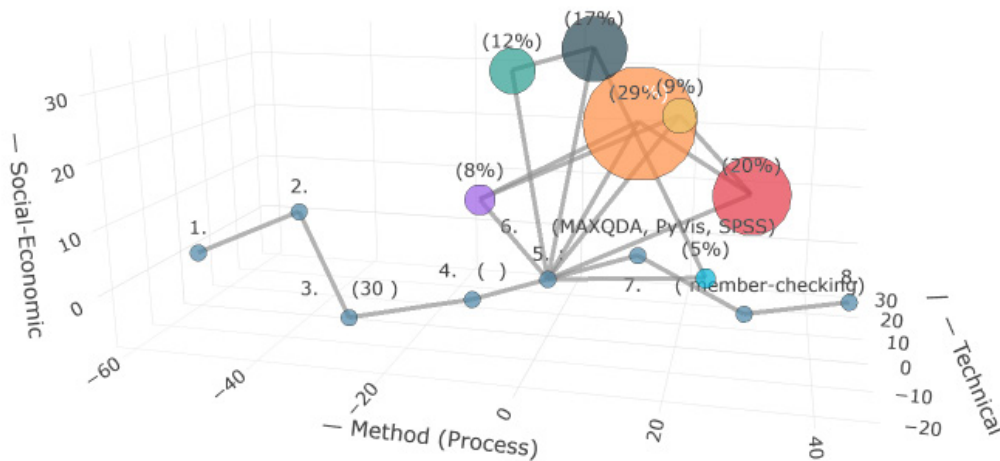


Figure 4. Research goal-setting process (model)

## 6. Research findings

In the first phase, to enhance coding reliability, at least 20% of the transcripts were independently re-coded by a second coder. Subsequently, as shown in Table 3, Cohen's Kappa for axial codes was calculated at 0.67 and reported as a weighted mean. To ensure internal validity, procedures such as limited member checking (selective transcript review by interviewees for correction or elaboration), peer debriefing with two co-specialist researchers, and data triangulation (interviews, documents, and field observations) were implemented. Methodological consistency was maintained through a documented audit trail, including versions of the codebook, analytical memos, records of code changes, and methodological

decisions. The researchers reflected on potential biases and the influence of prior assumptions on the coding process, thereby enhancing the result's confirmability.

Sampling cessation was determined based on the criterion of thematic saturation. As shown in Table 2, the stopping criterion was defined as the absence of new meaningful codes across two consecutive interviews. After the twenty-fifth interview, no new codes were added to the main dimensions, and for verification purposes, six additional interviews were conducted. Accordingly, theoretical saturation was confirmed at the twenty-fifth interview, and the total number of interviews reached 30.

Table 2. Tracking theoretical saturation

Emerging new codes	Number of new codes	Description	Interview number
Transparency, social participation, and institutional coordination	9	Initial extraction of primary codes related to urban governance and social participation	1
Construction violations and legal compliance	7	Consolidation of the construction law and monitoring axis	2

Emerging new codes	Number of new codes	Description	Interview number
Density, built form, and urban landscape	12	Expansion of physical and urban design concepts	3–5
Environmental quality, green space, and neighborhood sustainability	7	Completion of the environmental outcomes axis	6–10
Land speculation, revenue generation, and capital management	5	Integration with economic analysis and financial tools	11–15
Neighborhood identity, safety, and social services	5	Strengthening social outcomes and sense of belonging	16–20
Construction quality, safety, and contractor training	5	Completion of the construction quality and building safety axis	21–25
—	0	Theoretical saturation confirmed	26
—	0	Verification and confirmatory interviews	27–30

Source: Research Findings (2025)

Table 3. Cohen's kappa for axial codes

No	Axial category	Number of units	Observed agreement ( $P_o$ )	Expected agreement ( $P_e$ )	K (Cohen's kappa)	Agreement level
1	Construction violations and legal compliance	50	0.72	0.25	0.57	Moderate
2	Mapping and built density	45	0.68	0.24	0.58	Moderate
3	Land-use control	40	0.65	0.26	0.53	Moderate
4	Parking management and accessibility	38	0.71	0.23	0.62	Good
5	Functioning of technical control institutions	37	0.66	0.25	0.55	Moderate
6	Land market and speculation	35	0.69	0.24	0.62	Good
7	Revenue generation and managerial incentives	33	0.64	0.23	0.54	Moderate
8	Ownership and legal challenges	30	0.60	0.26	0.46	Moderate
9	Urban governance and social participation	42	0.74	0.25	0.65	Good
10	Transparency and access to information	36	0.69	0.24	0.62	Good
11	Executive and human capacity	32	0.63	0.25	0.50	Moderate
12	Environmental quality and green space	40	0.70	0.26	0.59	Good
13	Safety and construction quality	28	0.66	0.23	0.54	Moderate
14	Operational land-use changes	25	0.67	0.25	0.56	Moderate
15	Public services and accessibility	27	0.63	0.24	0.50	Moderate
16	Inter-organizational coordination	34	0.75	0.26	0.65	Good
17	Residential satisfaction and comfort	31	0.61	0.25	0.48	Moderate
18	Implementation model and validation	29	0.68	0.23	0.59	Good
*	Total (weighted mean)	567	0.67	0.25	0.67	Good

### 6.1. Research context and methodological rationale

Given the research approach, the analysis of

documents and field observations, and the development of an operational and measurable

framework—including regulatory revisions, strengthening of supervisory institutions, technical/design tools, and monitoring indicators (KPIs)—the expected output is an actionable guideline for revising local regulations and enhancing urban decision-making. This framework is designed to be implementable in District 3 of Tehran and generalizable to similar urban contexts.

Theoretical gaps primarily arise from the absence of localized models that systematically explain the relationships among regulatory instruments, institutional mechanisms, technical considerations, and tangible quality-of-life outcomes. Practical gaps are observed in the lack of operational guidance and measurable indicators for implementation and monitoring. Methodological limitations include a spatial and contextual scope confined to Tehran and potential organizational response biases, which were mitigated through guaranteed anonymity, open-ended questioning, and diversity in expert selection. The transferability of findings to other cities is facilitated by detailing contextual richness, enabling readers to evaluate the applicability of results based on local characteristics.

In developmental studies, geospatial monitoring (GIS) is incorporated to align qualitative findings with spatial indicators such as per capita green space, critical water points, and urban vulnerability mapping, thereby enhancing neighborhood-focused policy-making. Overall, this continuous and integrated methodology combines rigorous qualitative standards, technical analytical tools, validation measures, and ethical considerations to ensure that research outcomes are both technically defensible and practically applicable for urban policy-making.

## 6.2. Classification of construction control mechanisms and their impact on quality of life in District 3 of Tehran Municipality

According to official statistics and data from Tehran Municipality District 3, a portion of the district's land covering 2.19 hectares and serving a population of over 4,000 witnessed 479 construction units between 1998 and 2002 (1377–1381), with an average area of 154 m<sup>2</sup> each, of which 90% were unauthorized and lacked property titles. Additionally, the Dehvanak Gardens area has become a problematic and critical urban zone within Tehran. With the expansion of

Tehran's metropolitan area and the filling of vacant lands, capital inflows and specific social groups began to occupy the relatively untouched lands north of Valiasr Street, around Evin Valley, and in the Islamabad area. These developments intensified urban disarray, resulting in the proliferation of uncoordinated constructions, shanties, and low-quality housing.

Despite serious measures to prevent illegal constructions, the destruction of gardens and land occupation has persisted. Due to the legal ambiguity of land ownership and insufficient action by the municipality, a significant portion of the planned development area has been constructed with unregulated and informal structures, further extending the Dehvanak neighborhood toward southern Islamabad. However, due to the absence of systematic and legal control mechanisms, this area faces numerous challenges.

The Engineering Organization of Iran (organization for engineering system and construction supervision) plays a critical role as an arm of the municipality in controlling construction quality and preventing crises. According to Article 3 of the Engineering and Construction Supervision Law, the organization is responsible for achieving the objectives of this law. Article 2 emphasizes the promotion of architectural and urban planning principles, the enhancement of engineering service quality, and compliance with the national building code and urban planning regulations by all governmental agencies and municipalities. Additionally, pursuant to Articles 99 and 100 of the Municipal Law, supervising engineers act as the municipality's control arm, overseeing urban construction quality.

The central issue of the present study lies in the intersection of rapid construction, weak regulatory implementation and oversight, and the direct consequences of these gaps on the physical, environmental, and social quality of urban life. This issue is particularly evident in the complex urban fabric of District 3 in Tehran. The significance of the topic stems from the fact that the absence of coherent execution regulations and effective supervisory institutions not only leads to increased unauthorized construction and urban disorder but also undermines infrastructure, green spaces, service accessibility, and overall urban resilience.



**Figure 5. District 3 illustrated: a) deprivation and social disparity in Dehvanak; b) excavation site of Alzahra University – demolition of some Dehvanak houses for university expansion; c) demolition of valuable local gardens for residential development; d) Jordan Street under the shadow of high-rise construction**

In this section, the key interview questions were purposefully designed to investigate construction control mechanisms and their role in enhancing the quality of life within the urban fabric of District 3, Tehran. The design aimed to capture both the practical experiences of urban managers and experts, as well as local perceptions regarding the consequences of construction activities and cost-effective, implementable neighborhood-scale solutions. The strategic axes explored in the interviews comprised nine areas:

1. Experiences in addressing construction violations and legal compliance at the neighborhood and district levels.
2. Assessment of institutional mechanisms and capacities for coordination among the municipality, ministries, law enforcement agencies, and technical bodies.
3. Barriers and priorities in permit issuance, monitoring, and enforcement processes.
4. Technical and digital mechanisms (one-stop electronic services, violation databases, GIS applications, and sensor-based monitoring) for surveillance and reporting.
5. Requirements for standardizing permit issuance and technical inspection processes.
6. Financial incentives and control mechanisms for improving construction quality.
7. Impacts of land-use changes, density, and conversion of parking areas on neighborhood accessibility and

services.

8. Infrastructure capacities, building safety, and the need for periodic monitoring procedures.

9. Legal and social dimensions such as spatial justice, participation, and citizen reporting channels to enhance accountability and transparency.

The systematic three-stage coding process involved multiple readings of the transcripts, through which 76 initial codes were extracted. Using a written codebook—including definitions, inclusion/exclusion criteria, and illustrative examples—these were consolidated into 18 axial categories during the axial coding phase. In the selective coding and theoretical sampling stage, these categories were further grouped into seven final themes, forming the structure of the study's conceptual model:

1. Urban governance and social participation
2. Construction laws and supervision
3. Urban form and landscape
4. Environmental quality and green spaces
5. Urban economy and capital management
6. Safety and social belonging
7. Construction quality and building safety

Table 4 presents the classification of these three hierarchical coding levels.

In Table 7, network analysis and code co-occurrence using Plotly-PyVis quantified and qualitatively supported the conceptual relationships among the themes. Dispersion indices indicated that the highest concentration of data pertained to urban governance

and social participation ( $\approx 29\%$  of codes) and construction laws and supervision ( $\approx 20\%$  of codes). Other themes, including urban form and landscape ( $\approx 17\%$ ), environmental quality and green spaces ( $\approx 12\%$ ), urban economy and capital management ( $\approx 9\%$ ), safety and social belonging ( $\approx 8\%$ ), and construction quality and building safety ( $\approx 5\%$ ), played complementary and influential roles in determining neighborhood-level quality of life.

Documented outputs of the research include a comprehensive codebook, frequency tables, representative quotes, network and conceptual

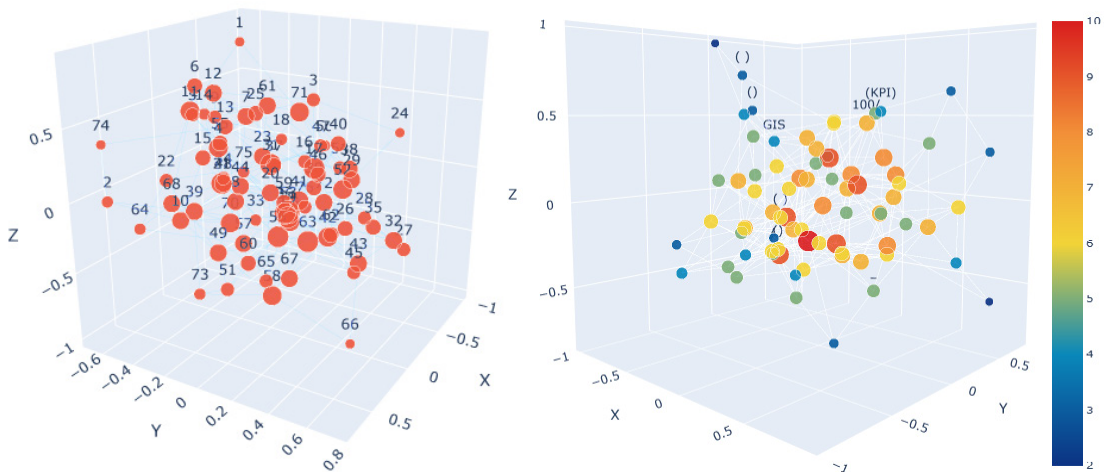
models derived from MAXQDA (Figure 7), and a methodological report aligned with the COREQ checklist. The findings indicate that to improve quality of life in similar urban fabrics, policy-making should prioritize: enhancing institutional transparency and accountability, integrating digital monitoring systems, standardizing permit issuance and technical inspections, employing financial incentives for high-quality construction, and strengthening participatory and citizen reporting mechanisms. These measures collectively enhance the effectiveness of construction control and spatial justice at the neighborhood level.

**Table 4. Summary of three-tiered coding results**

Axis	Count
Initial codes	76
Axial categories	18
Final themes	7

Based on the results of the coding process, the primary and secondary factors were categorized, and the most significant open codes adapted from interviewees were identified. These represent the classification of

construction control mechanisms influencing quality of life in the urban fabric of District 3, Tehran, as illustrated in Figure 6 and Table 5.



**Figure 6. Network of open-coded verbal data and a conceptual network of interviewees.**

**Table 5. Classification of primary and secondary factors and analysis of open codes (with respondent IDS, R)**

R/no	Initial code	Brief definition	Axial category	Final theme
r1	Unauthorized construction	Building without an official municipal permit	Construction violations and legal compliance	Construction laws and supervision
r2	Unauthorized additional floor	Construction of an extra floor or area beyond the permit	Construction violations and legal compliance	Construction laws and supervision
r3	Illegal change of use	Conversion from residential to commercial/administrative without a permit	Land use control	Construction laws and supervision
r4	Covering courtyards and increasing built area	Expanding building footprint by covering open spaces	Urban form and density	Urban form and landscape
r5	Parking shortages and conversion	Reduction or conversion of parking into residential/commercial space	Parking and access management	Urban form and landscape
r6	Weak supervision by engineers	Inadequate oversight or poor performance of supervising engineers	Technical control functions	Construction laws and supervision
r7	Rent-seeking, corruption, and land speculation	Interference of brokers in transactions and land-use changes	Land market and speculation	Urban economy and capital management
r8	Selling density for revenue	Issuance of additional density permits as a municipal revenue source	Revenue generation and managerial incentives	Urban economy and capital management
r9	Landowners' legal ambiguity	Legal and ownership issues are hindering control	Ownership and legal challenges	Construction laws and supervision
r10	Weak institutional coordination	Lack of coordination among construction-related agencies	Inter-organizational coordination	Urban governance and social participation
r11	Lack of process transparency	Public inaccessibility to permit and decision information	Transparency and information access	Urban governance and social participation
r12	Insufficient oversight personnel	Inadequate staffing for field monitoring	Executive and human capacity	Urban governance and social participation
r13	Reduced green space	Loss or reduction of neighborhood green areas	Green space deficiency	Environmental quality and green spaces
r14	Destruction of local gardens	Cutting or occupation of gardens (e.g., dehvanak)	Loss of ecological elements	Environmental quality and green spaces
r15	Noise and air pollution from construction	Increase in noise and air pollution due to projects	Environmental impacts of construction	Environmental quality and green spaces
r16	Reduced urban aesthetic quality	Visual chaos and façade anomalies	Urban landscape and visual identity	Urban form and landscape
r17	Loss of neighborhood identity	Loss of identity due to inconsistent forms and functions	Urban identity and belonging	Safety and social belonging
r18	Increased population density	The concentration of population and density rise in neighborhoods	Density and per capita management	Urban form and landscape
r19	Inadequate infrastructure	Pressure on water, electricity, sewage, and traffic systems	Infrastructure adaptation	Urban form and landscape
r20	Reduced residential quality	Decline in residents' satisfaction with living environment	Residential satisfaction and comfort	Environmental quality and green spaces
r21	Negative impact on structural safety	Unsafe buildings or non-compliance with standards	Safety and construction quality	Construction quality and building safety
r22	Deficiencies in urban utilities	Shortages or weaknesses in water and waste networks	Urban equipment and facilities	Urban form and landscape
r23	Conversion of parking into residential space	Misuse of parking for unauthorized housing	Operational change of use	Construction laws and supervision

R/no	Initial code	Brief definition	Axial category	Final theme
r24	Pressure on social services	Reduced service accessibility due to population growth	Public services and accessibility	Safety and social belonging
r25	Migration and social fabric changes	Influx of new populations altering social composition	Demographic dynamics and social change	Safety and social belonging
r26	Lack of regular monitoring mechanisms	Absence of indicators and continuous construction monitoring	Monitoring system and indicators	Urban governance and social participation
r27	Weak review of detailed plans	Failure to update plans to reflect current conditions	Plan review and refinement	Urban governance and social participation
r28	Misalignment of master and detailed plans	Overlap or lack of coordination between planning documents	Planning document integration	Urban governance and social participation
r29	Absence of an integrated digital mechanism	Lack of an electronic permit issuance and monitoring system	Single digital window	Construction laws and supervision
r30	Ambiguous legal constraints	General laws lacking operational details	Legal transparency	Construction laws and supervision
r31	Insufficient technical experts in the organization	Lack of technical capacity within the municipality	Institutional technical capacity	Urban governance and social participation
r32	Construction market influence on policy	Investors' influence over urban decision-making	Market dominance in urban policy	Urban economy and capital management
r33	Rising land and housing prices	Rapid increase in land value and rents	Economic pressure on residents	Urban economy and capital management
r34	Forced displacement and gentrification	Exit of low-income households from neighborhoods	Spatial and social inequality	Urban economy and capital management
r35	Inefficiency of Article 100 Commission	Failure to enforce legal reforms controlling violations	Efficiency of judicial-administrative institutions	Construction laws and supervision
r36	Inadequate performance of the engineering organization	Collaboration and role performance issues of the engineering organization	Coordination of technical institutions	Construction laws and supervision
r37	Absence of urban landscape quality indicators	Lack of criteria for visual identity and landscape assessment	Landscape standardization	Urban form and landscape
r38	Reduced neighborhood service coverage	Loss of service centers due to land commercialization	Land allocation and service use	Urban form and landscape
r39	Traffic and poor accessibility	Increased congestion and reduced public access	Mobility and access management	Urban form and landscape
r40	Weak local management	Absence of neighborhood-level structures for managing local issues	Local management and neighborhood capacity	Urban governance and social participation
r41	Low citizen participation in oversight	Lack of participatory and reporting mechanisms	Public participation mechanisms	Urban governance and social participation
r42	Absence of incentive mechanisms	Lack of financial/non-financial incentives for quality construction	Policy incentive tools	Urban economy and capital management
r43	Lack of local cost-benefit analysis	No economic analysis of projects at the neighborhood level	Project economic assessment	Urban economy and capital management
r44	Weak public information	Non-disclosure of performance reports and monitoring outcomes	Performance reporting and transparency	Urban governance and social participation
r45	Absence of functional indicators (kpi)	Lack of operational metrics for policy assessment	Kpi design and performance monitoring	Urban governance and social participation

R/no	Initial code	Brief definition	Axial category	Final theme
r46	Insufficient use of gis for monitoring	Incomplete use of spatial tools for oversight	Spatial information infrastructure	Urban governance and social participation
r47	Absence of updated violation maps	No spatial database of violations	Construction violation database	Construction laws and supervision
r48	Inadequate environmental impact assessment	Lack of local environmental assessments	Environmental project attachments	Environmental quality and green spaces
r49	Reduced surface permeability	Increased paved surfaces reducing water infiltration	Stormwater and infiltration management	Environmental quality and green spaces
r50	Improper construction waste management	Disposal of construction waste and insufficient recycling	Waste and environmental management	Environmental quality and green spaces
r51	Increased pressure on water networks	Higher water consumption and weak peak-time supply	Urban water resource sustainability	Environmental quality and green spaces
r52	Lack of neighborhood green space strategy	No operational plan for local green space development	Green space planning and maintenance	Environmental quality and green spaces
r53	Service satisfaction indicators	Measuring residents' satisfaction with urban services	Service quality and satisfaction assessment	Safety and social belonging
r54	Reduced social participation	Decline in engagement in local activities and associations	Social capital and participation	Urban governance and social participation
r55	Absence of local design guidelines	Lack of appropriate neighborhood design instructions	Urban design standards	Urban form and landscape
r56	Weak structural safety monitoring	Lack of periodic building safety inspection procedures	Technical inspection procedures	Construction quality and building safety
r57	Insufficient contractor training	Lack of technical and standard training for contractors	Private sector technical capacity	Construction quality and building safety
r58	Lack of urban maintenance program	Absence of a budget and a continuous maintenance process for public spaces	Infrastructure maintenance and durability	Urban form and landscape
r59	Absence of project review process	No post-project evaluation or lessons learned	Project review and correction	Urban governance and social participation
r60	Citizen reporting system (violation reporting)	Absence or weakness of citizen reporting channels for violations	Complaint and feedback mechanisms	Urban governance and social participation
r61	Adjusted violation density index	Quantitative measure for spatial violations	Spatial violation monitoring tools	Construction laws and supervision
r62	Visual impact of high-rise buildings	Visual and skyline effects on urban landscape	High-rise impacts on urban form	Urban form and landscape
r63	High-rise impact on accessibility	Effects of density and building height on traffic and access	Functional sustainability in density	Urban form and landscape
r64	Pressure on emergency infrastructure	Reduced capacity of emergency services (fire/rescue)	Emergency service resilience	Safety and social belonging
r65	Lack of environmental sensors/monitoring	Absence of a sensor network for monitoring pollution and traffic	Smart environmental monitoring infrastructure	Urban governance and social participation
r66	Urban information platform	Presence or absence of an online information and participation platform	Digital participation tools	Urban governance and social participation
r67	Financial incentives for quality construction	Financial tools to enforce construction quality compliance	Financial incentive policies	Urban economy and capital management
r68	Transparent contracts and agreements	Transparency in construction contracts and their implementation	Contractual transparency and auditing	Construction laws and supervision

R/no	Initial code	Brief definition	Axial category	Final theme
r69	Urban landscape/identity quality indicators	Criteria to measure landscape and urban identity in policies	Landscape-identity metrics	Urban form and landscape
r70	Local project impact assessment	Measuring project effects at the neighborhood level	Local project outcome evaluation	Urban governance and social participation
r71	Periodic monitoring and reporting	Producing periodic reports on performance and results	Monitoring and reporting processes	Urban governance and social participation
r72	Policy adjustment mechanism based on feedback	Ability to adjust policies based on monitoring outcomes		

The qualitative analysis based on in-depth interviews with experts reveals a systematic and complex pattern of construction control mechanisms, which can be conceptualized within three interlinked loops. At the first level, the regulatory–legal loop, centered on the axial categories of construction violations, land-use control, and the function of supervisory institutions, establishes the legal and regulatory infrastructure of the control system. This loop provides the foundational framework and enforcement guarantees required for effective construction management.

At the second level, the Physical–Functional Loop focuses on concepts such as urban density, land-use patterns, and spatial flexibility, encompassing the physical and functional dimensions of urban development and playing a decisive role in shaping the city’s form and structure.

At the third level, the outcome–quality loop includes the axial categories of environmental quality, social security, and construction quality, representing the final impacts of the construction control system on citizens’ quality of life.

The frequency distribution of codes across the seven final themes clearly indicates the priorities of the construction control system. The theme Urban Governance and Social Participation constitutes the most significant proportion ( $\approx 29\%$ ) with 22 initial codes, highlighting the importance of transparency, citizen participation, and institutional coordination in construction management. The theme Construction Laws and Supervision accounts for  $\approx 20\%$  and addresses construction violations, permit issuance, and technical oversight. The Urban Form and Landscape theme ( $\approx 17\%$ ) focuses on the physical and visual dimensions of urban development, while Environmental Quality and Green Spaces ( $\approx 12\%$ ) captures the environmental consequences of construction. The Urban Economy

and Capital Management theme ( $\approx 9\%$ ) covers financial and economic aspects, and Safety and Social Belonging ( $\approx 8\%$ ) represents the human and social dimensions of quality of life. Finally, Construction Quality and Building Safety ( $\approx 5\%$ ), although the least frequent quantitatively, holds strategic importance for urban safety and resilience.

Qualitative evidence from expert interviews confirms the validity of this analytical framework. For instance, a city planning manager emphasized administrative transparency, stating, “Clarifying the permit issuance process and implementing continuous monitoring enables more effective control of unauthorized constructions.” Similarly, a legal expert stressed the need to “strengthen supervisory mechanisms and take firm action against violators” as a deterrent. From an environmental perspective, a specialist highlighted the importance of “integrating environmental considerations into the permit process” to prevent the destruction of urban green spaces. An economic expert noted the necessity of “balancing municipal revenue generation with control of density sales” to achieve sustainable urban development.

In transforming qualitative data into quantitative instruments, a reconciliation approach was applied, which involved removing one code due to conceptual overlap, merging two codes under related categories, and directly mapping the remaining 76 codes to final survey items. This systematic process preserved the conceptual richness of the qualitative data while providing a valid and reliable quantitative tool for evaluating research variables. Overall, the comprehensive analysis indicates that improving urban quality of life requires coordinated strengthening of all three dimensions and a dynamic balance between regulatory, physical, and quality requirements within the construction control system.

**Table 6. Mapping open codes to axial codes**

Open codes	Axial category	Axial id
R1–R11	Urban Governance and Social Participation	G1
R12–R22	Construction Laws and Supervision	G2
R23–R33	Urban Form and Landscape	G3
R34–R43	Environmental Quality and Green Spaces	G4
R44–R52	Urban Economy and Capital Management	G5
R53–R62	Safety and Social Belonging	G6
R63–R76	Construction Quality and Building Safety	G7

**Table 7. Reconciliation mapping of R codes to final survey items (sample: first 10 of 76 codes)**

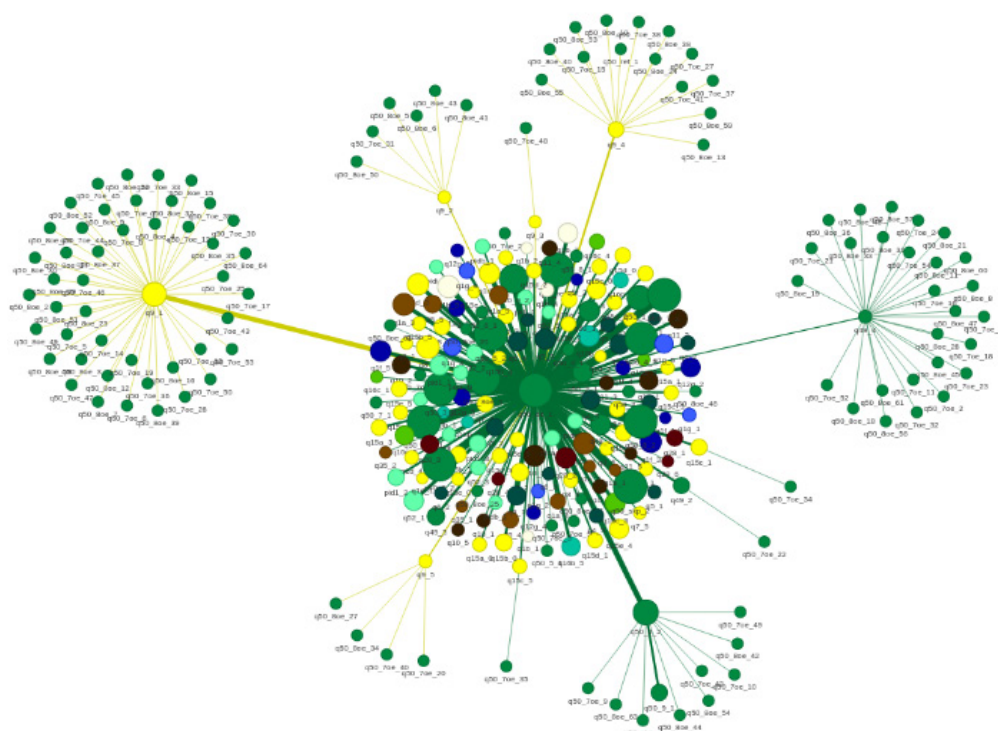
Methodological rationale	Dimension/target indicator	Final survey item code	Reconciliation decision	Condensed qualitative theme	R id
Complete coverage of governance concepts	Urban governance – transparency	GOV_A1_1	Direct mapping	Permit issuance transparency	R1
Information access metric	Urban governance – transparency	GOV_A1_2	Direct mapping	Public access to information	R2
Focus on citizen participation.	Urban governance – participation	GOV_A2_1	Direct mapping	Citizen oversight participation	R3
Institutional coordination evaluation	Urban governance – coordination	GOV_A3_1	Direct mapping	Inter-organizational coordination	R4
Continuous performance monitoring	Urban governance – monitoring	GOV_A4_1	Direct mapping	Continuous construction monitoring	R5
Control of construction violations	Laws & supervision – violations	LAW_B1_1	Direct mapping	Unauthorized construction	R6
Land use management	Laws & supervision – land use	LAW_B2_1	Direct mapping	Unauthorized land-use change	R7
Technical and engineering supervision	Laws & supervision – oversight	LAW_B3_1	Direct mapping	Performance of supervising engineers	R8
Building density review	Urban form – density	PHYS_C1_1	Direct mapping	Building density	R9
Urban landscape analysis	Urban form – landscape	PHYS_C2_1	Direct mapping	Urban landscape quality	R10

**Table 8. Summary of the reconciliation process**

Description	Status of the quantitative instrument	R id
Conceptual overlap with the participation indicator	Removed	R22
Merged into the comprehensive land-use management item	Merged	R23
Merged into a comprehensive urban landscape quality item	Merged	R24
Duplicate with a continuous monitoring indicator.	Removed	R25
Merged into the comprehensive construction standards item	Merged	R26
Mapped to final survey items according to instrument structure	Direct mapping	Remaining codes

**Table 9. Classification of primary and secondary factors and open-code analysis**

Final theme	Number of axial categories	Number of initial codes	Approx. % of total (~76)	Focus
1) urban governance and social participation	13	22 codes	≈29%	Highest data concentration; includes transparency, participation, institutional coordination, and policy monitoring.
2) construction laws and supervision	9	15 codes	≈20%	Second most coded; covers violations, permits, Article 100, engineer oversight, and legal transparency.
3) urban form and landscape	8	13 codes	≈17%	Focus on form, density, landscape, and physical neighborhood infrastructure.
4) environmental quality and green spaces	6	9 codes	≈12%	Covers pollution, gardens, permeability, and waste
5) urban economy and capital management	5	7 codes	≈9%	Includes land speculation, municipal revenue, economic inequality, and financial tools
6) safety and social belonging	4	6 codes	≈8%	Focus on neighborhood identity, satisfaction, services, and social resilience.
7) construction quality and building safety	3	4 codes	≈5%	Fewer codes but strategically critical; covers structural safety, contractors, inspections, and construction standards.



**Figure 7. Conceptual model of construction control mechanisms and their relationship with quality of life (MAXQDA)**

According to the findings presented in Table 9, the qualitative data analysis indicates that the distribution of code frequencies across the main themes directly reflects structural challenges in urban governance in Tehran, particularly in the domains of construction

control and environmental quality. The most significant data concentration, approximately 29%, is observed in the theme of urban governance and social participation. This high proportion indicates that governance issues—specifically weaknesses in

participatory mechanisms, information transparency, inter-institutional coordination, and continuous policy monitoring—are regarded by experts and local managers as the most fundamental factors underlying inefficiencies in the urban management system. Many codes related to construction violations, spatial inequality, and even environmental degradation indirectly stem from insufficient institutional coordination and opaque decision-making processes. The second-ranked theme, construction laws and supervision ( $\approx 20\%$ ), analytically reflects the gap between policy formulation and implementation. Focus on construction violations, inefficiencies in the Article 100 Commission, legal opacity, and incomplete performance of the engineering system indicates that the existing legal framework lacks sufficient deterrence and regulatory guidance, contributing to the city's physical and environmental challenges.

Urban form and landscape, representing approximately 17% of the codes, capture technical and urban design concerns, including density, visual character, infrastructure, and the quality of the built form. The data suggest that this theme is directly affected by governance weaknesses and unstable regulations, demonstrating an organic connection with supervisory and environmental domains.

The theme environmental quality and green spaces ( $\approx 12\%$ ) primarily addresses issues such as the destruction of gardens, reduced land permeability, noise pollution, and inadequate waste management, which can be interpreted as secondary consequences of inefficient spatial and regulatory policies. Urban economy and capital management ( $\approx 9\%$ ) reflects the deep interconnection between land speculation, density trading, and economic pressure on residents. Interviews indicate that municipal financial decisions and market interventions have exacerbated inequality and degraded environmental quality.

Safety and social belonging ( $\approx 8\%$ ) represents the human and social dimensions of urban development, highlighting loss of neighborhood identity, low resident satisfaction, and weakened social services as indicators of social fragmentation in dense and disordered environments. Although quantitatively smaller, this theme qualitatively underscores the direct effects of spatial and economic policies on social cohesion.

Finally, construction quality and building safety ( $\approx 5\%$ ) has the lowest proportion but holds strategic significance. Issues such as insufficient contractor training, lack of periodic inspections, and absence of

technical standards directly threaten urban resilience and citizen safety. Overall, the overlapping data pattern indicates that the themes are interconnected in a networked manner: macro-level governance weaknesses, technical supervisory deficiencies, and economic inefficiencies constitute three primary axes of a cycle that simultaneously undermines the city's physical, environmental, and social quality.

To test the conceptual model derived from the qualitative phase, data from 30 experts were analyzed. Descriptive statistics in SPSS show that the highest mean corresponds to the intermediate governance category (4.35), while the lowest mean pertains to market and speculation (4.25). Standard deviations ranged from 0.49 to 0.57, indicating balanced data dispersion around the mean. Shapiro–Wilk tests for normality indicated that most indicators deviated from normality ( $p < 0.05$ ). Under these conditions, partial least squares (PLS) analysis in SmartPLS was justified because it does not assume normal distributions and allows subsequent analyses without data transformation.

Content validity of the instrument was confirmed through CVR and CVI indices, yielding CVR values between 0.60 and 1.00 and CVI values between 0.82 and 0.96, all exceeding minimum acceptable standards. In the measurement model, AVE values for all constructs were above 0.50, indicating satisfactory convergent validity. CR values ranged from 0.80 to 0.88, confirming adequate composite reliability. Cronbach's alpha for all constructs exceeded 0.70, demonstrating internal consistency. Discriminant validity, assessed via HTMT, showed all values below 0.85, confirming conceptual distinction among constructs. The MICOM test confirmed measurement invariance for group comparisons. Harman's single-factor test indicated that the first factor accounted for less than 50% of the variance, suggesting no serious common method bias.

In the structural model, significant path coefficients and  $R^2$  values for dependent constructs ranged from 0.54 to 0.67, demonstrating the model's explanatory power. Positive  $Q^2$  values confirmed predictive relevance, and

$f^2$  indices indicated small-to-large effect sizes. PLS-SEM results indicate that the construction control system influences urban quality of life through three primary mechanisms. According to the path coefficients (Figure 4), intermediate governance has a total effect of 0.72 on construction violations and legal compliance,

highlighting its pivotal role in the control system. This suggests that strengthening local supervisory institutions and improving inter-organizational coordination can directly reduce construction violations. Transparency and access to information ( $\beta=0.81$ ) showed the strongest relationship across all paths, emphasizing the importance of transparent permit processes and public access to information. Inter-theme paths indicate that indirect effects via mediating variables play a crucial role. For instance, intermediate governance affects institutional misalignment through construction quality and safety ( $\beta=0.42$ ) and via transparency and information ( $\beta=0.55$ ). This pattern demonstrates that improving governance can reduce institutional misalignments both directly and indirectly.

For the market and speculation theme, the land and speculation path coefficient ( $\beta=0.76$ ) indicates that economic factors play a decisive role in the control system. This highlights the necessity of regulating land speculation and real estate markets as an integral component of construction management.

From a technical perspective, urban density and form, with three subcomponents—urban density mapping ( $\beta=0.66$ ), land-use control ( $\beta=0.58$ ), and parking/

access management ( $\beta=0.52$ )—demonstrate a direct link between the physical dimension of urban planning and quality of life, underscoring the importance of integrated land-use and density management.

Regarding construction quality and safety, path coefficients for safety and construction quality ( $\beta=0.71$ ) and technical control functions ( $\beta=0.63$ ) indicate that improving technical standards and strengthening supervisory institutions can directly enhance building safety and residents' quality of life. Direct, indirect, and total effect decomposition shows that intermediate governance (total effect=0.45), transparency and information (total effect=0.40), and market/speculation (total effect=0.33) have the most significant influence on institutional misalignment.

These findings suggest that improving the construction control system through these three primary axes can significantly enhance urban quality of life. The overall goodness-of-fit (GOF) of the model was 0.588, indicating a satisfactory fit and supporting its analytical validity for urban policy applications. Overall, improving urban quality of life requires a systematic approach that simultaneously focuses on governance strengthening, transparency enhancement, market regulation, and technical standard improvement.

**Table 10. Pearson correlation levels among themes**

Theme pair	Correlation (r)	Interpretation
Urban governance & social participation ↔ construction laws & supervision	0.881	Very high correlation; weaknesses in transparency and construction supervision almost always coincide with governance issues. This relationship is direct and stable; improvements in governance can directly enhance supervisory performance.
Urban form & landscape ↔ environmental quality & green spaces	0.653	High correlation; physical changes, density, and reduced permeability significantly affect environmental quality and green spaces. This is a direct, tangible effect in urban analysis.
Urban economy & capital management ↔ construction laws & supervision	0.603	High correlation; weak construction oversight facilitates economic exploitation and land speculation. Observed consistently in interviews and field observations.
Safety & social belonging ↔ urban governance & social participation	0.559	Medium-to-high correlation; inefficient governance and low social participation reduce security and social belonging. The effect is indirect, primarily, but substantial for social planning.
Construction quality & safety ↔ urban form & landscape	0.489	Moderate correlation; structural quality and safety are more relevant in high-density areas and unauthorized construction.
Urban economy ↔ safety & social belonging	0.441	Low-to-moderate correlation; urban economy impacts social security indirectly through spatial inequality, neighborhood migration, and local economic disparities.

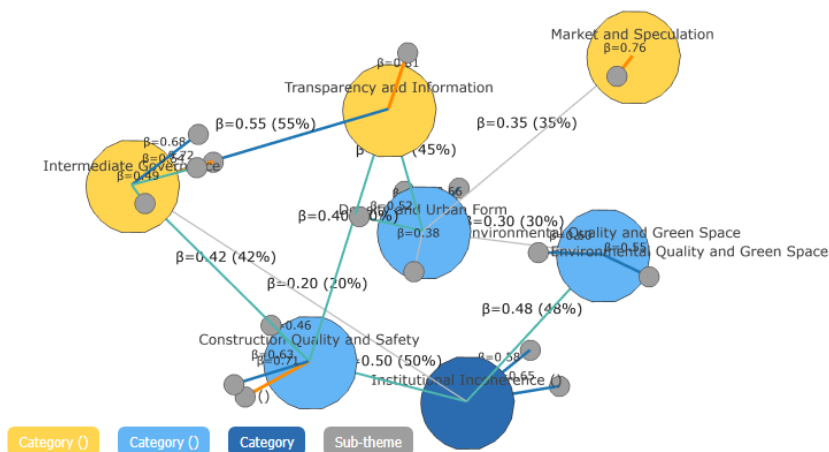


Figure 8. Conceptual model (coefficients) and structure of the interactive network of open-word interview codes (based on Smart-PLS & Plotly).

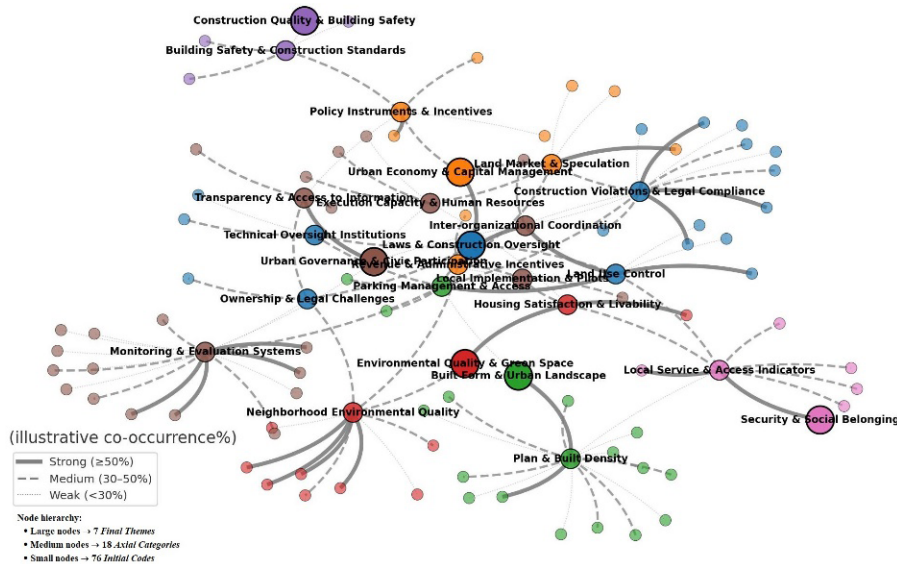


Figure 9. Conceptual model derived from PyVis based on 76 initial codes, 18 axial categories, and 7 final themes (strong links: co-occurrence  $\geq 50\%$ , medium: 30–50%, weak:  $< 30\%$ ) 2025.

## 7. Discussion

The present study, aimed at elucidating the control mechanisms in urban construction and their relationship with quality of life, was developed through an in-depth understanding of international experiences and a rigorous analysis of the domestic context. Scientifically, this research contributes in two significant ways: first, by reconstructing a localized conceptual-practical map that frames construction control as a socio-technical system and identifies measurable and mediating tools; second, by providing a mixed-methods methodology that can serve as a model for comparative studies and policy testing in

other Iranian cities. This approach leverages deep qualitative coding for indicator design and quantitative methods for causal analysis and scenario simulation. A review of the international literature reveals that, in developed economies, construction control is based on an “integrated governance” paradigm, in which codified technical regulations (ICC codes), transparent regulatory institutions, and multidimensional performance standards (safety, resilience, social well-being, and citizen satisfaction) are intertwined. The outcomes, documented by institutions such as OECD and FEMA, show measurable improvements in quality-of-life indicators. This model views construction

control not merely as an administrative process but as a dynamic socio-technical system capable of influencing both objective and subjective urban quality-of-life outcomes through output-based requirements—akin to what Horn and Lee (2023) term “human-centered regulation.”

In contrast, in many developing countries, despite relatively similar legal frameworks, three operational gaps—limited enforcement capacity, institutional corruption, and lack of stakeholder participation—create a disconnect between law and practice, undermining the causal relationship between construction control and quality of life. This duality is evident when comparing international and domestic studies: while global research (Răducan, 2025; Estoque & Wu, 2024) emphasizes the integration of physical, social, and economic indicators and the pivotal role of transformative governance and local ecological knowledge, domestic studies primarily focus on physical outcomes (like, air pollution and visual disorder), municipal financial constraints, and shortcomings in Article 100 commissions. This conceptual and methodological gap precisely forms the point of departure for the present discussion.

The findings indicate that the main challenge in the Iranian context lies not merely in the “existence of laws” but in the “execution, monitoring, and systematic interaction of urban governance components.” As domestic literature notes, the hazardous reliance of municipalities on unstable density-based revenues (Pazouki, 2024; Samati & Bakhshayesh, 2012), structural deficiencies in judicial and oversight systems (Ebrahimi & Ganji, 2022; Sharj-Shirifi et al., 2022), and institutional–technical weaknesses (Dalvand et al., 2022) are the three principal axes weakening control. This study shows that these factors operate in a self-reinforcing vicious cycle: the dominance of short-term financial logic (urban economy) weakens legal and technical governance (laws and oversight), resulting in uneven physical development and environmental degradation (urban form and landscape), which in turn erodes social security and sense of belonging (security and attachment) and compromises building quality and safety, ultimately impairing quality of life.

These findings align with Malik et al. (2024), who identify limited enforcement capacity and weak follow-up as key obstacles, and extend the social dimensions highlighted by Estoque & Wu (2024) and Becerik-Gerber et al. (2022) regarding the impact of

the built environment on human experiences in the complex context of Tehran. The study’s primary innovation lies in proposing a three-dimensional corrective model derived from this comparative analysis, bridging domestic and international research traditions. First, the “conversion of regulations into performance-based tools” aligns with Li & Fan (2025), who emphasized quantifying the relationship between physical elements and urban life perception. Second, the “creation of a digital institutional architecture (single-window system)” directly addresses centralization, lack of transparency, and inefficiency gaps highlighted in domestic studies (for example, Hosseinpour et al., 2023), mitigating informational asymmetries and regulatory evasion. Third, “defining standardized operational indicators” allows continuous measurement and causal analysis, linking global evidence on multidimensional assessment (Răducan, 2025) with domestic needs for functional performance monitoring.

Methodologically, the integration of advanced qualitative and quantitative approaches (including SEM and system dynamics) not only enables testing of the complex conceptual model but also moves beyond domestic studies that primarily rely on descriptive or correlational analyses. Finally, the emphasis on “simultaneous reform of economic, regulatory, and participatory dimensions” and the proposal of a phased pilot implementation to evaluate cost–benefit effects demonstrates a transition from descriptive analysis to the design of actionable, testable strategies. This approach simultaneously addresses gaps between theory and practice, as well as between international literature and local challenges, proposing a framework to transform construction control from rigid regulations into a dynamic tool for improving urban quality of life in Iranian megacities.

### 7.1. Conclusion and recommendations

The results of this study can be summarized around a central, testable proposition: construction control in District 3 of Tehran Municipality (generalizable to other Iranian cities) is neither a singular technical issue nor solely a legal deficiency. Instead, it represents a systemic bottleneck arising from the convergence of three overlapping causal components: gaps in governance and transparency, inadequate technical and regulatory enforcement, and financial incentives that drive land speculation and density trading. The

operational findings, derived from in-depth expert interviews, triangulation of documents and field observations, and network analysis of codes, indicate that these three dimensions mutually reinforce each other, resulting in physical disorder, environmental degradation, weakened social capital, and decreased quality of life. Hence, piecemeal or single-axis interventions (Like intensified field inspections or legal amendments) are insufficient to break this vicious cycle.

From a theoretical standpoint, these results align with contemporary socio-technical perspectives, which view control mechanisms as networks of rules, capacities, and technologies, each capable of playing causal, mediating, or moderating roles. The findings reveal that, in the Iranian–Tehranian context, the relative roles and correlation strengths, despite overlapping with international studies, generate unique inefficiencies that cannot be resolved through mechanical transfer of external experiences.

## 7.2. Policy implications

The study suggests that partial or one-dimensional solutions cannot break the cycle. At the macro level, three reform axes are essential:

1. Governance architecture transformation: Establishment of a multi-level decision-making system emphasizing information transparency and social accountability.
2. Technical supervision re-engineering: Shift from administrative control to performance-based, risk- and output-oriented monitoring.
3. Economic incentive adjustment: Replacement of unstable municipal revenue sources with sustainable and equitable financial tools.

At the operational level, implementation of a “digital single-window” to integrate permit issuance and supervision, defining quantitative performance indicators (Like open-space-to-population ratio, surface permeability index), and deploying mandatory risk-based inspections are recommended.

## 7.3. Research limitations

This study faced limitations, including a focus on District 3 of Tehran and incomplete access to municipal financial data. Despite triangulation methods, some hidden dimensions of governance could not be deeply examined due to field constraints.

## 7.4. Future research directions

- Expansion of study areas: extending the research to medium- and small-sized cities to test the transferability of findings.
- Mixed-methods experimentation: incorporation of randomized field trials at neighborhood levels combined with system dynamics analyses.
- Predictive modeling: use of long-term spatial data to simulate the impacts of density trading on infrastructure and housing markets.
- Exploration of emerging dimensions: investigation of the role of emerging technologies (AI, IoT) in transforming regulatory systems.

## 7.5. Recommended implementation framework

### Short-term:

- GIS-based monitoring of construction violations.
- Design and deployment of macro-level performance indicators for safety and construction quality.
- Launch of a citizen participation platform for public reporting.

### Medium-term:

- Pilot implementation of “data-driven governance” in one urban district using stepped-wedge design.
- Adoption and enforcement of mandatory energy sustainability standards in new buildings.
- Creation of neighborhood development funds to allocate density revenues purposefully.

### Long-term:

- Transformation of municipal revenue structures via land value taxation.
- Establishment of a comprehensive building rating system based on sustainability indicators.
- Institutionalization of participatory governance through a Supreme Urban Development Council.

This proposed framework, integrating technical, institutional, and economic strategies, provides a pathway for structural reform of the construction control system and the enhancement of urban quality of life. Successful implementation requires strong commitment from governing institutions, capacity building, and active stakeholder participation.

### Author contributions

First author: 85% – conceptualization, methodology, data collection and analysis (interviews and transcription), and drafting. Second author: 15% – review and final editing.

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## Conflict of Interest

The authors declare no conflicts of interest related to authorship or publication of this article.

## EndNotes

<sup>i</sup> All documented quotations in the final report have been presented anonymously, maintaining strict confidentiality. The raw audio recordings and transcripts have been stored in encrypted folders with restricted access, and any identifying information has been removed or slightly modified in the published texts to preserve meaning while preventing recognition of participants. Ethical considerations included obtaining informed consent, either written or verbal, clearly communicating the research objectives, ensuring anonymity, and providing participants the option to withdraw from the study at any stage.

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